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Foxground and Berry bypass

Princes Highway upgrade

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Technical paper: Aboriginal heritage

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Foxground and Berry bypass

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Executive summary

The Roads and Maritime Services (RMS) is seeking approval under Part 3A of the *Environmental Planning and Assessment Act 1979* for the upgrade of 11.6 kilometres of the Princes Highway between Toolijooa Road north of Foxground and Schofields Lane south of Berry, in New South Wales (NSW) (the project), to achieve a four lane divided highway (two lanes in each direction) with median separation. The project includes bypasses of Foxground and Berry.

This report presents the results of a program of archaeological survey and subsurface testing undertaken by Navin Officer Heritage Consultants (NOHC) for the project. In order to minimise the potential for vandalism to sites, some locational information has been removed from this unrestricted public release version of the report.

Wherever possible, test pits were situated within the anticipated construction 'footprint' - the area that would be subject to direct impact from the project. Test pits were arranged in straight line transects, which in most cases were aligned according to the confines of the development footprint and therefore in parallel to the project and/or the existing highway.

The project is being conducted under the provisions of Part 3A of the *Environmental Planning and Assessment Act 1979*.

Results of data research and the field survey program

Data review and field survey identified twenty nine Aboriginal heritage items within the project area. These comprised two lithic artefact occurrences (G2B A3 and G2B A38), twenty three potential archaeologically sensitive areas [PASAs] (PASA12-29 and PASA 40-44), and four non-archaeological recordings of places of Aboriginal cultural heritage significance.

The non-archaeological recordings comprise: three places relating to historical events or occupation - The '*Little Mountain'* or '*Dicky Wood's Meadow*' battle ground (G2B A13) and Aboriginal Encampments at '*Brookside*' (Broughton Village) (G2B A14) and Berry (G2B A39), and one cultural landscape, the Toolijooa Ridge Aboriginal cultural landscape.

Two generalised Aboriginal cultural heritage values are recognised; large and old growth fig trees, and Aboriginal burial sites. Twelve large or old growth fig trees have been identified in or near to the project area (MFT12 – 23).

Results of the subsurface testing program

Twenty one PASAs were selected for archaeological testing across the project area. These were: PASA12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 40, 41, 42, 43 and 44.

Eighteen of the 21 PASAs subject to testing were determined to contain archaeological deposits.

Two hundred and ninety eight archaeological test pits were excavated in the twenty one PASAs in the project area.

Two hundred and thirty six lithic artefacts were recovered from 19 PASAs and 92 test pits.

The lithic assemblage is classifiable into twenty seven distinct types and seven raw materials.

The lithic assemblage is dominated by flakes (58 per cent), and flaked pieces (19.1 per cent).

Chert is the dominant raw material (71 per cent), followed by quartz (27 per cent), and minor occurrences of volcanic stone silcrete, chalcedony, mudstone, quartzite, sandstone, glass, ochre, and an unidentified sedimentary stone (<five per cent in total).

The assemblage shows internal differentiation between PASAs, with differences evident in artefact abundance, activities represented, vertical distribution of artefacts, and assemblage richness. The project assemblages show higher than average regional assemblage richness and raw material richness.

Three PASAs stand out as having higher than average richness: PASA 25, 27 and 29, while four have lower than average richness: 13, 16, 23 and 28.

PASA 12 has a large and diverse assemblage with abundant subsurface material. Flake manufacture and retouching also appear to be well represented at this location even though the site is not especially rich in comparison to other PASA in the study. These factors make PASA 12 probably the most important location identified in the subsurface testing program.

The assemblage is quite fragmented, with more than half the assemblage broken, and more than half of these by excessive heat. The assemblage nevertheless retains high identifiability and contributes to understanding regional stone procurement, stone artefact manufacture and other behaviours of regional significance such as implement manufacture and reduction.

The assemblages are all small despite their high regional richness, and this may detract from their overall significance.

Twenty-three Aboriginal sites have been identified across the 19 PASAs that were found to contain archaeological deposits relating to Aboriginal occupation. The identified sites are: G2B A15, G2B A16, G2B A17, G2B A18, G2B A19, G2B A20, G2B A21, G2B A22, G2B A23, G2B A24, G2B A25, G2B A26, G2B A27, G2B A28, G2B A29, G2B A30, G2B A31, G2B A32, G2B A33, G2B A34, G2B A35, G2B A36 and G2B A37.

Subsequent to the drafting, review and finalisation of the test excavation program, a proposal to change access infrastructure in the area just south of Broughton Village was added to the project. A consequence of this would be construction impact to a locally elevated spurline crest adjacent to Broughton Creek. Based on the results of the test excavation program and the subsequently revised predictive site location model, this landform can be classed as archaeological sensitive with a predicted moderate or high archaeological potential. This area has been identified as a potential archaeological deposit (G2B PAD1).

The main conclusions regarding trends in site location are as follows:

- Higher artefact incidence and/or assemblage richness tends to coincide with major spurlines and low gradient basal slopes above, and set back from, the valley floor.
- The valley floors, and in particular the alluvial flats, are generally characterised by intermittent and low incidences of artefacts.
- Micro-topographic features such as locally elevated terraces and creek banks, within the broader valley floor context, tend to contain a higher incidence of artefacts.
- The ridgeline crests and saddles tend to be characterised by intermittent and low incidences of artefacts, with higher incidences occurring in association with features such as low gradient knoll crests and break of slope interfaces.

Development impact and potential mitigation strategies

Of the 42 Aboriginal heritage recordings, (two surface artefact occurrences, 23 subsurface artefact occurrences (archaeological deposits), one potential archaeological deposit, twelve fig trees, and four ethno-historical recordings), sixteen would not be impacted by the project, eighteen would be partially impacted, and eight fully impacted. Of those fully impacted, all consist of archaeological deposits, with the exception of one fig tree. Three of the four ethno-historical recordings would be partially impacted. In the cases of G2B A13 and G2B A14, impact is measured relative to the broadly defined areas within which those places may have been located. Only one of the twelve fig trees would be impacted by the project.

The project would directly impact (either partially or fully) the confirmed location of 21 subsurface artefact occurrences. These are: G2B A15, G2B A16, G2B A17, G2B A18, G2B A19, G2B A21, G2B A22, G2B A23, G2B A24, G2B A25, G2B A26, G2B A27, G2B A28, G2B A29, G2B A30, G2B A31, G2B A32, G2B A33, G2B A34, G2B A35 and G2B A36.

One potential archaeological deposit (identified following the completion of the test excavation program) would be partially impacted (G2B PAD1).

The project would have direct, albeit partial impacts to three ethno-historical places. These are: G2B A13 and G2B A14 and the Toolijooa Ridge Aboriginal Cultural Landscape.

The potential avoidance of the above sites by the realignment of the preferred project route would be counterproductive given that in most cases the identified archaeological deposits extend either side of the construction footprint. A shifted alignment would simply impact the same archaeological resource within an adjacent area. A re-alignment would also move the preferred project alignment away from the disturbance corridor associated with the existing highway, which is paralleled closely by the project works.

It is considered a better proposal to focus the project disturbance as close as possible to the existing disturbance corridor than establish new corridors which would likely impact a more intact and less degraded archaeological resource.

Recommendations

The following recommendations have been prepared with input from the RMS and in certain instances are limited by RMS policy which excludes monitoring strategies.

These recommendations would be incorporated into the Statement of Commitments and included, as appropriate, within a project specific Construction Environmental Management Plan or relevant Heritage Sub Plan or equivalent.

<u>With regard to stakeholder consultation it is recommended that:</u>

1. Aboriginal stakeholders should continue to have the opportunity to actively participate in an on-going consultation program regarding the management of Aboriginal cultural heritage within the project area.

<u>With regard to archaeological sites it is recommended that:</u>

2. Avoid unnecessary impact to site G2B A32, G2B A20 and G2B A37. All of these sites are outside of the project area.

3. Avoid impact to site G2B A38, and the associated area of potential archaeological deposit. This site is situated within a proposed ancillary area (refer also recommendation 23 b).

4. No further archaeological investigation is necessary at G2B A15, G2B A17, G2B A19, G2B 20, G2B 21, G2B A22, G2B A23, G2B 25, G2B 26, G2B 27, G2B 28, G2B 34, G2B A35 or G2B 37.

5. A program of salvage archaeological excavation should be completed at G2BA16, G2B A18, G2B A24, G2B A29, G2B A30, G2B A31, G2B A32, G2B A33, G2B 36 and G2B PAD1 prior to the conduct of construction related ground disturbance within the area of those sites. The aim of this program would be to realise the information potential of the deposits through the recovery and analysis of a larger sample of artefacts from each site.

6. Where an Aboriginal site, or portion thereof, is situated adjacent to, but outside of the zone of construction activity, temporary fencing should be erected between the zone of construction activity and the adjacent site area and/or archaeological deposit, with the aim of defining a 'no–go' area for vehicles, material storage or other actions likely to result in ground disturbance. This function may be realised by temporary and purpose specific fencing, or by standard fencing which may be erected to define the road easement and works area, regardless of heritage requirements. Temporary fencing should be removed at the cessation of construction activities. This recommendation is relevant to the following known Aboriginal sites: G2B A2, G2B A3, G2B A15, G2B A16, G2B 17, G2B A18, G2B A19, G2B A21, G2B A23, G2B 24, G2B 25, G2B A26, G2B A27, G2B A28, G2B A29, G2B A30, G2B A31, G2B 32, G2B A33, G2B A34, G2B A35, G2B A36 and G2B A38.

7. The protocols provided in Appendix M of this report should be adopted and followed in the event that construction related disturbance involves the unanticipated discovery of Aboriginal objects or suspected human remains.

<u>With regard to Aboriginal cultural values and Ethno-historical recordings, it is recommended that:</u>

8. A Heritage Interpretation Plan (HIP) should be developed, with the aim of identifying options for the promotion of the cultural values of the project area for current and future generations. The HIP should be drafted with the involvement of Aboriginal stakeholders, landowners and local Councils. Options may include interpretive signage, educational materials, and supporting local museum displays. In particular, the HIP should address the acknowledgement and promotion of Aboriginal cultural values associated with the Toolijooa Ridge Aboriginal cultural landscape, and the Dicky Wood's Meadow traditional battleground (G2B A13).

9. The RMS continue to liaise with Aboriginal stakeholders regarding the management and curation of all Aboriginal artefacts (Aboriginal objects) recovered or salvaged from the project, following the completion of any required description and analysis. Where possible a consensus or majority view should be determined. If and as necessary, an application for a Care Agreement may need to be approved by OEH where artefacts are to be held in the care of an individual or organisation. Alternatively, recovered artefacts may be re-buried on-site or deposited with the Australian Museum (Sydney) pursuant to section 88 of the *National Parks and Wildlife Act 1974*.

   The location of all reburied Aboriginal objects must be recorded on an OEH Aboriginal site recording form and submitted to the OEH.

10. In order to minimise and mitigate impacts to cultural landscape values, the following strategies should be conducted where feasible:

    a. Reduce the visual impact of the project through the planting and regeneration of vegetation.

    b. Minimise and mitigate impact to ecological values.

    c. The re-establishment of native vegetation should be a priority in areas requiring revegetation.

    d. The use of native plant species with Aboriginal cultural values should be encouraged in revegetation programs. Appropriate species can be identified through liaison with Aboriginal stakeholders.

    e. Incorporate or allow for the interpretation of cultural values, through the erection of signage, the adoption of Aboriginal nomenclature, or the inclusion of appropriately commissioned Aboriginal art or motifs.

    f. Provide opportunities and access for the conduct of Aboriginal ceremony.

11. The RMS provide an opportunity for the Aboriginal stakeholders to conduct ceremonial activities, where required, within the project area sections of the Toolijooa Ridge Aboriginal cultural landscape, and Dicky Wood's Meadow traditional battleground (G2B A13) prior to construction works

G2B A13 "Little Mountain" or "Dicky Wood's Meadow" battle ground

12. Where feasible, minimise disturbance to the natural soil profile of G2B A13 within the construction footprint. This would generally be achieved by constructing the proposed carriageway on an embankment, thus reducing the need to cut into the natural soil profile.

13. Prior to the conduct of construction works within G2B A13, archaeological salvage excavation should be conducted in all areas where it is anticipated that the natural soil profile would be impacted, such as from pier, abutment and swale construction. Consideration should be given to the use of remote sensing techniques as an initial stage of the salvage excavation program. This could assist in the selection of areas warranting detailed salvage methodologies.

G2B A14 Brookside (Broughton Village) Aboriginal Encampment

14. Where feasible, adopt a carriageway elevation and a construction methodology which minimises disturbance to the natural soil profile within the construction footprint, and which requires the construction of an embankment across the valley floor rather than the excavation and removal of the natural soil profile.

G2B A39 Historical Aboriginal encampments at Berry (G2B A39)

15. The proposed roundabout at the intersection of Woodhill Mountain Road and the current Princes Highway, should be designed and constructed in such a way that direct impact is limited to the area of the existing disturbance corridor around the intersection. This corridor is illustrated in Appendix I.

16. Temporary fencing should be erected between the zone of construction activity and the adjacent areas of G2B A39, with the aim of defining a 'no–go' area for vehicles, material storage or other actions likely to result in ground disturbance. This function may be realised by temporary and purpose specific fencing, or by standard fencing which may be erected to define the road easement and works area, regardless of heritage requirements. Temporary fencing should be removed at the cessation of construction activities.

Toolijooa Ridge Aboriginal Cultural Landscape (TRACL)

17. Where feasible, construct and finish the embankment and cutting faces in such a way as to minimise adverse visual impacts, and re-establish vegetation to reduce visual impacts and minimise disruption to wildlife corridor values.

With regard to the management of potential impact to mature fig trees it is recommended that:

18. Wherever feasible, direct impact to mature fig trees is avoided and the continued and sustainable health of near or adjacent trees is considered in the detailed design of the bypass.

19. In cases where direct impact to mature fig trees is unavoidable:

    a. Then, wherever feasible, trees with reduced health, condition or vigour are impacted in preference to examples displaying good condition, health and vigour.

    b. Establish a management and impact mitigation program in consultation with the Aboriginal Focus Group (AFG).

20. Consultation with Aboriginal stakeholder groups should be conducted with regard to all incidences of anticipated impact to mature fig trees. The objective of this consultation is to propose strategies for the management of the Aboriginal cultural values which may be effected by the impact. Some impact mitigation strategies previously suggested by Aboriginal stakeholders for consideration by the RMS include:

    a. Conducting a program of propagation (such as via semi-hardwood cuttings) for replanting within and outside of the development.

    b. Make available established cuttings to members of the local Aboriginal and non-Aboriginal community for use in private gardens and landholdings.

    c. Removal and transplantation of high or exceptional value trees, to a new secure location and providing necessary aftercare.

With regard to potential impact within ancillary areas it is recommended that:

21. The following selection criteria for the location of ancillary facilities should be adopted:

    a. Ancillary facilities to be located on sites that have a low likelihood of having Aboriginal significance and/or potential.

    b. Sites or areas of moderate to high Aboriginal significance and\or potential, including known sites, potential archaeologically sensitive areas and areas of Aboriginal cultural significance, are not to be used for ancillary facilities except where the impact is authorised and managed by a relevant approval or an approved Heritage Management Plan.

22. In all cases, direct impact to areas of predicted archaeological potential should be avoided where feasible. This could be achieved by:

    a. Fencing off and excluding these areas from ancillary functions and use.

    b. Avoiding disturbance to the natural soil profile, by overlaying the area with a temporary protective treatment and barrier (such as a geotextile), followed by a layer of hard stand gravels, all of which would be removed after construction and during rehabilitation.

       The design and deployment of this strategy should seek to address recently identified limitations of the technique in other RMS projects, and take into account the characteristics and possible refinements outlined in section 11.1.3

23. Where direct impact to areas of predicted archaeological potential cannot be avoided, it is recommended that:

    a. Those areas of potential which consist of an extension of a landform on which a confirmed archaeological deposits is situated, and which has been recommended for salvage excavation, should be the subject of a program of salvage excavation prior to impact. This applies to the proposed ancillary areas: east of Broughton Creek, the two areas west of Broughton Creek, the area southwest of Tindalls Lane, and on the south side of North Street.

    b. Those areas of greater than low predicted archaeological potential which are unrelated to adjacent confirmed archaeological deposits should be subject to a program of test excavation prior to direct impact, and any management strategies developed as a consequence of the results of the test program. This applies to the proposed ancillary areas: southwest of Toolijooa Road, (including site G2B A38), the ridgeline knoll in the southern area on Toolijooa Ridge, southwest of Austral Park Road, and south of Graham Park.

    c. Any required test excavation program should be conducted and completed as part of the detailed design stage of the project, and prior to construction. This would allow for a focused approach, in which testing can be limited to defined facility locations, and necessary revisions or mitigation actions can be proposed and enacted.

<u>With regard to the management of unanticipated finds it is recommended that:</u>

24. Conduct of the following strategies is recommended to address the potential for encountering unanticipated finds, including human remains:

    a. Basic recognition skills for Aboriginal artefacts and human remains should be included in all construction fieldwork induction programs.

    b. Adopt and conduct, when and as necessary, the protocols outlined in the RMS policy - Unexpected Finds Procedure, provided in Appendix M of this report.

<u>With regard to on-site staff training it is recommended that:</u>

25. An appropriate representative of the registered Aboriginal parties and a project archaeologist be invited to give a tool box talk to construction teams prior to construction. The purpose would be to make the construction teams aware of the cultural significance of Dicky Wood's Meadow, Brookside and Toolijooa Ridge. In particular, to be aware that if any bones are identified during construction, works must cease until they can be dealt with in accordance with the RMS' *Unexpected archaeological finds procedure*.

26. With regard to any anticipated works (including mitigation actions such as revegetation and land rehabilitation) to be conducted outside of the currently defined project area, proposed easement boundaries, or ancillary areas, it is recommended that:

    a. An appropriate heritage assessment and impact mitigation process should be completed prior to any disturbance occurring. This process should be outlined within any Construction Environmental Management Plan or relevant Heritage Sub Plan or equivalent.

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1 Introduction

Roads and Maritime Services (RMS) propose to upgrade 11.6 kilometres of the Princes Highway between Toolijooa Road north of Foxground and Schofields Lane south of Berry, in New South Wales (NSW) (the project), to achieve a four lane divided highway (two lanes in each direction) with median separation. The project includes bypasses of Foxground and Berry.

The project would form part of the Princes Highway upgrade to four lanes from Waterfall to the Jervis Bay Road Junction, Falls Creek. The upgrade of the Princes Highway would improve road safety and traffic efficiency, including for freight, on the NSW south coast.

This working paper was commissioned by AECOM and presents an assessment of the potential environmental impacts on Aboriginal cultural heritage. It supplements the environmental assessment for the project as required under Part 3A of the *Environmental Planning and Assessment Act 1979*. The Aboriginal cultural heritage assessment included Aboriginal consultation, field survey and a program of archaeological subsurface testing.

1.1 Project description

The project comprises the following key features:

- Construction of a four lane divided highway (two lanes in each direction) with median separation (wire rope barriers or concrete barriers where space is constrained, such as at bridge locations).
- Bypasses of the Foxground bends and the Berry township.
- Construction of around 6.6 kilometres of new highway where the project deviates from the existing highway alignment at Toolijooa Ridge, the Foxground bends and the Berry township.
- Provision for the possible widening of the highway (if required in the future) to six lanes within the road corridor and, in some areas, construction of the road formation to accommodate future additional lanes where safety considerations, traffic disruption and sub-optimal construction practices are to be avoided.
- Grade-separated interchanges at:
  - Toolijooa Road.
  - Austral Park Road.
  - Tindalls Lane.
  - East of Berry at the existing Princes Highway, referred to as the northern interchange for Berry.
  - West of Berry at Kangaroo Valley Road, referred to as the southern interchange for Berry.
- A major cutting at Toolijooa Ridge (around 900 metres long and up to 26 metres deep).
- Six lanes (two lanes plus a climbing lane in each direction) through the cutting at Toolijooa Ridge for a distance of 1.5 kilometres.
- Four new highway bridges:
  - Broughton Creek bridge 1, a four span concrete structure around 170 metres in length and nine metres in height.
  - Broughton Creek bridge 2, a three span concrete structure around 75 metres in length and eight metres in height.
  - Broughton Creek bridge 3, a six span concrete structure around 190 metres long and 13 metres in height.

  - A bridge at Berry, an 18 span concrete structure around 600 metres long and up to 12 metres in height.
- Three highway overbridges:
  - Austral Park Road interchange, providing southbound access to the highway.
  - Tindalls Lane interchange, providing southbound access to and from the highway.
  - Southern interchange for Berry, providing connectivity over the highway for Kangaroo Valley Road along its existing alignment.
- Eight underpasses including roads, drainage structures and fauna underpasses:
  - Toolijooa Road interchange, linking Toolijooa Road to the existing highway and providing northbound access to the upgrade.
  - Property access and fauna underpass in the vicinity of Toolijooa Ridge at chainage 8400.
  - Dedicated fauna underpass in the vicinity of Toolijooa Ridge at chainage 8450.
  - Property access underpass between Toolijooa Ridge and Broughton Creek at chainage 9475.
  - Combined drainage and fauna underpass in the vicinity of Austral Park Road at chainage 12770.
  - Combined drainage and fauna underpass in the vicinity of Tindalls Lane at chainage 13320.
  - Dedicated fauna underpass in the vicinity of Tindalls Lane at chainage 13700.
  - Property access underpass between the Tindalls Lane interchange and the northern interchange for Berry in the vicinity of at chainage 15100.
- Modifications to local roads, including Toolijooa Road, Austral Park Road, Gembrook Road, Tindalls Lane, North Street, Queen Street, Kangaroo Valley Road, Hitchcocks Lane and Schofields Lane
- Diversion of Town Creek into Bundewallah Creek upstream of its confluence with Connollys Creek and to the north of the project at Berry.
- Modification to about 47 existing property accesses.
- Provision of a bus stop at Toolijooa Road and retention of the existing bus stop at Tindalls Lane.
- Dedicated u-turn facilities at Mullers Lane, the existing highway at the Austral Park Road interchange, the extension to Austral Park Road and Rawlings Lane.
- Roundabouts at the southern interchange for Berry and the Woodhill Mountain Road junction with the exiting Princes Highway.
- Two culs-de-sac on North Street and the western end of Victoria Street in Berry.
- Tie-in with the existing highway about 75 metres north of Toolijooa Road and about 440 metres south of Schofields Lane.
- Left in/left out only provisions for direct property accesses to the upgraded highway.
- Dedicated public space with shared pedestrian/cycle facilities along the southern side of the upgraded highway from the playing fields on North Street to Kangaroo Valley Road.
- Ancillary operational facilities, including permanent detention basins, stormwater treatment facilities and a permanent ancillary facility site for general road maintenance.

The project area and the key features of the project are shown in **Figure 1.1**.

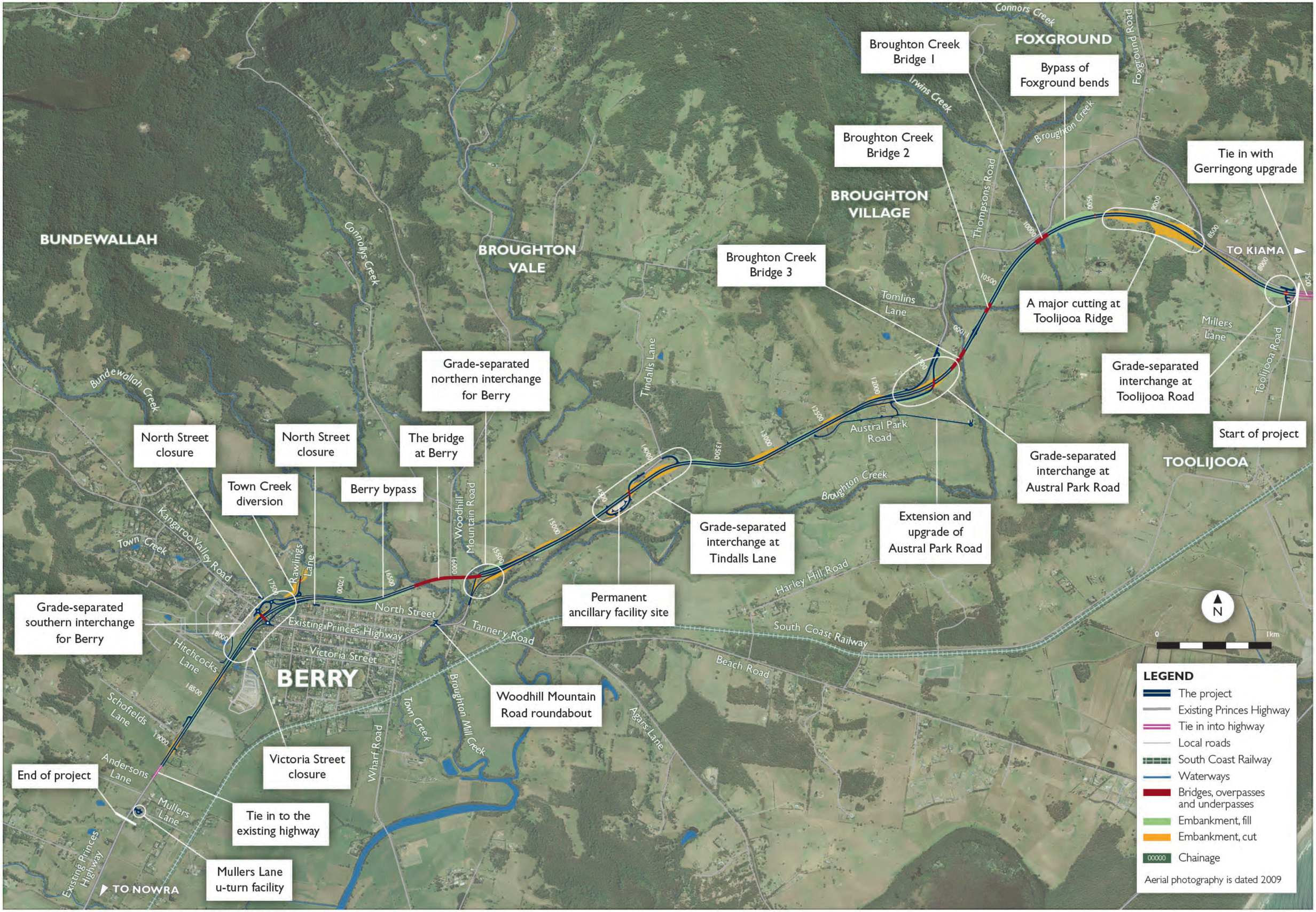

Figure 1-1: Foxground and Berry bypass project area

1.2 Background to assessment

Maunsell (now AECOM) was engaged by the RMS in December 2006 to carry out an Options and Route Selection Study, Concept Development and Environmental Assessment (EA) for the upgrading of the Princes Highway between 42.6 kilometres to 74.6 kilometres south of Wollongong.

The cultural heritage assessment program for the project includes two main assessment streams, a cultural assessment and an archaeological assessment, as specified by Department of Environment, Climate Change and Water (DECCW) (now the Office of Environment and Heritage (OEH)), and RMS policy.

The following cultural heritage assessments/studies and Aboriginal consultation have been conducted to date:

- *A preliminary Aboriginal and non-Aboriginal heritage assessment*

  This study involved literature and heritage database reviews; mapping of known sites; and provision of a predictive model for Aboriginal and historical heritage sites (Navin Officer Heritage Consultants (NOHC) 2007).

- *A preliminary landscape review*

  The review comprised: archaeological survey of limited ground surface exposures (most of which occurred within the existing road reserve), and a predictive assessment of subsurface archaeological potential (NOHC 2008).

- *An oral history of non-Aboriginal residents along the upgrade route*

  This study involved: literature and heritage database reviews; interviews with local informants; and compilation of gathered information in an oral history (NOHC 2009a). Some informants had recollections of early Aboriginal residents.

- *An Aboriginal cultural values study*

  This study involved:

  - A series of Aboriginal Focus Group (AFG) meetings conducted throughout the project components listed above (which would continue for the duration of the project).

- A series of meetings with (individual) Aboriginal stakeholders where they had an opportunity to provide relevant information regarding known cultural heritage values and places, issues, and potential constraints and opportunities concerning the route selection study and the project.
  - A site walkover which included visits to selected areas and some limited field survey. The site visit facilitated stakeholders in gaining an appreciation of potential cultural significance with regard to the short listed route options.
  - Compilation of this information in an Aboriginal cultural values report (NOHC 2009b).
  - Utilisation of this data, where applicable, in the formulation of the subsurface testing methodology.

- *A program of (Aboriginal) archaeological subsurface testing for the Gerringong upgrade*

  This study involved: excavation by machine of one hundred and thirty seven test pits within Potential Archaeologically Sensitive Areas (PASAs) 32-39 in the Gerringong upgrade; one hundred and forty six (146) stone artefacts were recovered from 42 pits and five PASAs (31-33, 37, 38 and 39), comprising 20 different assemblage elements (NOHC 2010, 2011a).

- *A program of Aboriginal archaeological salvage for the Gerringong upgrade*

  This study is ongoing and has to date involved: hand excavation of fifty eight 50 x 50 centimetre salvage pits and twenty one 200 x 200 centimetre salvage pits at sites A7 and A9; and machine excavation of fifty six test pits and five thirty metre salvage grader scrapes at site G2B A12 (PASA31), (NOHC 2011b in prep.).

- *Previous Aboriginal stakeholder consultation*

  The RMS has undertaken Aboriginal community consultation and investigation consistent with the *Interim Guidelines for Aboriginal Community Consultation* (Department of Environment and Conservation (DEC) 2005) and the RMS *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI, June 2008) for prior Gerringong to Bomaderry Princes Highway upgrade project components.

  For the Foxground and Berry bypass project, the RMS has undertaken Aboriginal community consultation and investigation consistent with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

  A list of registered Aboriginal stakeholders is provided in **Appendix A**.

  In addition to the consultation conducted for the Aboriginal cultural values study the RMS has conducted 13 Aboriginal Focus Group (AFG) meetings to date.

  A bus trip and field inspection was conducted in June 2009 with nominated representatives from the AFG, as appointed by the AFG, to visit and review areas where investigative works are proposed.

  The aim of the bus trip was specifically to discuss and provide feedback on a previous draft of this proposed methodology (written for a Gerringong to Bomaderry project area). This trip was undertaken after registered stakeholders had been provided with a copy of the previous draft and allowed time to review the methodology.

  As a result of comments received from attendees of the June 2009 bus trip, three additional archaeological test locations were added to the proposed test excavation program (PASA40, 41 and 44), two of these occur within the project area (PASA40 and 41). Written responses to the previous draft were received from:

  - Jason Davison.
  - Gwenda Jarrett (Yunimyna Industries and Logistics).
  - Sharralyn Robinson (Illawarra Local Aboriginal Land Council).
  - Aaron Broad and John Padgett (Illawarra Local Aboriginal Land Council).
  - Graham Conolly (Jerrinja Consultants Pty Limited).
  - Adell Hyslop (Nowra Local Aboriginal Land Council).

  These responses were addressed and presented in the Gerringong upgrade methodology (November 2009) which formed part of the Aboriginal Heritage Impact Permit application for that project. Apart from differences in the location of testing, and an increased test pit interval of 50 metres in some contexts, the methodology conducted for this test program is the same as the previously approved Gerringong upgrade test methodology.

- *Aboriginal stakeholder consultation regarding the methodology followed for this program*
  With the exception of a longer test pit interval of 50 metres in some circumstances, the methodology followed for this test program is consistent with approved by the Aboriginal stakeholders for the Princes Highway Gerringong upgrade test excavation program.

  A copy of the proposed methodology was posted to all registered Aboriginal stakeholders by the RMS on the 8 July 2011 with an invitation to provide a written response by the 5 August 2011. By the end of this period, no written responses from stakeholders had been received by either the RMS or NOHC.

  An AFG was duly convened and held by the RMS on the 14 July 2011, at the Gerringong Town Hall. Invitations to attend the AFG were circulated to all registered stakeholders. An agenda item discussed at this meeting was: (5) Comments on the draft test excavation methodology for the project.

  A brief outline of the methodology was presented at the AFG. The following issues were raised in subsequent discussion:

  - The advantages and disadvantages of machine excavation:
    - One speaker favoured the use of by-hand excavation, others supported the machine methodology.
    - The reasons for the use of machine excavation were outlined (namely the stage one (test excavation) status of the program, and the ability to maximise the number and spread of test pits within a limited period of time and using finite resources.
    - It was also pointed out that the methodology included a by-hand excavation contingency in the event that high value archaeological features are encountered.
  - Test pit sampling intervals:
    - The variable 50 and 20 metre test pit frequency was explained, and it was noted that valley floor traverses across areas related to ethno-historical information retained a 20 metre test interval.
    - The limitations of any sampling frequency were discussed, especially in relation to burial remains.
    - It was noted that the testing regime proposed could not adequately test for burials (i.e. even though no burials may be encountered in the test pits this would not mean that burials are not present within the tested deposit).
    - It was concluded that management of the risk of encountering burials would be one of the subjects of the conclusions of the test excavation report.
  - The role and origin of the nineteenth century ‘meadows’ with regard to Aboriginal site location in the Southern Illawarra, and how the predictive model accommodates this variable.
    - It was noted that there was little archaeological information about the potential role of the ‘meadows’ (natural clearings in the coastal plain forests, probably related to intermittent wetlands) in local patterns of traditional Aboriginal occupation. Some of the selected PASA locations reflect this possible relationship. One speaker suggested that the meadows were the result of Aboriginal burning practices.

  The minutes note that the AFG was in agreement with the extent, frequency and location of the test excavation methodology.

- Participation of Aboriginal stakeholders in fieldwork program

  Aboriginal stakeholders have been involved in all of the archaeological subsurface testing and salvage programs conducted to date for the upgrade of the Princes Highway between Mount Pleasant ridge and Bomaderry (NOHC 2010, NOHC 2011 in prep).

  A team of field workers, selected by the RMS from nominated stakeholder applications, participated in the current test excavation program for the project. The names of those who took part are acknowledged in section 2.6 below.

1.3 Legislative approval and requirements

The project is being assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*. The Director General's requirements (DGRs) for the project were issued on 11 February 2011 by the Department of Planning and Infrastructure (DP&I) and must be addressed in the environmental assessment. The DGRs relevant to Aboriginal cultural heritage are provided in **Table 1-1** and are addressed in this report.

Table 1-1: DGRs for Aboriginal cultural heritage

Director-General's requirements
The environmental assessment must include an assessment of Aboriginal Heritage – including but not limited to:
• An assessment of the project on Aboriginal cultural heritage consistent with the draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, July 2005), specifically considering artefacts, potential archaeological deposits and landscape cultural values. The EA must demonstrate effective consultation with indigenous stakeholders during the assessment and in developing mitigation options (including the final recommended measures). The EA must describe the actions that will be taken to avoid, mitigate or offset impacts.

1.4 Report outline

This report:

- Provides an outline of consultation with local Aboriginal organisations carried out in the course of the cultural heritage assessments.
- Describes the environmental setting of the project area.
- Provides a background of local and regional archaeology and history for the project area.
- Describes the results of field survey.
- The archaeological subsurface testing program.
- Provides mitigation measures based on the results of the investigation and the anticipated impacts of the project on Aboriginal cultural heritage.

1.5 Copyright

Copyright to this report rests with RMS except for the following:

- The Navin Officer Heritage Consultants logo and business name (copyright to this rests with NOHC).
- Generic content and formatting which is not specific to this project or its results (copyright to this material rests with NOHC).
- Descriptive text and data relating to Aboriginal objects which must, by law, be provided to DECCW for its purposes and use.
- Information which, under Australian law, can be identified as belonging to Indigenous intellectual property.
- Content which was sourced from and remains part of the public domain.

1.6 Restricted information

None of the information provided by Aboriginal stakeholders and presented in this report has been specifically identified as requiring access restrictions due to its cultural sensitivity.

Information relating to the exact location of Aboriginal archaeological sites has been removed from the general release version of this report in order to minimise the potential for vandalism to sites. A restricted release version of this report has also been produced in which all locational information is included. A note has been inserted into the text to identify all instances where information has been removed.

1.7 Confidentiality

No information in this report has been classified as confidential.

2 Study methodology

2.1 Literature and database review

A range of archaeological and historical data was reviewed for the project area and its surrounds. This literature and data review was used to determine if known Aboriginal sites were located within the area under investigation, to facilitate site prediction on the basis of known regional and local site patterns, and to place the area within an archaeological and heritage management context. The review of documentary sources included heritage registers and schedules, local histories and maps, and archaeological reports.

Aboriginal literature sources included the Aboriginal Heritage Information Management System (AHIMS) maintained by the OEH, associated files and catalogue of archaeological reports and theses held in the library of the School of Archaeology and Anthropology, the Australian National University.

Searches were undertaken of the following heritage registers and schedules:

- Aboriginal Heritage Information Management System (AHIMS) (NSW OEH).
- World Heritage List.
- The National Heritage List (Australian Heritage Council).
- The Commonwealth Heritage List (Australian Heritage Council).
- Section 170 Heritage and Conservation Register(s) compiled by the RMS.
- Heritage Schedule(s) from the Shoalhaven and Kiama Local Environmental Plans.

2.2 Consultation with statutory authorities

Community and stakeholder engagement for this project commenced in March 2006, during the route option development process for the Princes Highway upgrade from Gerringong to Bomaderry. Following the announcement of the preferred route in June 2009, community consultation for the project has included meetings with government agencies including NSW OEH, DP&I, and the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) (which incorporates the Department of Primary Industries (DPI), the NSW Office of Water (NOW) and Southern Rivers Catchment Management Authority (CMA)).

In April 2010, the OEH published the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010). These replaced the *Interim Guidelines for Aboriginal Community Consultation* (DEC, 2005). In consultation with OEH, RMS transitioned to and has substantially complied with the 2010 guidelines since their commencement.

Throughout the life of the project, RMS has notified a variety of organisations about the project including and specifically, the Planning and Aboriginal heritage section of OEH. Invitations have been extended to OEH for a representative to attend each of the AFG Meetings conducted to date for the FBB project.

2.3 Field survey and project area

The area subject to survey and assessment (the project area) consisted of the study corridor of the preferred project alignment (**Figure 1-1**), and the additional area of investigation, declared by the RMS in August 2011, for the refinement of the project alignment north of Berry (**Figure 2-1**).

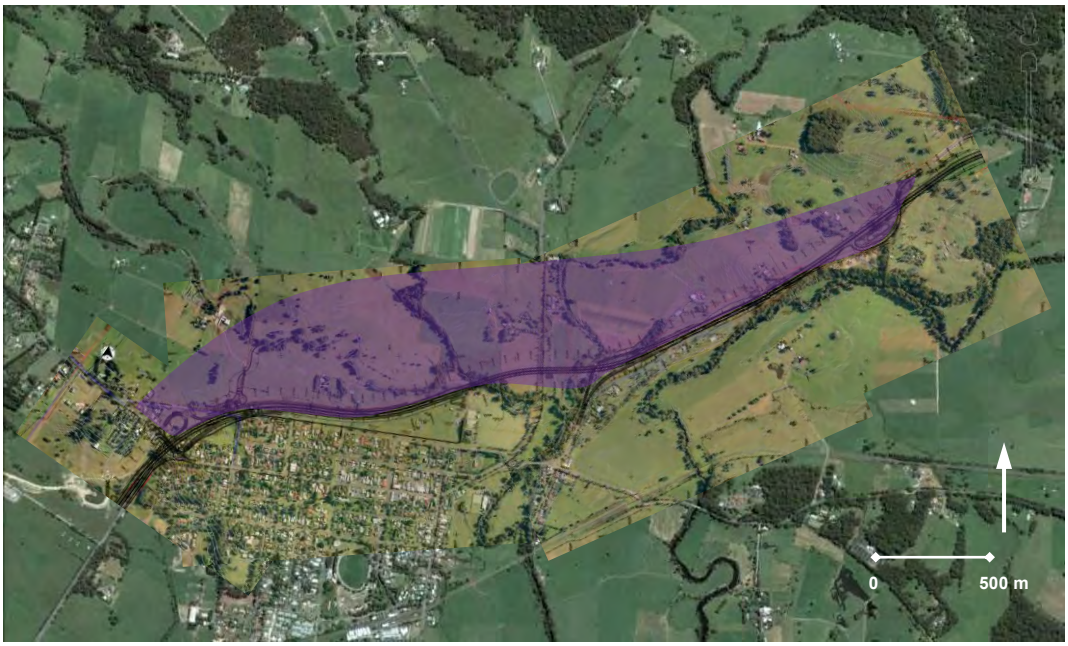

Figure 2-1: Location of additional area of investigation and assessment declared by RMS in August 2011 for the refinement of the project alignment north of Berry (Base image from Google Earth Pro 2012 (image date 30/1/2006)

Field survey was conducted over a period of two months (February to April 2009) in multiple survey events across the Gerringong to Bomaderry Princes Highway upgrade area according to property access availability and local weather conditions. Field survey of the project area to refine the Berry bypass preferred option was conducted in the context of the archaeological subsurface testing program (August 2011).

Survey of a proposed ancillary area at the eastern end of the project was conducted in March of 2012 as part of a separate assessment for the neighbouring Gerringong upgrade portion of the Princes Highway (NOHC 2012). The results of this assessment, where relevant to the FBB project area, have been incorporated into this report.

Survey involved inspection both on foot and via vehicle, depending on property access and ground visibility constraints. The field assessment involved the detection of any surface archaeological material, and an assessment of the potential for subsurface archaeological material. Further detail on survey coverage and visibility is provided in **Section 6.3**.

Site recording parameters are provided in **Appendix B**.

2.4 Subsurface testing program

2.4.1 Rationale for subsurface testing program

The preliminary landscape review, which included some archaeological survey, found that ground surface exposures across the project area were very limited in both area and occurrence, and could not provide a reliable basis for the identification and assessment of the likely archaeological resource. As a consequence, a program of subsurface archaeological investigation was required to test and assess potentially occurring archaeological deposits.

2.4.2 Potential archaeologically sensitive areas (PASA)

A review of previous archaeological assessments across the southern Illawarra coastal plain found that the conduct of subsurface testing programs as part of environmental assessments has not been consistent across the landforms within the plain. Most excavations have been conducted in rock shelters or within sand bodies along coastal and estuarine margins, and little information existed for the hinterland and basal slopes adjacent to the escarpment. The limited data reported from an archaeological testing program conducted for the Eastern Gas Pipeline is a notable exception.

A predictive model was constructed for the project area based on the limited corpus of subsurface results, combined with surface site data, and community and ethno-historic information (refer **Section 5.4**).

The model predicted that zones of archaeological sensitivity would be associated with riparian corridors, the elevated margins of wetlands and the valley floor, and the crests of major ridges and spurs. There are many unknowns associated with the model, especially the effect of formerly dense rainforest vegetation on the location, formation and preservation of Aboriginal occupation sites, and similarly, the intensity of occupation, and how this may affect the density and distribution of archaeological material.

Using the predictive model as a basis, archaeologically sensitive landforms were identified within the project area. These have been termed PASA. The use of this term is deliberately distinct from potential archaeological deposit (PAD). In the context of the present investigation, the identification of a PASA is more tentative, and based on a less tested regional model, than for a PAD.

The implications of the results of the Gerringong upgrade testing program (NOHC 2011a) have been considered in the current testing program, and where appropriate, the scope of proposed testing has been modified accordingly.

2.4.3 PASA selection parameters

The identification of PASAs has been based on:

- The predictive model - developed in the route options assessment stage of the project, and refined as a result of the Gerringong upgrade test excavation results.
- Ethno-historical information.
- A review of landscape characteristics relative to known archaeological site patterning and landscape disturbance.
- Locations suggested by local Aboriginal community representatives.

2.4.4 Locations for archaeological subsurface testing

Forty four PASAs have been identified across the whole length of the Princes Highway between Gerringong and Bomaderry (PASAs 1-29 and 31-44). Twenty three of these PASAs occur within the project area. (Appendix C). Some of these areas share defining landscape characteristics with previously tested PASAs in the Gerringong upgrade investigation.

An initial proposition of the archaeological test excavation program for the Princes Highway program was that the testing of the PASAs could be based on representative samples. This would have meant that PASAs in similar landscape contexts were grouped together and the test results from one of the areas could be used to assess the group as a whole. There are a number of factors which largely reduced the value of this approach for the project:

- Many of the PASAs incorporate the potential for archaeological remains based on ethno-historical information, such as the reported battle ground at 'Dicky Wood's Meadow'. Despite the fact that some of the PASAs in this category include landform contexts which are repeated, and/or have already been tested in the Gerringong upgrade test program, the potential for historic period Aboriginal occupation, and/or burials provided a strong basis for conducting a comprehensive rather than sample-based approach to testing.
- The OEH expressed a desire for the test program to be inclusive across the project areas. This allowed for the application of Aboriginal Heritage Impact Permits across the whole construction footprint of the development (when not subject to a Part 3A assessment), and also gave greater certainty in the development of impact mitigation programs.
- Some of the PASAs with shared and repeated landform characteristics were specifically selected by Aboriginal stakeholders for archaeological testing.

The results of the Gerringong upgrade test excavation program have been applied in the current methodology by increasing the testing interval from 20 metres to 50 metres across the valley floor deposits in PASAs 12 and 13. An exception to this was PASAs 20 to 27, where the valley floor occurred within the potential area of interest related to the Dicky Wood's Meadow battle ground.

Two PASAs were excluded from the test program owing to the fact that anticipated construction impact would avoid the PASA, or impact would only occur within already substantially disturbed deposits (such as from previous highway upgrade works). These are PASAs 17 and 19.

An additional area for the investigation of a bypass alignment north of Berry was proposed by the RMS during the course of the subsurface testing program (refer **Figure 2-1**). This resulted in the identification of two new PASAs (43 and 44) and the extension of three PASAs (12, 13 and 41) to cover additional areas of archaeological sensitivity within the alternative bypass alignment options.

Taking into account the above considerations, twenty one PASAs were selected for archaeological testing across the project area. These are PASA12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 40, 41, 42, 43 and 44.

It should be noted that, due to the continuity of the landforms involved, nine of the PASAs are grouped as follows, and were tested as continuous areas:

- PASA12/13.
- PASA21/22/23/24.
- PASA 25/26/27.

One of the PASAs within the project area (PASA42) is associated with nearby recorded surface Aboriginal artefacts (G2B A3).

2.4.5 Number and arrangement of test pits

Wherever possible, test pits were situated within the anticipated 'footprint' (area subject to direct impact) associated with the project.

Test pits were arranged in straight line transects, which in most cases were aligned according to the confines of the development footprint. This meant, that in most cases transects were positioned approximately along the proposed bypass centreline, or parallel to it, depending on ground disturbance and micro-topographic variables. In test areas away from the bypass alignment (such as in the additional investigation area north of Berry), transects were aligned strategically to sample both high potential micro-topographic features and broad area cross sections.

The distance between test pits was either 20 metres or 50 metres. The fifty metre interval was used at PASAs 12 and 13, based on the low rate of detecting artefacts along similar valley floor contexts in the Gerringong upgrade test excavation program. Regular test pit intervals were maintained except in the following circumstances:

- Where the avoidance of an erosional or other disturbance feature required a one-off larger or smaller interval.
- Where an on-site appreciation of landform and archaeological potential indicated that a larger or smaller interval was necessary.
- Within 60 metres of a drainage line – test pits were always placed at 20 metre intervals.

Where possible, within the confines of the footprint, transects were positioned according to an appreciation of natural micro-topographic characteristics, and any corresponding variation in archaeological potential. In this way transects were preferentially situated along spurline crests or creek banks.

Where a test pit fell within an area of:

- Large stone cobbles or tors (with maximum linear dimensions greater than 300 millimetres).
- Outcropping bedrock.
- Highly disturbed or eroded ground.
- Substantial vegetation (with stem diameter of 500 millimetres or greater).

The location of the test pit was amended to the nearest location which avoided the constraint/s listed above.

Test pit locations and transects for each selected PASA are shown in **Appendix D**.

Pit data and descriptions of soil profiles for each pit are provided in **Appendix E**.

The number of test pits conducted at each PASA is provided in **Table 2-1**.

Table 2-1: Number of test pits conducted at each PASA

PASA	No. of test pits
12	46
13	28
14	12
15	7
16	6
17	0
18	8
19	0
20	23
23 (incl. 21 and 22)	20
24	7
25	9
27 (incl. 26)	15
28	17
29	22
40	17
41	13
42	6
43	33
44	9
Total	**298**

2.4.6 Field methodology

Two excavation methodologies were implemented for the Aboriginal subsurface testing program:

- Mechanical test pit excavation using an excavator.
- By-hand test pit excavation.

The mechanical test pit methodology was followed for all test pit excavations with the provision that where there was evidence to indicate that the mechanical method should be suspended a by-hand excavation methodology would be adopted.

A by-hand methodology was followed in one area: pit 20 in PASA 20. This pit was located on a small knoll situated between two creek lines. The machine methodology was suspended in this case and a by-hand methodology was conducted as a result of this location, where access to this area by the excavator was not feasible.

Mechanically excavated test pits

The following excavation methodology was followed.

1. The required locations of mechanical excavation pits were marked out and recorded.

2. Turf was removed by excavator and the pit was excavated.

   Two hundred and ninety seven (297) pits were excavated by excavators using straight-edged toothless buckets. Two machines had 900 millimetre buckets; one machine had a 1000 millimetre bucket.

   The intended depth interval for each spit was 100 millimetres. In some cases, unforeseeable deposit characteristics, such as large cobbles or sudden changes in consistency, caused the excavated spit depth to vary. This is an unavoidable consequence of the machine methodology and in most cases, involved variation of 40 per cent or less (i.e. up to or less than 40 millimetres).

   Machine excavated pits had a final length of between one metre and three metres. The width of the pit generally corresponded to the width of the bucket plus up to 200 millimetres (depending on the width of any material systematically removed from the side of the pits (refer below). The final length of the test pit was dependent both upon the final depth achieved in the test pit, and the nature of the deposit.

   The following machine excavation sequence was followed (refer **Figure 2-2**):

   - Where necessary, top vegetation was removed by scraping the surface with the edge of the machine bucket.
   - Spit one was excavated along an interval ranging between 0.7 and 1.5 metres in length. A sample of spoil was removed from machine bucket for sieving, and the remaining spoil set aside.
   - Following the removal of spoil from the bucket, a 50-100 millimetre wide strip was removed from (normally) one or (sometimes) both sides of the pit and the spoil set aside in a ‘mixed provenance’ pile. This was done where the sediment was loose or friable. This pit modification was conducted to make the pit marginally wider than the bucket so that on the next spit excavation, the sides of the bucket did not contact the pit sides and dislodge material into the bucket from upper levels.
   - Following the removal of the machine bucket from each spit excavation, loose surface material or other sediment was removed either manually or using the mechanical bucket (depending on the risk of contamination from upper levels) prior to the commencement of the following spit excavation. This spoil was incorporated with the corresponding spit material unless it was considered that contamination from upper levels was likely, in which case it was set aside in the ‘mixed provenance’ pile.
   - Notable and representative areas of the base of the spit were manually cleaned with a hand trowel and inspected for stratigraphic and pedological characteristics.
   - Excavation of spit two (and all subsequent spits) began approximately 20-100 millimetres from the far end of the previous spit, this is done to create a 'clean' wall and to prevent contamination from loose sediments at the start of the pit. The bucket was tilted and drawn up and away from the near end of the pit to minimise the risk of contamination from previous spits. The removal of a strip from one or both sides of the pit was conducted as for spit one, as was the manual or mechanical clean-up of the base of the spit prior to the next spit excavation.

- Following spit two (and after all subsequent spits), the near end of the pit was extended by up to 300 millimetres in order to remove any fallen sediment from upper levels and to provide a 'clean' end point for the backhoe bucket.
- Following each spit excavation, a consistent sample of the excavated sediment was recovered for sieving. The size of the recovered sample, if necessary, varied according to the depth of the spit so that the volume was equivalent to the in situ deposit which was recovered from an excavation area of 1000 x 500 millimetres[1].

These varying sample sizes are shown in **Table 2-2** (below). In the case of a spit with the preferred depth interval of 100 millimetres, the sample size was 5.5 x 10 litre buckets.

The material for sieving was preferentially taken from the middle of the backhoe/excavator bucket, prior to the emptying of the bucket. This minimises the potential for contamination from sediments falling to lower levels from the pit sides. All material remaining in the bucket after recovery of the sample for sieving (if any) was set aside in a separate pile.

A larger sample for sieving was recovered from this separate pile, if an in-field assessment of results indicated that a larger sample would be beneficial.

All sieving was conducted with the aid of pressurised water from a water truck. All material was sieved through 4 x 4 millimetre mesh, with the use of a top 10 x 10 millimetres or larger mesh when required by the presence of large gravels.

All identified or suspected cultural material recovered from sieving was retained, bagged and labelled.

3. Following cessation of excavation, the face of one or both sides of the pit was cleaned and the stratigraphic and pedological characteristics of the soil profile described and checked with the separately documented incremental spit descriptions. The soil profile was photographed, and where appropriate, also drawn and measured.

4. Excavation ceased according to an on-site appreciation of the vertical distribution of the archaeological deposit or when one or more of the following were encountered:

   - Bedrock.
   - Massive clay substrate.
   - Large cobbles or gravels preventing further effective excavation.
   - The water table.
   - Material considered to pose a health or safety risk to field personnel.

[1] This sample volume has been determined over a number of field programs as the most effective in providing a consistent sample within the constraints of a backhoe/excavator methodology. These constraints include necessary pit dimensions to allow access and recovery at depths of potentially 1.5 metres or more, and to allow for the discard of contaminated materials. 55 litres of loose sediment represents about 50 litres of *in situ* sediment (allowing for 10 per cent expansion following excavation). 50 litres of *in situ* sediment represents an *in situ* volume of 50,000 cubic centimetres or 50 per cent of a 100 x 100 x 10 centimetre spit volume.

5. Where sterile sediment was reached (sterile in this context means the absence of artefactual material), and an assessment is made that further archaeological material was unlikely but that exploratory excavation into deeper deposits would aid geomorphological interpretation of the deposit, subsequent spits of variable depth were conducted without sieving of the spoil, and with basic recording only (this generally occurred only within massive clay substrate).

6. All pits were backfilled with the remaining excavated and sieved spoil. Topsoil was placed in the correct position. (All pits were backfilled at the end of each day, to avoid the potential danger to livestock or people).

Table 2-2: Sample size of sediment recovered from each spit relative to spit depth

Vertical Spit interval (cm)	No. of 10 litre buckets*	Loose volume (litres)	Equivalent *in situ* volume (litres)
2.5	1.4	13.7	12.5
5	2.8	27.5	25.0
7.5	4.1	41.2	37.5
10.0	**5.5**	**55.0**	**50.0**
12.5	6.9	68.7	62.5
15.0	8.3	82.5	75.0
17.5	9.4	94.0	85.5
20.0	11.0	110.0	100.0
22.5	12	120.0	108.0
25.0	13.3	133.3	120.0

**Multiply spit depth (cm) by 0.535 to get no. of required 10 litre buckets*

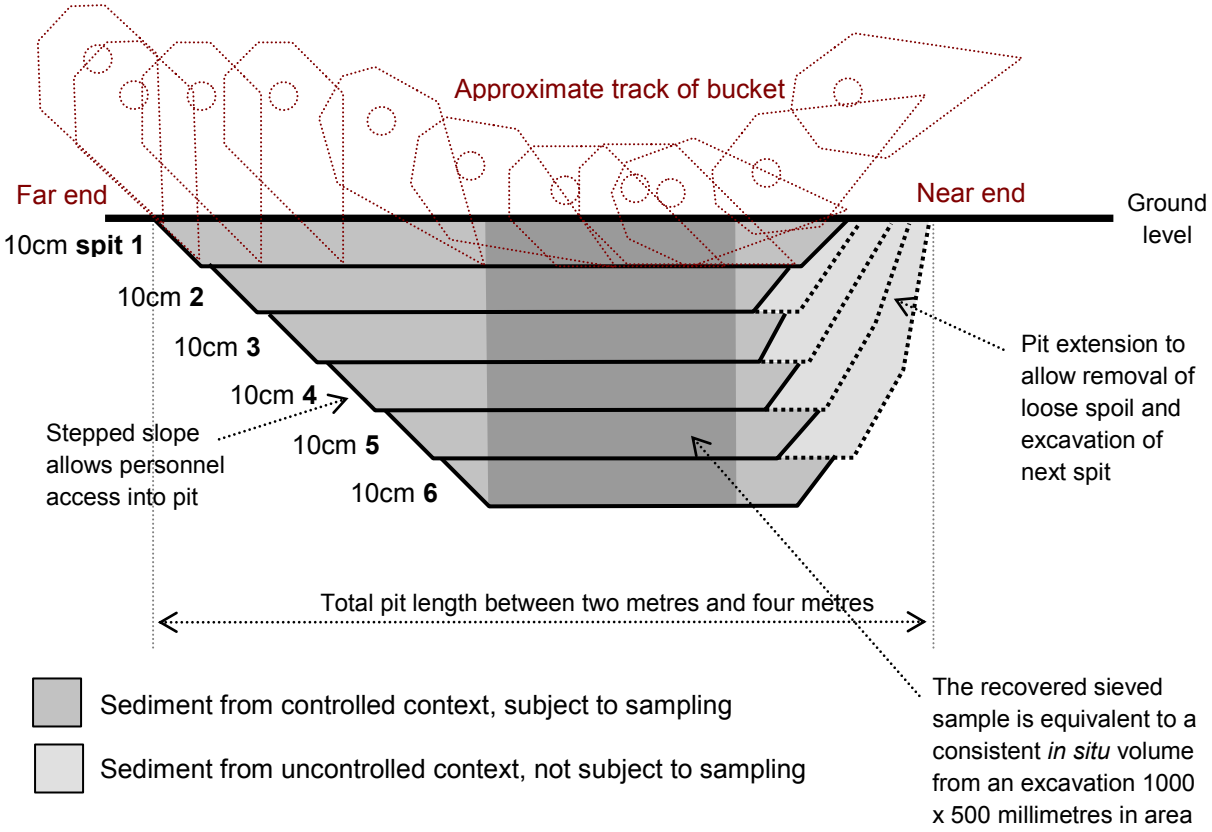

Figure 2-2: Indicative pit profile (not to scale) showing sampling methodology and sequence for mechanical pit excavation

Hand excavated test pits

One pit was excavated by hand (Pit #20 in PASA 20). Pit location was marked out and recorded. The size of the pit was 500 x 1000 millimetres. This size ensured that each hand dug spit sample (100 per cent of each spit was sieved), was equivalent to the machine dug spit samples (where only a sample of the spit spoil was sieved, equivalent to a 500 x 1000 millimetre area of the excavation).

The pit was excavated by shovel and trowel using standard by-hand archaeological methodologies including vertical and horizontal recording of spit levels and sedimentary, cultural and stratigraphic features. Spit intervals were 100 millimetres.

All excavated archaeological deposit was sieved with the aid of pressurised water from a water truck. All material was sieved through 4 x 4 millimetre mesh, with use of a top larger mesh (10 x 10 millimetres) where appropriate.

All identified or suspected cultural material recovered from sieving was retained, bagged and labelled.

The pit was backfilled with the remaining excavated and sieved spoil (following construction requirements).

2.4.7 Lithic analysis

Analysis of the recovered stone artefacts first involved the macroscopic inspection and classification of all stone artefacts into techno-typological classes. The approach to classification adopted here first orders artefacts resulting from conchoidal fracture into cores, flakes and retouched flakes. This scheme views these three categories as mutually exclusive, chronologically distinct stages in the reduction of stone materials (Clarkson and O'Connor 2005).

Cores are defined as artefacts possessing only negative conchoidal scars. Eight types of cores are identified in the classificatory scheme: single platform, multiplatform, bidirectional, bifacial, discoidal, faceted radial and uni- and multi-directional bipolar cores.

Flakes that have been spalled along their lateral margins are recorded as burinate cores as well as retouched flakes.

Flakes are defined as artefacts possessing one or more of the following fracture features: ring-crack, platform, eraillure scar, waves of force, or a clearly discernible ventral and dorsal surface. Flakes that remove old platform edges are termed 'redirecting flakes'.

Retouch is defined as any scar longer than two millimetres deriving from the lateral margins that were formed subsequent to the creation of the ventral surface. Scars less than two millimetres are classified as edge-damage.

Artefacts that clearly derived from conchoidal fracture but lacked the distinguishing features of flakes or cores listed above are recorded as flaked pieces.

Several categories describe artefacts at least partly manufactured by processes other than flaking, such as ground implements (edge ground axes), fabricators (hammerstones and anvils), and artefact fragments created by heat fracture (pot lids, flaked pieces, and fire-cracked rocks).

The completeness and cause of breakage (egg cone-split, transverse snap or heat fracture) is recorded for all artefacts and only those features present are recorded for broken fragments. Percussion length (or maximum length in the case of cores and flaked or non-flaked pieces) and weight are taken as an indication of size for all artefacts whether complete or broken.

A range of dimensions are also taken on complete flakes (proximal, medial and distal width, platform width and thickness, platform angle, the old platform angle on redirecting flakes etc.), and dimensions and fracture features are also recorded on remaining portions of flakes when appropriate. The amount, type and location of cortex is also recorded for each artefact.

Platform type (single or multiple conchoidal, focalised and single or focalised and multiple, cortical and crushed) and the presence/absence of platform preparation is recorded for cores and flakes. The length and width of the largest flake scar found on cores is also recorded. Termination types are recorded for all complete and distal sections of flakes.

The height and perimeter of retouch is recorded for retouched flakes and the degree of retouch is calculated using Kuhn's (1990) Geometric Index of Unifacial Reduction (GIUR) and Clarkson's (2002a) Index of Invasiveness (II). The mean edge angle and curvature of the retouched edge is also recorded for retouched flakes, as is the location and orientation of retouch (e.g. left distal, dorsal only etc.) (Clarkson 2002b).

For hammerstones and anvils, size, weight and location of pitted areas are recorded.

Several formal retouched and ground artefact forms are recognized. These conform to implement types commonly found in southeastern Australian assemblages. These are symmetric and asymmetric backed artefacts (i.e. Bondi points, geometric microliths and eloueras), ground edge hatchets and bifacial hatchet blanks, burins and burin spalls, burrens and various forms of retouched flakes traditionally called 'scrapers', but here referred to according to the location of retouch and the presence of notches (i.e. side, end, double side, double side and end, double side and double end, double end and notched). These typological categories are entirely morphologically defined according to retouch location and type, and no assumptions are made about artefact function. It is recognized that various types may form arbitrary divisions of morphological continuums or stages within a reduction sequence (Clarkson and O'Connor 2005).

Raw material type is recorded for each stone artefact, however, no attempt is made to identify varieties of stone beyond broad categories such as 'quartz' 'basalt', 'silcrete', 'chalcedony', 'chert' etc. Artefacts made from raw materials that were more difficult to identify were classified as either 'fine-grained-sedimentary' or 'fine-grained-volcanic' stone.

Attributes for each artefact in the assemblage are entered into a relational database (Lotus Approach) and digital photographs are taken of selected artefacts. Information for each specimen recorded in the analysis can be found in **Appendix F**. A glossary of the descriptive terms used is provided in **Appendix G**.

2.5 Map references

Unless stated otherwise, all map grid references presented in this report relate to Zone 56 of the Map Grid of Australia and have been generated using the WGS84 datum.

2.6 Project personnel

Field survey was conducted by archaeologists Kelvin Officer, Kerry Navin and Deirdre Lewis-Cook.

The subsurface testing program was directed by Kelvin Officer, Rebecca Parkes, Sam Harper and Nicola Hayes.

Field assistance was provided by Glenda Hyde, Phil Price, Jo Dibden, Carmen Sarjeant, Mirani Litster, Emily Cobbold, Alexis Schlegal, Samantha Keats, Rochelle Coxon (AECOM) and Luke Atkinson (AECOM).

Aboriginal field representatives are listed in **Table 2-3**.

Table 2-3: Aboriginal field representatives

Name of site officer	Organisation
Broad, Aaron	Workforce International Pty Ltd
Carpenter, Nathan	Jerrinja Local Aboriginal Land Council
Charles, Paul	Kulilla Site Consultants
Glover, Pam	Workforce International Pty Ltd
Gray, Leroy	Jerrinja Local Aboriginal Land Council
Little, Leslie	Jerrinja Local Aboriginal Land Council
Maher, Ali	Kulilla Site Consultants
Maher, Maria	Kulilla Site Consultants
Moore, Anthony	Workforce International Pty Ltd
Pagett, John (Jnr)	Workforce International Pty Ltd
Pagett, John (Snr)	Workforce International Pty Ltd
Stewart, Jodie	Workforce International Pty Ltd
Thulin, David	Workforce International Pty Ltd
Wellington, Brett	Jerrinja Local Aboriginal Land Council
Wellington, Craig	Jerrinja Local Aboriginal Land Council
Wellington, James	Jerrinja Local Aboriginal Land Council

Lithic analysis was conducted by Dr Chris Clarkson.

This report was prepared by Kelvin Officer, Kerry Navin, Nicola Hayes, Sam Harper and Chris Clarkson.

2.7 Aboriginal consultation

A draft copy of this report was provided to all registered Aboriginal stakeholders on 20 October 2011 with an invitation to comment by 21 November 2011.

An AFG meeting was convened on Thursday 10 November 2011 to discuss the draft report and its findings. The meeting lasted from 10am to 1pm. Minutes of the meeting are presented in **Appendix A**.

The findings and recommendations of the draft report were presented in summary.

The role of the Aboriginal stakeholders in providing information to RMS regarding the Aboriginal cultural values of the places and items identified was stressed, as was the desirability of providing written responses to the draft report and on proposed site management.

Discussion revolved around a number of issues, including:

- The Aboriginal significance of all artefacts.
- The management of artefacts which remain on site after archaeological salvage is completed.
- The need for Aboriginal representatives to monitor construction impacts and recover artefacts.
- The RMS policy which does not support monitoring of construction works.
- Whether Dick Wood Meadow Battle ground should be described as a Massacre site.
- The impact of the proposed Toolijooa Ridge cutting.

A question was raised regarding the identification of a green frog which had been encountered and photographed during the test excavation program. Was it an endangered species such as a Green and Gold Bell Frog? Subsequent to the AFG, the frog in the photographs has been identified as an Eastern Dwarf Tree Frog (*Litoria fallax*) (email from Josie Stokes, RMS, 22/12/11). This species is not endangered.

Three resolutions were made at the AFG. These are:

- That as little damage as possible be incurred at Toolijooa Ridge and Dicky Wood's Meadow, [these places] should be protected at all costs.
- It was strongly recommended that RMS reconsider its monitoring policy [in favour of] requiring monitors on-site during activities resulting in ground disturbance.
- That there is a fair and equitable distribution of Aboriginal workers across the project.

Apart from the AFG discussion and resolutions, only one response to the draft report was received. This was prepared by the Jerrinja Local Aboriginal Land Council (LALC) and dated 18 November 2011. A full copy is presented in Appendix H. The Jerrinja LALC commented that:

- Jerrinja LALC feel there is inadequate participation of Aboriginal sites officers in the preliminary site excavation by RMS on new road construction.
- Jerrinja LALC propose that during the removal of the first 500 millimetres – 1000 millimetres of topsoil on new road construction, Aboriginal sites officers be present at all times to inspect for artefacts.

Subsequent to the Aboriginal stakeholder review of the draft report, a number of design changes have been made. These consist of:

1. Diversion of Town Creek on either side of Rawlings Lane into Bundewallah Creek, Berry.
2. Revised Austral Park Road interchange including the removal of the formerly proposed Austral Park Road Heavy Vehicle Rest Area.
3. Replacement of the formerly proposed roundabout at the intersection of Tannery Road and the current highway, with a roundabout at the intersection of Woodhill Mountain Road and the current highway.
4. Revised pier arrangement supporting the Bridge over Broughton Mill and Bundewallah Creeks.
5. Revision of the noise barrier running adjacent to Berry township to include Ha-ha treatment (a gentle embankment on the town side of the barrier).
6. Revised Berry southern interchange, including the extension of the northbound off-ramp under the Kangaroo Valley Road overpass and a longer overpass span.

Of these, only 1, 2 and 3 include changes to the previously proposed construction footprint. None of these extensions however, present a significant potential for impact to Aboriginal archaeological and cultural values, outside of those impacts already identified and subject to review. The Town Creek diversion (1), would fall within the 2011 additional area of investigation area (refer **Figure 2-1**), and as such, the potential for construction impact was anticipated and considered in the Aboriginal stakeholder review.

The Austral Park Road interchange (2) includes a new connecting access road, approximately 140 metres in length, which would traverse spurline mid-slopes adjacent to an existing trackway. The landform which would be subject to impact has low archaeological sensitivity (based on its gradient and distance from water), and occurs within an area of comparable mid slope topography, much of which was included in the draft report and subject to Aboriginal stakeholder review.

The proposal for a new roundabout at the intersection of Woodhill Mountain road and the existing highway (3) is situated within a much larger area that constitutes recording G2B A39. This is an area within which historical Aboriginal encampments may have been situated (refer sections 4.4.3 and 6.2.3). The roundabout proposal has been designed so that the construction footprint falls within previous zones of road construction disturbance (refer **Appendix I**). This has the consequence that the roundabout works would not pose a risk of impact to any potentially occurring archaeological remains belonging to recording G2B A39.

3 Landscape context

3.1 Broad scale context

The project area consists of an 11.6 kilometres traverse across the valley floors and fringing spurs and slopes of the Southern Illawarra Coastal plain.

The coastal plain consists of the rolling hills, littoral zone and valley floor topography situated downslope and downstream of the basal ranges and spurs of the Cambewarra Range (a southern extension of the Illawarra Escarpment). The boundary between the foothills and the coastal plain is not distinct and an approximate cut-off would be the 100 metres to 140 metres contour (AHD).

The basal slopes bordering the coastal plain have formed from the Berry Formation (siltstone, shale and sandstones), the Broughton Tuff (tuff and tuffaceous sandstone), and the Bombo Latite. The former two are metamorphic sedimentary formations, the latter a series of igneous lava flows. The Bombo Latite has formed the watershed ridges and higher ground that subdivide the various catchments and valley floors in the Kiama and Gerringong region. It dominates the higher relief of the eastern Project area, notably the crest and upper slopes of Toolijooa Ridge and the mid-range of the western slopes of the Broughton Creek valley adjacent to Broughton Village. The lower slopes of Toolijooa Ridge are comprised of the Kiama Tuff (trachytic tuff). Elsewhere across the western half of the project area, basal slopes and watershed ridges have formed from the Berry formation.

The valley floor of the coastal plain presents a low relief topography of quaternary fluvial sedimentary deposits which typically includes a suite of depositional landforms such as colluvial fans, flood plain, terrace sequences, current and former streambeds (including palaeochannels), wetland basins and old delta deposits. Across the project area quaternary fluvial deposits are encountered on the floor of the Broughton and Broughton Mill Creek valleys.

The majority of the fluvial valley deposits were laid down some 20,000 to 30,000 years ago and the high terrace levels probably date to around 29,000 years ago (Walker 1962). There has been a marked increase in water runoff and the rate of sediment discharged from major Illawarra streamlines in the last 100 years (Wollongong City Council 1976). The increase in sedimentation is attributable to the great disruption of vegetative cover, and the consequent erosion caused by European clearing and agriculture. A consequence has been the deposition of sediment layers across the surface of the plain's basins and fans, causing pre-historic land surfaces to be buried and obscured. Another impact is increased rates of erosion and bank failure.

The town of Berry is situated at a point where the fluvial deposits of the Broughton Mill Creek valley (including Bundewallah Creek) interface with the former estuary embayment of the lower Shoalhaven. Upon entering the estuary, these streams would have dumped their sediments, and formed a small delta which extended progressively from north south into the embayment, prior to its infilling by about 4000 years ago (Wearne 1984:Fig 6.1, Woodroffe et al. 2000).

The sedimentary facies of the coastal margin are dominated by marine and aeolian sediments deposited as a result of prograding coastlines after high sea levels. These consist of estuarine deposits, as well as former sand barriers, dune and beach ridges. Around 8000 years ago, the sea was more than 10 metres below the present level, and reached its present level between 6000 to 6500 years ago. This is known as the post glacial marine transgression (Roy 1994, Thom and Roy 1985, Woodroffe et al. 2000).

Following stabilisation of former, and the current sea level, sand barriers formed across drowned valley embayments, creating a series of estuarine environments along the eastern seaboard, which subsequently and variously filled with sediment (Roy 1994). The plains of the lower Shoalhaven River are a large scale example of this process. They demonstrate an evolution from a brackish water estuarine environment to freshwater alluvial plains. When the sea reached its present level, most of the plains were flooded to form a large coastal embayment. Following the incipient formation of a sand barrier (of which Comerong Island is an evolved remnant), a coastal lagoon and estuary, similar in extent to Lake Illawarra must have been formed. This lagoon received fluvial input from Broughton Creek to the north and the Shoalhaven River to the west. The gradual infilling of the estuary then proceeded, with a pattern characterised by sedimentation around the periphery and gradual infill in the centre of the flood basin. Most of the plains adjacent to Broughton Creek were infilled between 5000 and 4000 years ago. Infill of the estuary basin was largely complete by 3000 years ago (Woodroffe et al. 2000).

During the last 2000 to 3000 years, the Shoalhaven River appears to have been channelized within levee deposits for most of its course across the plain. Isolated flood basins have persisted to the north and south. (Woodroffe et al. 2000).

3.2 Small scale context

The project traverses a series of ridge and spurline slopes, interspersed by valley floor flats and fringing toe slopes. The far eastern end consists of a traverse of the east facing slopes of the Toolijooa Ridge. This forms the watershed between the Crooked River and Broughton Creek catchments, and is the highest point in the project area reaching approximately 100 metres AHD. The ridge is a locally dominant, bedrock based, topographic feature which bisects the coastal plain. It extends from Currys Mountain (around 320 metres AHD), two kilometres to the north of the project area, to within one kilometre of Seven Mile Beach, four kilometres to the south-east.

West of Toolijooa Ridge, the project traverses obliquely across the basal slopes and floor of the Broughton Creek valley. Broughton Creek is a major drainage line and the largest catchment of the southern Illawarra coastal plain north of the Shoalhaven. The project traverse crosses the creek three times. The localities of Broughton Village and Broughton are situated within this valley, along the historical corridor of the highway. Broughton Village remains a loose concentration of residential buildings and small lot farm holdings, which boasts a history with a higher population and former public and community buildings.

From Tindalls Lane, the project area follows the crest of a low spurline which forms the watershed between Broughton Creek to the east, and Broughton Mill Creek to the west. The Project traverse of this spurline descends from around 50 metres, to less than 10 metres AHD, at the crossing of Broughton Mill Creek.

The project area then traverses the fluvial sedimentary deposits, flats and palaeochannels of the Broughton Mill Creek, and Bundewallah Creek (a tributary of the former), to the north of the Berry township, before crossing a low bedrock formed spurline at the western end of the town (Berry Mountain Road). From this point the project area turns south-west, paralleling the current highway corridor and traversing a series of unnamed minor tributary drainage lines and low interfluve spurs, which drain 800 metres downslope (south-east) to a former wetland basin which form part of the lower flood plain of Broughton Creek.

4 Aboriginal cultural context

4.1 Ethno-historical context

References to the Aboriginal history of the Illawarra district can be found in a large corpus of historical and ethno-historic documentary sources, however, most written references tend to be incidental in nature and vary in accuracy or perceived bias.

Complementing (and sometimes also contradicting) the written record is an often rich body of oral history. Aboriginal oral histories relate to both distant and near past events and include references to places in the context of Aboriginal tradition as well as from archaeological perspectives. Places which remain within remembered tradition include nineteenth century and later camps and settlements, hunting, fishing and gathering grounds, burial grounds and story places. Reports of the locations of Aboriginal sites have also been provided by local European people with a long-term interest in the Aboriginal occupation and archaeology of the region. Various Aboriginal groups and individuals (some now sadly departed) have generously shared their knowledge of the region over the years with interested researchers.

The very nature of oral history means that it is an ever-changing and dynamic body of information. The core sources of tradition are constantly being reviewed and re-contextualised according to the motivations of the tellers and listeners. This means that the 'truths' or facts related in oral histories may not necessarily transpose accurately back to the transformed modern physical world. Place names and the meanings of words or actions change over time. As a consequence, the information can often only ever be considered 'indicative' or anecdotal until demonstrated otherwise. Often the confirmation of oral or written references is impossible due to the disparate or limited nature of potentially corroborative information. Despite these limitations, references to places in Aboriginal history and story tradition form a valuable corpus of information which has the potential to illustrate the Aboriginal cultural landscape which has largely been ignored by other forms of the historical record.

Places and events known from the oral record are often of considerable and continuing importance to the local Aboriginal community. Places identified from the historic written sources have sometimes fallen out of the oral tradition and provide a valuable means of re-identifying places of historical significance.

4.2 Tribal boundaries and social structures

Based on the gaps, inconsistencies and lack of detail within surviving records, it is now difficult to be certain about the location and nature of linguistic and tribal boundaries.

Tindale conducted a comprehensive review of boundary information across Australia in 1974 (Tindale 1974). Based on Tindale's work, the project area falls within the tribal area of the Wodi Wodi people. Tindale found that the Wodi Wodi occupied an area which extended from approximately Stanwell Park in the north, to the northern bank of the Shoalhaven River in the south, and west as far as Picton, Moss Vale and Marulan. In keeping with his view that natural topographic boundaries were likely to coincide with cultural ones, Tindale considered the Shoalhaven River to form the boundary between the Wodi Wodi and the Wandandian people to the south.

These groups are distinguished by different languages, with the Wodi Wodi speaking Dharawal (Thuruwal) and the Wandandian speaking Dhurga. Howitt, however, refers to the language of the Shoalhaven area as Gurungada (Howitt 1883, 1904). Dharawal was spoken as far north as the southern side of Botany Bay (Eades 1976). Both the Dharawal and Dhurga languages form part of the Yuin linguistic group which extends southward from Sydney to almost the Victorian border (Schmidt 1919).

Contrary to Tindale's river boundary, ethnographers and other historic sources have tended to describe the Aborigines and linguistics of the lower Shoalhaven in terms of a single cultural character, one district, and one dialect (Capell 1963:S36; Dixon in Eades 1976:4). There is no mention of differences amongst the 'Shoalhaven Aboriginals' according to which bank of the Shoalhaven River they came from. In all references, the Shoalhaven tribes are treated collectively. It seems, therefore, more probable that the tribal boundary on the coastal plain was further south, and concomitant with linguistic evidence, adjacent to Jervis Bay. A boundary in this region would roughly be equivalent with the Shoalhaven-Jervis Bay watershed (Sefton 1980, Officer 1991a).

The term Wodi Wodi is first recorded by Ridley in 1875, who based it on the testimony of Lizzy Malone, the daughter of a woman of the Shoalhaven tribe. She stated that Wodi Wodi was the name of the language spoken by the Aboriginal people of the Illawarra (Ridley 1875, Organ 1990:xlii). Janet Mathews noted the name ‘Illawarra Tribe’ in 1960 stating that ‘old inhabitants around the lake swear that their tribe was called this, and it was bounded by the shores of the lake’ (Mathews c1960:1). She adds that ‘their language appears to be Dharawal, but the Aborigines never use or have heard of that word. They say there was a separate tribe at Shellharbour but that cannot be checked as they appear to have been extinct there for some time (Mathews c1960:1).

Many modern researches use the term Dharawal or Tharawal to refer to the tribal group within the Illawarra. Amongst contemporary local Aboriginal people the term Wodi Wodi is often preferred. However, some groups now identify the Illawarra tribe(s) as the Elouera, possibly guided by early references to the pronunciation of Illawarra as 'Eloura' or 'Ellowera' meaning a pleasant place (Thornton's 1896 word list in Organ 1990:358, also McCaffrey's notebook 13, 1910-1930 in Organ 1990:486). The Aborigines of the Nowra region refer to themselves as the Wandiwandian people (pers. comm. Sonny Simms 2007).

Within these broad language and tribal groupings were smaller social divisions, perhaps consisting of different family groupings, which appear to have been associated with local areas or home territories. European observers tended to identify these groupings as ‘tribes’ and associated them with localities which may have related to home territories. Examples from the Gerringong to Bomaderry Princes Highway upgrade area include the Shoal Haven (Nowra and the adjacent area south of the Shoalhaven River), Murro (Meroo Meadow region), Broughton Creek (lower Broughton Creek and coastal plain north of the Shoalhaven River) and Gerongong (Seven Mile Beach hinterland to Gerringong) (Egloff, Navin and Officer 1995:41, Organ 1990:c.f. 190).

Howitt records the name of the Yuin 'clan' inhabiting the Lower Shoalhaven District as Gurungatta-manji (Howitt 1904:82).

Generally speaking, the term 'tribe' is employed to describe a large group of people who, for the most part, speak a common language and occupy a broad tract of land within which 'clans' consisting of loosely-related families own the land, and smaller groups referred to as bands perform the daily tasks of group maintenance. Matthews and Everitt described the clan organization of the Shoalhaven as consisting of related males with married women joining the band of their husband but maintaining an affiliation with their clan of birth. Children belong to the father's clan, with both sons and daughters receiving the totem of their father's clan (Matthews and Everitt 1900:264).

Bands frequently change composition in what is referred to as a 'fusion and fission' model of local group organisation. The Aboriginal people of the Shoalhaven banded together for specific activities, were together for a time, and then split apart; later they formed new groups which most likely had at their core a number of closely-related families. Leadership was assigned to experienced elders with the males being predominant. Alexander Berry (1838: letter 2, in Andrews 1979:6) described a band which was camping near his house as 'natives who were all sitting in groups with their different families'.

Boundaries between local bands and clans were flexible and permeable, allowing groups to move about (Poiner 1976). Where resources, food or materials, were particularly rich, it is likely that use of those goods was controlled and permission had to be obtained from the custodians of that place. Where resources were widely distributed across the landscape, movement of people was less controlled. Disputes did occur, particularly between the coastal people and the mountain groups, but the nature of these arguments is not well recorded; generally speaking, conflict was ascribed to clashes by men over possession of women. It is known that there was armed conflict in the Shoalhaven district, but it is not certain how this impacted on Aboriginal patterns of land use (Egloff, Navin and Officer 1995).

It is likely that Aboriginal groups were able to maintain their structure throughout the early period of European settlement. Later responses may have included seeking refuge and establishing camps either at a distance or close to European properties, being partially integrated into maritime or pastoral activities, or dwelling on the fringes of European communities. As the land-use patterns of the new colonists intensified, there would have been a demand on natural resources, and the food sources of the Aboriginal people would have diminished radically. In the 1840s and 1850s, the introduction of dairy farming (Bell 1960) further reduced the availability of game in the Shoalhaven District. The issuing of rations by the government encouraged a clustering of people into camps, which would have caused some breaking down of the previous marriage patterns where polygamy (male having more than one wife) was the economically preferred strategy. It is thought that rations were issued to discourage multiple partners (Andrews 1979:9).

New camps frequently were situated close to towns, and most likely contained members of a number of different clans and bands. The camps became more or less permanent, much more fixed on the landscape than the hunting and gathering camps which had provided the primary locus in previous times. In the Shoalhaven district, camps were found at Bilong, near Currambene Creek, and at Coolangatta Mountain on the Berry property.

Camp life, with a mixed population from a number of groups, broke down established patterns of local organization. As the numbers of children with white fathers being born to Aboriginal women became more common, the practice of the offspring being absorbed by the mother's clan increased. Descent came to be reckoned through both lines and support for child-raising was more likely to come from the mother’s family. Ceremonies and group activities which once bonded together the clan groups began to weaken and take on new forms. The institution of Christmas was of particular importance, not for its religious connotation, but more for the social meetings which were permitted during the times when other kinds of gatherings of Aboriginal people for more traditional activities were actively discouraged. (Egloff, Navin and Officer 1995).

Mobility, particularly among males seeking employment, increased as kinship ties became more extended through inter-clan marriages. Bell (1960) reported an incident which occurred in 1878 when a group of Aborigines from the South Coast camped in a disused structure at Circular Quay. When asked to leave, twenty-six people stated that they wished to remain. They formed the nucleus of the La Perouse settlement in Sydney.

By the 1880s, it appears as if most of these arrangements were weakening and Aboriginal people were being pressed into reserves or missions. Although the missions provided places for ration distribution they also may have been inappropriately sited or offered constraints and other forms of control such as the infamous removal of mixed-blood children (Egloff, Navin and Officer 1995).

4.3 Historical overview

The first European sightings of the Shoalhaven region were made by Captain Cook in April of 1770. He noted a protected bay which would later be named Port Jervis, and on April 26 'several smokes along shore before dark'. This observation may relate to Aboriginal campfires in the vicinity of Bass Point.

The earliest contacts between Europeans and local Aborigines were amicable (Grant 1801). He recorded large numbers of unarmed Aboriginals whom he described as ‘more robust than Sydney Blacks’. Friendly relations continued and in 1811 Governor Macquarie recorded that the population was numerous and disposed to trading for biscuits and tobacco.

First reference to interaction between the Shoalhaven tribes and Europeans comes from the recollections of survivors of the wreck of the 'Sydney Cove' who walked up the south coast from Gippsland to north of the Illawarra before being picked up. As the exhausted party came towards the Shoalhaven they met with 'unfriendly natives, at whose hands it is thought some of the exhausted ones lost their lives' (Cambage 1916).

In 1805 James Meehan reached the Shoalhaven River on an exploratory trip and noted the existence of considerable stands of red cedar along the lower reaches (Antill 1982). The cedar getters, both legal and illegal, quickly followed and were almost certainly the first Europeans to venture into the coastal escarpment of the Illawarra Range. The first official shipment of cedar from the Shoalhaven, cut from its lower reaches, was in 1811. A year later seven ships were engaged in the trade.

An undocumented and probably violent story of culture contact and exploitation followed the cedar cutters. The conduct of the cutters was mostly beyond the control of Colonial Officials. There is evidence to suggest that the Shoalhaven Aborigines were not friendly toward the newcomers. The timber getters were obliged to fell their timber near the river banks, not only due to transport limitations, but partly for fear of the natives who were described as never having been 'otherwise than inimical to us' (Perry 1954:30).

It is possible that conflict between the cedar getters and the Aborigines led Governor Macquarie in 1814, to forbid vessels to enter the Shoalhaven to cut timber, a directive which appears to have been ignored. Such conflict is hinted at in a statement by Macquarie referring to the 'abuse' occasioned by cedar getters while logging and extracting timber:

> “There being reason to believe that the Indulgence which has occasionally been granted to Masters and Owners of Vessels to resort to and bring Timber from Shoalhaven is subject to considerable Abuse...' (Sydney Gazette 3/12/1814)'.”

Shortly afterwards, in 1815, a party of three cedar cutters were found to have been murdered by natives 'soon after their arrival at Shoal Haven' (Perry 1954:30). One body was eventually located. This incident made the new white inhabitants afraid of the Aborigines for ten years (Bayley 1975).

Breton tells of an early Shoalhaven incident where 'Three natives persuaded a convict servant to accompany them in search of cedar...' The natives pushed him over a precipice and cut out the dead man's tongue in the hope that eating it would enable them to speak English (Breton 1834:168).

On 4 June 1816, Governor Lachlan Macquarie issued a proclamation which prohibited Aborigines from approaching towns or farms if they were armed or if in a group of more than six. All large gatherings were forbidden regardless of their proximity to any British settlement. This proclamation was seen as sanctioning actions of colonists in allowing them to fire on groups of Aborigines. Prisoners could be taken and those who refused could be shot and their bodies hung in ‘public’ places. These rules applied to men, women and children (Cleary 1993).

In 1812 the surveyor George Evans made the first recorded European explorations on the Cambewarra and Illawarra Ranges. Following completion of a survey of the Jervis Bay foreshores, Evans intended to return overland to Appin. The difficulty of his party's ascent of Good Dog Mountain changed his mind, but before descending to the coast he camped overnight on Tapitalee Mountain. Evan's exploration was assisted by a local Aboriginal he called Bundle (Griffith 1978:12).

In 1818 Charles Throsby and Deputy Surveyor James Meehan were commissioned to locate an overland route between Sydney and Jervis Bay. They were accompanied by Hamilton Hume. The party split into two groups after encountering the barrier of the Shoalhaven Gorge. Throsby, and two others returned to Bundanoon Creek accompanied by two Aborigines 'a native boy' called Broughton and Bundle (probably Evan's guide). There they met two Aborigines both known to Throsby from Lake Illawarra, one called 'Mamaa' the other 'Timelong' (letter from Mrs Brooks 1827 quoted in Griffith 1978:13). The two Illawarra Aborigines guided Throsby's party into Kangaroo Valley via Meryla Pass to a place on the Kangaroo River identified as Yarranghaa.

During 1819, John Oxley and Meehan were returning from Jervis Bay to the Shoalhaven with the aid of a local guide, Broughton:

> 'We fell in with five natives who were friends of our guide, Broughton, and at his request they joined us, and when we had recrossed the waterfall, guided us to a high conical forest Hill, being the highest of the tract of country lying between Shoalhaven River and Jervis Bay [Nowra Hill], the country in its immediate neighbourhood, better clothed with grass, heavily timbered, the soil a stiff mould, with abundance of Indigofera and various species of Acacias. On the top of this hill was a native tomb, decorated with boughs; Broughton informed us it contained an infant daughter of his' (Cambage 1916:9).

The surveyor Throsby returned to the Shoalhaven from Kangaroo Valley in 1821 and went to a place he called 'Nou-woo-ro', now known as Nowra (Griffith 1978).

Early in 1822, on returning from verifying the existence and source of the Clyde River, Alexander Berry spent several days exploring the Shoalhaven River, up as far as Burrier. Six months later Berry returned with the aim of establishing a permanent settlement. He was in receipt of a government grant of 10,000 acres on the Shoalhaven River, and a labour force of nineteen convicts. This marked the start of permanent European settlement in the Shoalhaven River valley.

Berry chose an area of elevated ground at the foot of a hill variously referred to as Coolungatta, Cullengatty, Coloomgatty for the site of his settlement (Antill 1982:10, Bayley 1975:24, 27), and Cooloomgatta (Mitchell 1834 NSW Map). The name was recorded by Surveyor James McBrien in 1824 as Aboriginal, meaning 'high hill' (Antill 1982:10). It is now known as Coolangatta. Howitt records the name of the Yuin 'clan' inhabiting the Lower Shoalhaven District as Gurungatta-manji (Howitt 1904:82). 'Coolangatta' may therefore be a derivation of the name used by the original Aboriginal social groups who lived in the Nowra region.

Berry’s selection of this location was apparently treated with apprehension by the local Wodi Wodi. Berry notes that in June of that year, during construction of a hut and a canal near the Shoalhaven Heads a native called Wagin (a local chief), confronted the workers and claimed the ground where they had been working (in Jervis 1942:235). This action falls into context when it is acknowledged that the Coolangatta Mountain was a place of ancestral significance to local Aboriginal people.

Another early project of Berry's was the cutting of a track from Illawarra in order to drive cattle from Bong Bong to the Shoalhaven. It is probable the track traversed the Saddleback Ridge, which forms the eastern spur extending from Barren Grounds (Bayley 1975:24).

Berry's settlement grew steadily with the immediate introduction of herds of cattle and the establishment of plant crops at Numbaa. Berry initially considered the local Aborigines to be ferocious and his timber workers tried to drive them away.

For several years potatoes and maize was 'stolen' from the fields (Bayley 1975). Several weeks after Berry's arrival a party of twenty Aborigines camped near his settlement. Berry notes that there were two chiefs, Wagin, chief of Numba (Lower Shoalhaven), and Yagen chief of Jervis Bay. He also describes Brogher (or Broger), the brother of Broughton (an Aboriginal guide employed by Berry), as a native chief (probably of area north of Coolangatta). These probable band groupings suggest that most of the Aboriginal population was centred on the more fertile coastal plains.

In 1824 Berry employed seven men to cut cedar from the Broughton Creek (Berry) and Morow (Meroo) regions to supply the growing market demand in Sydney (Antill 1982).

Other grants followed including the first land grants within the Kiama hinterlands in the early to mid 1820s (Jervis 1942). From this period, settlers furnished brief descriptions of Aborigines in the Shoalhaven particularly those which settled on pastoral properties and gained employment (Berry 1834). Aboriginal people also gained employment in fledgling local industries such as the failed whaling station at Jervis Bay.

The population of the local Aboriginal groups was estimated in 1826-27 to be 68 for the 'Bundgong' (or Bridgong) and Shoalhaven (the lower Shoalhaven River), and 71 for Kangaroo Ground (Evidence given to Committee of Enquiry into Immigration 1841, in Ellis 1989, Science of Man 4(4):71).

In 1826, the majority of the cedar arriving in Sydney came from Kiama, and the 'Long Brush', an area rich in cedar stretching ten kilometres from Jerram (just west of Kiama), to Jamberoo. Equally abundant were the gullies feeding Broughton Creek in the Jasper's Brush district (Griffith 1978).

In 1829, a cedar cutter engaged by Berry named John Rivett, was reported as murdered at Broughton Creek by Broger (Brogher) a local Aboriginal 'chief' (Antill 1982).

In 1830 Alexander Berry testified in the trial of Broger, who was a brother of his long-standing friend Broughton. It was alleged that Broger, offered to show a party of cedar cutters some trees and then killed John Rivett, an employee of Berry. The trial took place in Campbell Town, and was reported in the Sydney Gazette of 26 August 1830 (Organ 1990:159). A plea of self-defence was entered by the defendant, which was also held to be common knowledge shared amongst the local Aboriginals, but this did not mitigate the sentence, and Broger was convicted of murder and subsequently hanged in Sydney.

In 1831 Robert Anderson applied for 'two sections of land in the district of Shoalhaven known by the native name of Nowry' (Jervis 1942:246).

In 1835, a number of European settlers complained of the 'great and grievous losses' they had suffered from the depredations of the blacks at Kiama. Whole acres of corn were removed in one night and two of the complainants had lost twenty pigs in three months (Sydney Morning Herald, August 20, 1835).

There are a number of historical accounts of enmities in the early to mid nineteenth century between tribal groupings of the northern and southern Illawarra Dharawal speakers. These consist of clashes between the ‘Illawarra’ tribes and apparent northward offensives of the Bong Bong, Broughton Creek, Kiama and Shoalhaven tribes. This has been interpreted as a consequence of changes in social order, resource distribution and political alliances brought about by the European settlement and occupation of tribal lands (DEC 2005:16).

Examples are the battle of Fairy Meadow in 1830 between the Bong Bong and Illawarra groups (involving 1500 participants and 100 deaths), and a battle at Albion Park in around 1842 between the Broughton Creek and King Hooka's Illawarra tribes. (DEC 2005:18).

The Albion Park battle occurred somewhere in the area between the present Albion Park railway station and Albion Park township. The battle involved more than 400 individuals and was reportedly precipitated when the 'Coolangatta blacks' moved into the Illawarra with the intention of attacking the white settlements. The Coolangatta force was repelled after a day of combat and the death of many participants, including King Hooka who was reportedly buried in a variety of locations around Lake Illawarra (Young in Organ 1990:375, Dollahan in Organ 1990:492 & 494, Thomas 1975:12).

In 1836, James Backhouse toured the Australian Colony and passed through the study region, travelling from the Five Islands (Wollongong), through Colomgatta (Berry's estate on the Shoalhaven), and Kangaroo Ground (Kangaroo Valley) to Bong Bong (Backhouse 1843). Backhouse encountered many parties of Aborigines, often describing them as partly clothed in European clothes and subsisting according to both traditional and European sources of food and materials (Backhouse 1843:435).

On the 1st October Backhouse's party crossed the Shoalhaven 'with John and William Berry being rowed by three blacks, one of whom named Lewis recognised us, having met us at John Batman's in Van Diemans Land. He is one of those who were employed in collecting the natives of that Colony and was dressed in an old suit of Colonel Arthur's clothes'.

Backhouse goes on to recount that 'A Black came from a sawing establishment of Alexander Berry's where he had learned to work and said he had cleared a piece of land and sowed some pumpkins. He asked also for some seed potatoes to plant, and said he thought it much better to have settled habitation than to lead a wandering life like his countrymen. Alexander Berry was much pleased with this spontaneous attempt on the part of the Black to settle, having often in vain tried to persuade some of these people to adopt such a course' (in Organ 1990:205, and in Egloff, Navin and Officer 1995:37). This passage is revealing for its indication of Aboriginal employment in the Berry estate industries, and the provision of space for vegetable gardens tilled by Aboriginal employees.

At the foot of the Cambewarra Mountains, he met a group of six aborigines dressed in blankets and old European clothes. 'These people were accoutred with hunting and fishing spears, and weapons of war' including a death spear barbed with 'pieces of glass' and a shield painted in white with red lines (Backhouse 1843:433).

On the Kangaroo Ground (Kangaroo Valley) Backhouse noted an assembly of about two hundred Aborigines. It seems probable from his description that he observed the end of a ceremonial gathering amongst some of the southern groups of the Wodi Wodi people:

> "Three tribes of Blacks were assembled here last night; one belonging to the neighbourhood, and the others to Shoal Haven and Bong Bong. There were forty men in one of these tribes: they were going to Cow-Pastures, [Camden district] to learn a new song, that had been invented by some of their country people there! All the men had undergone the ceremony of having one front tooth knocked out, on being admitted to the privileges of manhood; and they had the cartilages of their noses perforated, and bones, the thickness of a quill, and about four inches long, through them. They wore fillets of net-work around their heads, and beads, formed of short pieces of reed, around their necks' (Backhouse 1843:435)."

Perhaps in response to his need for cheap manual labour, Alexander Berry conducted a census of Aboriginal people in the immediate proximity to his estate in 1838. He remarked that the numbers had decreased in the last sixteen years.

His collation identifies the individual bands in the region:

Gerongong Tribe	21	Broughton Creek	26
Uurro Tribe	24	Shoalhaven Tribe	39
Numba Tribe	25	Wooragee Tribe	45
Jervis Bay	62		

(Burton Papers NSW Archives, in Egloff 1981:13).

By the late 1830's the majority of the lower coastal plain between Gerringong and the mouth of the Shoalhaven River had been taken up as land grants. By 1840 the Coolangatta Estate had a population of 270 people.

Through the 1840s and 1850s Aboriginal communities were increasingly impacted by the spread and consolidation of European settlement. In response, Aboriginal people either settled on the pastoral stations, in ‘fringe camps’ adjacent to European settlements, or were forced into adjacent rough and mountainous country. In the mid 1840s it was recorded that there were five Aboriginal camps in Kangaroo Valley, 'each camp in a separate gully' (Griffith 1978:9). Egloff (1981) concludes that by the 1840s the Shoalhaven Aborigines had been reduced to remnant groups either wandering large tracts of the coast, or subsisting at the edge of the now permanent European settlements.

Reports from the 1850s onwards suggest a trend in Aboriginal occupation and subsistence such that camps and most food gathering and hunting became concentrated along the coast. This pattern was shaped by European settlement which pushed Aboriginal people onto country unsuitable for agriculture, notably the coast and the adjacent wetlands (DEC 2005:25). Permanent Aboriginal camps became established on Broughton Creek (Berry), Crooked River (also referred to as Black Head or Gerongong), around Jervis Bay (notably Bilong on Currambene Creek), and in a gully on the northern side of the Coolungatta Mountain on the Berry Estate (Egloff 1981). The Coolangatta camp had grown with the Berry Estate, and a number of the residents there were employed as labourers and to grow vegetables (Egloff 1981).

Other encampments known from the latter half of the nineteenth century include the banks of Broughton Creek at Broughton Village (Donlon 1991a:12), and the banks of Broughton Mill Creek adjacent to Berry (Barbara Timberry in DEC 2005:39-41).

In 1850 a newspaper article on the Shoalhaven region noted that:

“Bacchus has many more votaries than he used to have and aboriginal tribes have become great drunkards, yet there is only one public house in the neighbourhood' (Sydney Morning Herald Oct 5 1850, in Jervis 1942).”

By the 1860’s the potential refuge posed by the remaining mountainous and forested slopes was being eroded by closer European land settlement and consequential reductions in bush foods and game from forest clearance and the pasturage of herds of cattle and sheep.

In 1867, the death of an Aborigine known as 'Commodore' or 'Commandant' was noted 'from the effects of exposure and want' at the Aboriginal encampment on the Minnamurra Estuary, on the then Eureka Estate. 'Commandant', or Jaunda, had been listed in the 1837 blanket return at Shoalhaven (Coolangatta) as a member of the Gerongong tribe, then aged 14 (in Organ 1990:214, 321). This is suggestive of considerable movement of Aborigines between the main encampments in this part of the Illawarra, namely between Coolangatta (on the Berry Estate), Crooked River, and the Minnamurra River Estuary.

Reclamation of the Shoalhaven wetlands began on a major scale from 1873. By 1909 a total of 600 km of drains had been constructed. The draining of the wetlands effectively alienated the last terrestrial wild food areas open to the remaining local Aborigines.

Following cholera and typhoid epidemics in the Coolangatta camp in the late 1890's, The Board for the Protection of Aborigines moved residents to a newly proclaimed Reserve at Roseby Park (Orient Point) in 1900 (Antill 1982, Bayley 1975).

The last remembered initiation ceremony staged in the region was conducted in the late 1880's by 'the Shoalhaven River tribes' on the southwestern side of Moeyan Hill, a low hill to the north of Coolangatta Mountain (Mathews 1896).

Aboriginal groups responded to the dispossession of their lands in a variety of ways including fostering camps close to pastoral properties, as well as at places of refuge away from settlement. Some people moved into areas of settlement and communities grew on the edges of rural towns. In response to moves into areas of settlement, the New South Wales government established a system of Aboriginal reserves in the 1880's.

In 1881 a Protector of Aborigines was appointed. The Report of the Protector' George Thornton provides the first comprehensive census since the blanket issue returns of the 1840s. It gives the following information with respect to the people of Shoalhaven and Jervis Bay (Thornton cited by Organ 1990:339-341).

> "Shoalhaven - Most of the half casts are employed. The Jervis Bay people live by fishing and Government rations. The Jervis Bay blacks get Government rations. This is necessary as there are few white people in that locality. Three boats in the district - one at Terrara, one Broughton Creek, one Jervis Bay. All in good order. Provided by Government. About thirty half-cast children are at school at Coolangatta, five at Jervis Bay and three blacks. [Blanket] issue necessary and not in any way misappropriated. [Supply of clothing needed] at Jervis Bay. A number of them given to drink. But since the Act of 1882 came into force drunkenness has ceased. [Medical] own expense."

The Protector was replaced in 1883 by the Aborigines Protection Board which by the turn of the century had established 133 reserves across the State. Aboriginal reserves were sited to allow for the exploitation of natural resources (marine and estuarine) at a distance from white rural centres (Goodall 1982).

The Aborigines Protection Board was also responsible for the infamous policy which resulted in the removal of thousands of Aboriginal children to the Cootamundra Girls Home, the Kinchela Boys Home, and in the lower Shoalhaven, the Bomaderry Aboriginal Children's Home (Read n.d.). The Bomaderry Aboriginal Children's Home was established in 1908 when it received seven 'native' children, six orphans and one baby (Bayley 1975:176).

Missionaries were allowed to live on many of the reserves and in popular terms Aboriginal people came to refer to the reserves as 'missions'. Reserves to which managers were assigned were referred to as 'stations'. Like the many small reserves created in the nineteenth century these places were regarded by the government as temporary arrangements to be altered or closed on the advice of the Board.

Prior to 1890 at least two petitions were presented to the government of NSW requesting a reserve within the Shoalhaven district and at Jervis Bay (Egloff et al 1995:46). These were refused by the Government.

The pattern of later nineteenth century Aboriginal occupation on the lower Illawarra coastal plain can be characterised by an early evolution of non-government or mission-aided encampments, and later enforced translocation onto government reserves and mission institutions.

Prior to the establishment of government reserves, most Aboriginal settlements developed around the remaining access to coastal resources such as at Crooked River (Gerrongong), or sources of employment and/or provisions such as Berry's Coolangatta Estate, and towns such as Broughton Creek (Berry). All of these areas of encampment appear to have been established or continued, despite the alienation of the lands to European freehold owners. Their location may have been determined by a variety of factors, including established seasonal camping locations, proximity to food resources, friendly (or non-hostile) white settlers/landholders, and proximity to European settlements, rations and employment.

Toward the latter part of the nineteenth century, government authorities placed pressure on Aborigines to re-settle within government reserves. This effectively removed local Aboriginal groups from freehold and crown lands, and concentrated the remaining populations onto reserve lands. Reserves were often situated on marginal land, away from people's traditional lands and forced peoples of differing tribal affiliation into close contact. Despite this, the occupation of coastal and fringe camps continued, especially as part of the required movement of people looking for seasonal work.

In 1899 a government Aboriginal reserve of 43 acres was established near the northern end of Seven Mile Beach. The reserve was revoked in January 1953 (AR 29911, McGuigan nd:39). Although the exact nature of Aboriginal occupation on this reserve is not well documented, its location and duration supports the documentary evidence for a historical focus of Aboriginal occupation in the Crooked River (Black Head/Gerringong) area.

In a census conducted by the Commonwealth in 1901 the Aboriginal population of the Illawarra was distributed across seven camps with 33 at Port Kembla, 13 at Minnamurra River, 8 at Dapto, 18 at Bombo, 20 at Gerringong, 3 at Jamberoo and 3 at Kiama, giving a total of just 98 (DEC 2005:24). Noted by the census at Coolangatta were the Amatto, Ardler, Ferguson, Judson, Methven, Nipple and Steel families. Families at Roseby Park were Bundle and Carpenter (State Archives NSW in DEC 2005:25).

In 1903 there were 100 people living at Roseby Park. Other local Aboriginal camps and Reserves included: Bilong on Currambene Creek at Jervis Bay, Beecroft Peninsula, Orient Point, and Wreck Bay. The old Wreck Bay and Orient Point reserves are now Aboriginal-owned land.

From 1940 to 1969 the Aborigines Protection Board vigorously pursued a policy of assimilation. Reserves were reduced in size or were revoked (Long 1970). Houses and facilities were allowed to deteriorate in an attempt to force Aboriginal people to move off the reserves.

Goodall considered that the pattern of reserve establishment reflected changes in European landuse more than it does the distribution of the people they were supposed to be servicing (Goodall 1982:58):

> "South Coast Guris continued in the 1900s to use both reserved and non-reserved land as a residential base. Some gained casual or seasonal work with white dairy or crop farmers while others were employed in the continuous work of the timber industry, either felling or in saw mills. Many South Coast Guris, however, continued to support themselves fishing, some at a subsistence level but others increasingly selling their catch in competition with white fishermen. A total of 37 Board-provided boats were in use by the turn of the century; more than half had been supplied to South Coast Guris who used them for fishing ..."

In 1935 the Shoalhaven Council received a petition signed by 64 citizens requesting that the Aboriginal people who had established 'shanty' dwellings in the public reserve be removed to Roseby Park. It was claimed that the living conditions were unsanitary. The Board responded that it could not force the people to move to the reserve.

By March of 1937 all informal dwellings, those erected without Council approval, had been demolished throughout the township and the squatters removed to the reserve. Further complaints were lodged by town citizens against an Aborigine who had erected a dwelling with Council approval (Antill 1982:104 in Organ 1990:381, Goodall 1982:306), but the Council did not to heed the citizens demand for removal (Egloff, Navin and Officer 1995).

A Directorate was established in 1969 to control reserves and an advisory council with Aboriginal members was appointed. In 1979 the New South Wales Aborigines Welfare Board, the successor to the Aborigines Protection Board, was abolished and the reserves transferred to the Aboriginal Lands Trust. To meet the new policy of self-determination, steps were then taken to consolidate, revitalise and upgrade reserves. Reserve ownership has for the most part been transferred to LALCs.

Today, Aboriginal people live throughout the Illawarra and South Coast as residents of the larger towns and cities - Bega, Nowra, and Wollongong, as well as maintaining communities on former reserves, and are found throughout the region in family groups. Communities of Aboriginal people are located at La Perouse, Orient Point (Jerrinja), Wreck Bay, and Wallaga Lake, as well as on 'informal reserves' such as Browns Lane near Nowra and Murray's Flats outside of Bega.

4.4 Places of reported historical and cultural Aboriginal significance

This section provides information on known or reported places which have, or may potentially have, historical and cultural significance to the local Aboriginal community. This information has come from previously prepared heritage assessment reports and other published material, including local histories and some recent compilations of oral histories.

Four places occur within the project area; these are the historical encampments at Broughton Village and Berry, the “Little Mountain” or “Dicky Wood’s Meadow” battle ground, and the Toolijooa Ridgeline. The general location of these places relative to the bypass is shown in **Figure 4-1**.

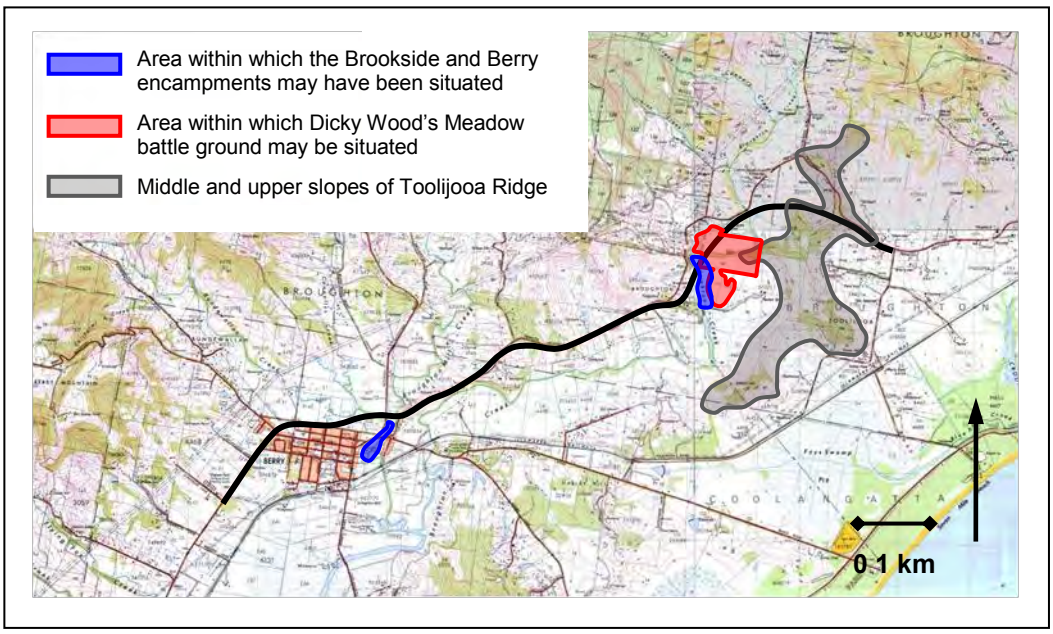

Figure 4-1: General location of three Aboriginal culturally significant places relative to the bypass

4.4.1 Aboriginal encampment at 'Brookside' (Broughton Village) (G2B A14)

Information collected from a local community questionnaire conducted by Donlon in 1991 for a previous highway upgrade option analysis revealed a local oral tradition that 'Aboriginal people were known to have camped along the banks of Broughton Creek in the vicinity of 'Brookside' at Broughton Village until at least the turn of the century' (**Figure 4-2**). It was added that 'artefacts have been observed and collected in this area in the past', suggesting that this location also was occupied in prehistory (Donlon 1991a:12).

An area up to 200 metres from the eastern bank of Broughton Creek, and 350 metres up and downstream of the Brookside homestead has been identified as an area within which the Aboriginal encampment may have been situated (refer Appendix C.1).

Figure 4-2: View of '*Brookside*' and the adjacent flats of Broughton Creek, at Broughton Village, looking north-east. The creek banks were recorded to be the site of historical Aboriginal encampments

4.4.2 The '*Little Mountain*' or '*Dicky Wood's Meadow*' battle ground (G2B A13)

An Aboriginal battlefield is recorded within the project area, in the vicinity of Broughton Village. This information comes from notes made in 1900 by Archibald Campbell from various interviews with a Shoalhaven Aborigine known as Buthring (in Organ 1990:470).

Campbell writes 'Buthring says that one of the main battle-fields the blacks used in the olden times was 'The Little Mountain" or "Dicky Wood's Meadow" beside the creek, on the east side of Broughton Village. He said the different tribes from all directions used to fight there – mostly about women matters. "Lots" of blacks were killed there in battle, and buried here and there about'.

Richard Woods (or Wood), of Shoalhaven, purchased portion 181 in 1842 for £400. This is a 100 acre portion of land situated on the floor of the Broughton Creek valley, just southeast of the Broughton Village subdivision (**Figure 4-3**).

The property is referred to in Land Title Records as ‘Finns Valley or the Little Meadow” (Land Title records Bk 9 No.203, but see also Elliott 2009, and McCaffrey 1914 in Caldwell 1999). ‘

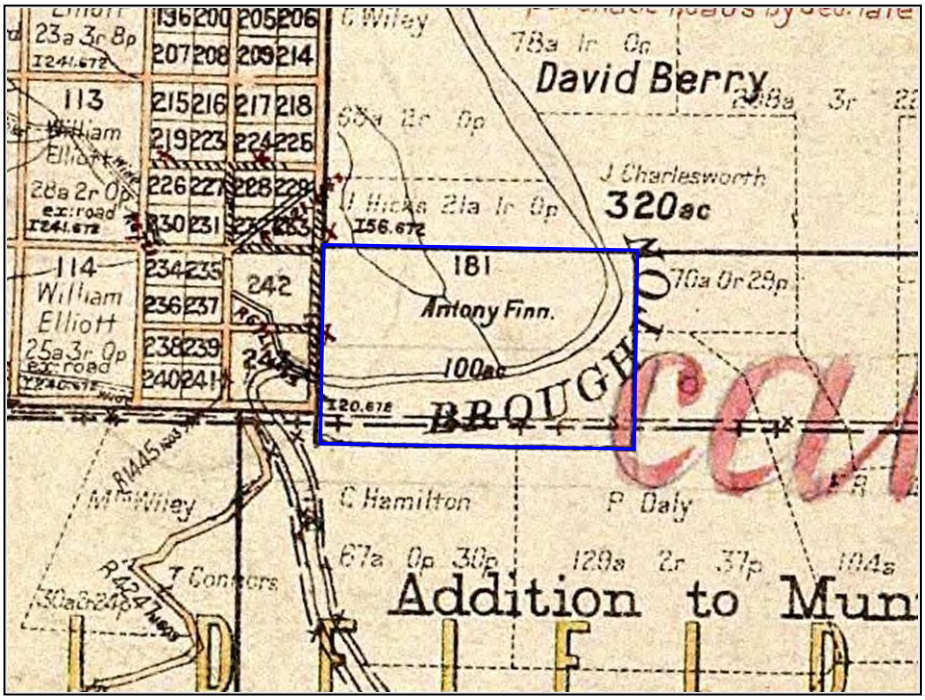

Figure 4.3: **Extract from 4th Edition parish map for Broughton, County Camden, showing the location of Portion 181, an original land grant of 100 acres to Antony Finn, and subsequently purchased by Richard Woods (or Wood) (Map dated 1893, cancelled 1902, Parish map preservation project ID no. 10353801)**

Dick Woods was employed at one time as a cook on one of the boats owned by the Berry and Wollstonecraft partnership. He was joined by his brother William, a carpenter, who is reported to have built the second house erected in Goulburn (McCaffrey 1914 in Caldwell 1999). Dick Woods was remembered to have bred dairy cows and horses on the property and was considered an ‘excellent horse doctor”. Both of the Woods brothers had been transported to New South Wales, and neither married (McCaffrey 1914 in Caldwell 1999).

In 1866 Richard Woods of Broughton Vale, farmer, sold Lot 181 to George Tate, also of Broughton Vale, farmer, for £2000 (Land Title records Bk 100 No.853). A mortgage of £1000 was subsequently discharged from Woods to Tate in 1870 (Land Title records Bk 100 No.855; Bk119 No.124). McCaffrey notes that following the death of William Woods, Richard sold the farm to George Tate for £1000.

Using Campbell’s description of the location of the battlefield ‘beside the creek’ and ‘on the east side of Broughton Village’, and the knowledge that Richard Wood owned portion 181 for the period 1842 to 1866, it is now possible to be more specific regarding the possible location of Dicky Wood’s Meadow, and the approximate area in which the battlefield may have been located.

If the reference to a meadow relates to a natural clearing within the forest, it is probable that it corresponded to a wetland or intermittent wetland basin. There are two low lying areas, within or near to portion 181. Both were probably permanent or intermittent wetland basins prior to the cutting of drainage channels by Europeans to drain and basins for agriculture. One is situated, north of Broughton Creek, across the north western corner of the portion, and forms the lower catchment of a small tributary streamline.

The other is situated just south and outside of the portion and forms the upper catchment of a small tributary draining the valley floor. Either of these may have supported a natural 'meadow' community and could have been associated with Woods' occupation of the valley floor. The northern basin, being situated mostly within Woods' property is therefore the most likely of these two options (**Figure 4-4** to **Figure 4-9**).

If the meadow reference is to a man-made clearing in the forest, then it probably refers to a cleared area on Wood's 100 acres. In this case, somewhere in close proximity to the site of the former homestead would be the most likely location. A number of remnant pine trees marks the location of a former homestead on this portion, and is located just south of the Broughton Creek, on the low gradient basal slopes.

The boundary of portion 181, and the location of the two former wetland basins, and the homestead site are shown in **Figure 4-10**. Taken together, they provide an area of potential, near to, or within which, the Aboriginal Battle ground is likely to have been located. If a buffer of 200 metres is allowed for, this area of potential consists of 136.6 hectares.

Together with the intangible cultural values of this place, there is an associated potential for archaeological remains in the form of burials.

Figure 4-4: Looking east along a drainage channel within a former wetland basin in the northwestern section of Richard Woods' land holding. This is a possible location for a natural 'Meadow' on Dicky Woods' property

Figure 4-5: Looking south towards Broughton Creek at the location of a proposed bridge crossing on the bypass alignment. This part of the alignment is situated within Dicky Woods' former land holding (portion 181)

Figure 4-6: View looking south from Thompson Road towards Harley Hill. The former wetland basin in Richard Woods' land holding is in the middle distance. Was Harley Hill the 'Little Mountain'?

Figure 4-7: A more distant view, looking south-east, of the same proposed bridge crossing site shown in Figure 4-4 (above). Note former wetland basin in middle left of picture

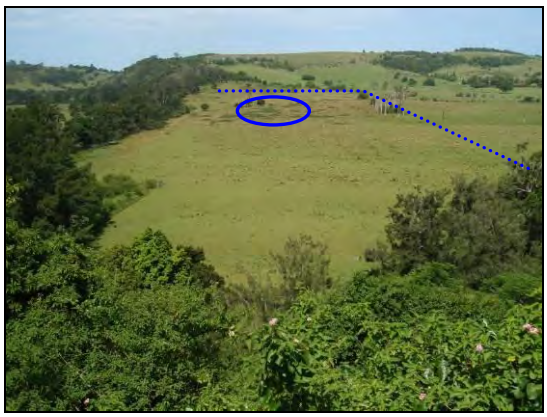

Figure 4-8: View from the current highway, looking east towards that part of portion 181 situated south of Broughton Creek. The southern boundary is shown as a dotted blue line and the former homestead site is circled. If Dicky Woods' Meadow was a man-made forest clearing it was probably situated on these flats adjacent to the homestead.

Figure 4-9: View from the current highway looking south-east towards the former wetland basin situated to the south of Dicky Woods' land holding.

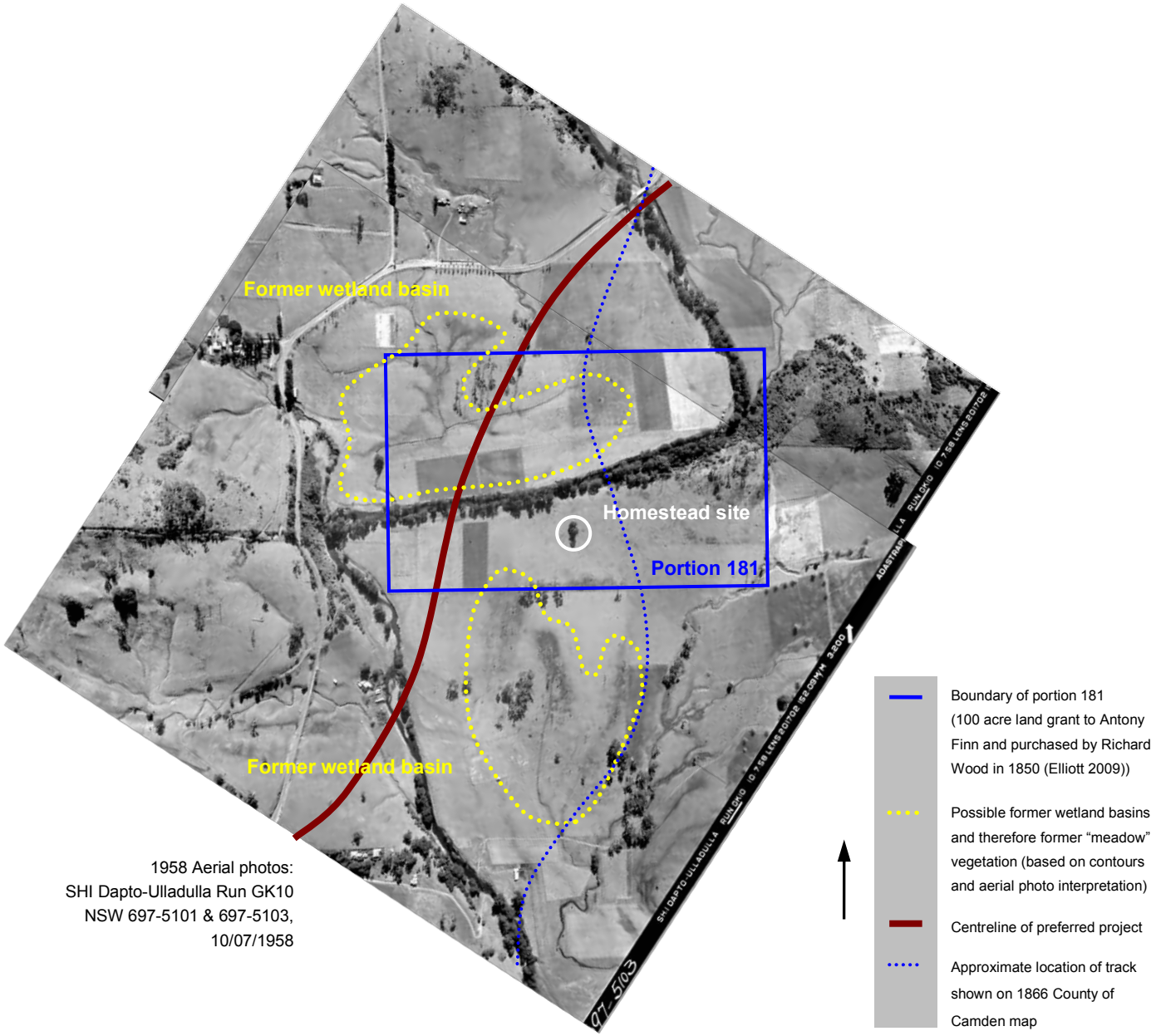

Figure 4-10: The possible locations of Dicky Woods' Meadow can be determined based on the potential for former natural wetland basins and the location of Woods' former land holding (portion 181)

4.4.3 Historical Aboriginal encampments at Berry (G2B A39)

The documentary and oral evidence indicates that there were at least two phases of Aboriginal encampment in the Berry area since the establishment of the Berry Estate. The first was the Boongaree encampment, noted in the 1820s and centred on a 'Meadow' on the north side of the junction of the Broughton and Broughton Mill Creeks. The second was the establishment of temporary seasonal encampments by Aboriginal crop pickers, in the middle decades of the twentieth century on the Broughton Mill Creek flats on the eastern margin of Berry (NOHC 2009b).

The proposal to construct a roundabout at the intersection of Woodhill Mountain Road and the current highway, places the project within the potential areas of these two encampment phases. It is a possibility that nineteenth century Aboriginal occupation, related to the Boongaree encampment, may have extended upstream along the Broughton Mill Creek flats as far as the Pulman Street spurline. The same flats, in the general area of the Berry bowling club, are remembered as the site of seasonal pickers camps.

The area within which Aboriginal encampments from either of these phases may have been situated in the relative proximity of the project area has been identified as recording G2B A39 (refer section 6.2.3).

Boongaree Aboriginal Encampment

Historical research conducted by local historian Keith Campbell has revealed a number of reliable nineteenth century documentary sources indicating that an Aboriginal encampment known as Boon-ga-ree, existed on a semi or permanent basis during the 1820s on a clear area or 'meadow' at the junction of Broughton and Broughton Mill Creeks. The information presented here is based on notes kindly provided by Campbell (refer Appendix J). The camp was situated on the north side of the junction, between the two creeks and presumed to have extended northwards to where Pulman Street is today (**Figure 4-11**). The clearing was surrounded by thick brush (rainforest).

This area, adjacent to the creek junction, was also the location in November 1825, where the first Broughton Creek settlers, seven free sawyers employed by Alexander Berry, made their camp. A wharf, known as the 'Double Wharf', was later established at the creek junction to service the European community at Broughton Creek (Lidbetter 1993:3).

The Boongaree Aboriginal encampment is known to have been the birthplace of two historically important local Aboriginal identities, Broger (or Brogher) and Toodwick, who are recorded to be brothers. Toodwick, who was known to the European population as Broughton, established a strong friendship with Alexander Berry and was well respected by many other Europeans in the district. Broughton Head and Broughton Creek are named after Toodwick, the latter also being the original name for the township of Berry.

Broger was especially noted for being attached to Boongaree, and widely known for calling it 'his place' (refer Campbell's notes in Appendix J).

Broger was found guilty of the murder of a local cedar sawyer John Rivett, and was subsequently hanged in Sydney in 1829 (Organ 1990: 159-161). Research by Campbell suggests that the circumstances surrounding the death of Rivett may have been complex and a consequence of previous conflicts between the Aboriginal community and the local sawyers (lecture presented by Keith Campbell, Nowra 2007). Brogers Creek is named after Broger.

Of relevance to Aboriginal encampments in the vicinity of Pulman St is the report of the discovery of an Aboriginal gorget in the bed of Broughton Mill Creek after a heavy flood in the vicinity of John Stewart's residence ('Mananga') in 1925. The gorget is described as crescent shaped, with a chain, and bearing the legend 'Neddy Noora Shoal Haven 1834' (The Shoalhaven Telegraph, Nowra, July 10 1925, Organ 1990:389).

Neddy Noora is recorded as a 'chief' of the Shoalhaven tribe who acted as a guide (together with Broughton) to the Surveyor-general John Oxley when he explored the Shoalhaven and Jervis bay areas in 1819. The discovery of the gorget in the creek bed next to Stewart's residence, lends support to the contention that nineteenth century Aboriginal encampments may have extended as far as the vicinity of Pulman Street, possibly acting as 'fringe' encampments on the floodplain and situated close to the resources and employment offered by the mid nineteenth century European settlement on this ridgeline.

If the hypothesis that nineteenth century Aboriginal camps extended upstream this far, and in deliberate association with the European settlement, then it is worth noting that the twentieth century encampments at Berry (refer below) would represent an extension of this Aboriginal occupation pattern.

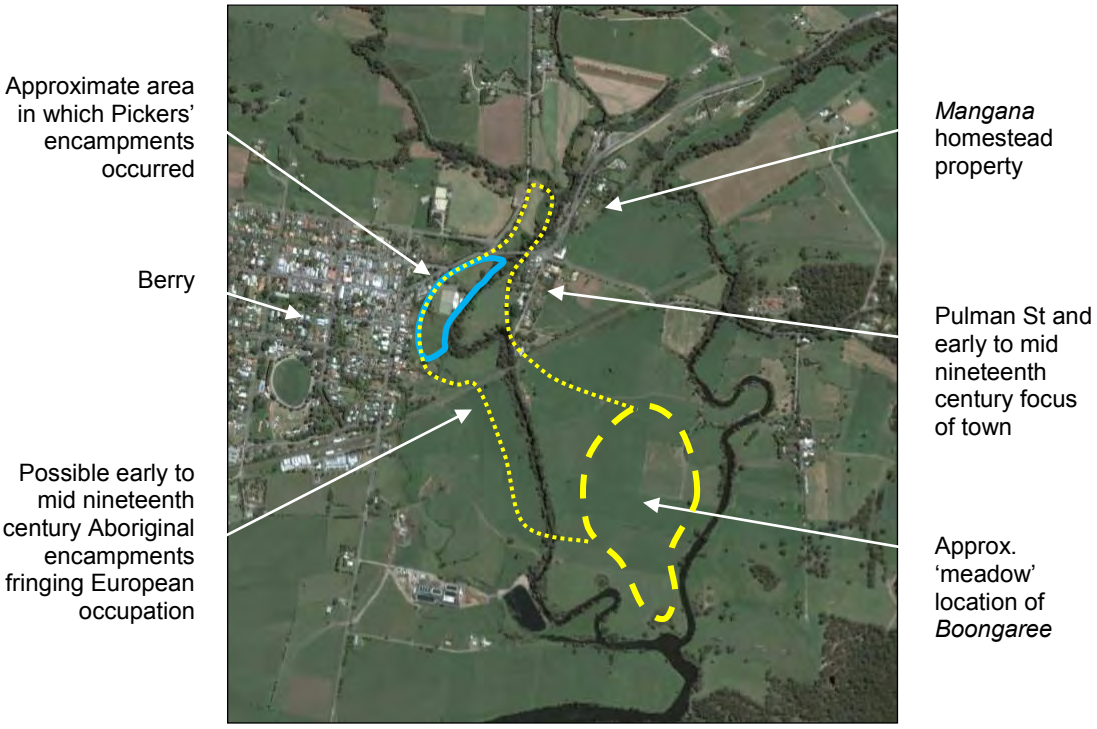

Figure 4-11: Aerial photograph with the approximate location of the twentieth century Pickers' encampments (blue line), and the nineteenth century Aboriginal encampment *Bongaree* (dashed yellow line). The dotted yellow line shows the conjectured possible extension of Aboriginal camping from Boongaree to the flats adjacent to the Pulman Street ridge, where early to mid nineteenth century European settlement was focused. (base image from Google Earth 2009).

Berry Pickers Encampments

A variety of oral histories corroborate the presence of seasonal encampments by Aboriginal crop pickers along the Broughton Mill Creek flats (DEC 2004, NOHC 2009b, RTA 2009). These memories span from the 1930s up to the 1960s and possibly later.

Barbara Timbery was born at Roseby Park in 1913. She recalls camping at the Berry Camp and being employed to pick beans on the local farms. The camp was situated on Broughton Creek, just before you get to the town, 'That's where we camped. There near the creek. That's up where the hospital is, across the bridge there. There's a club there now, but that's where we camped back then' (Barbara Timbery in DEC 2004:41). Her reference to the club indicates that the camp was situated on the western flats of Broughton Mill Creek, where the Berry Bowling Club is now situated (**Figure 4-12**).

Mary Lidbetter (born 1938), local historian and Berry resident since 1956, recounts that "the Aboriginals would come over here [to Berry] pea picking, and they would be brought in from Bomaderry Mission and left in town for the pea-pickers trucks to come [in from various farms in the area] and pick them up …". At the end of each day they would be brought back to Berry. The ladies would wander into Mary Lidbetter's shop for "their reel of cotton or stickybeak or what have you" and the men would congregate in Tom Lidbetter's saddlery shop. Apparently, the men were told by their elders, "While you're waiting for the truck, you do not hang around the street, you do not go to the pub, you go to Lidbetter's shop". "…. one of their later sites, this is after farming and people moving in and all the rest was the site of the bowling green, Berry bowling green."

Lily Toohey (born 1914), Berry resident since 1934, can remember Aboriginal people camping annually in an old shed on the flats below Pulman Street. "Where the ground goes down towards the railway station there was an old shed down there and the Aboriginals used to come from further down to pick peas and beans and all that sort of thing." "…all that top where those houses are now on Pulman Street Mr Watson grew all peas and beans there in season and he used to hire these Aboriginals to come and pick his peas and beans and that was on that side [the east side of Pulman Street] and we were the only house on that side.

Figure 4-12: The flats where the Berry Bowling Club is now situated is the reported location of a former Aboriginal historic encampment. View looking south from the Princes Highway.

4.4.4 Toolijooa Ridge Aboriginal cultural landscape (TRACL)

Toolijooa Ridge is a locally prominent ridgeline which extends across the coastal plain, southwards from Currys Mountain, (east of Foxground), to Toolijooa and Harley Hill in the south, (adjacent to Foys Swamp) (**Figure 4-13**).

Information collected in 1991 from a local community questionnaire by Donlon revealed a local oral tradition that 'an old cattle trail now running along Toolijooa Ridge and down towards the coast actually follows an old Aboriginal trail which had its origins in Foxground.

In addition, ‘on Toolijooa Hill, close to this trail, there is thought to be a fairly open area associated with a stand of Lilli Pilli trees, a stone arrangement and bora ring. Stone artefacts have also been found by locals on the north saddle close to this trail’ (Donlon 1991a:13).

The location of the reported stone arrangement and bora ring is not known.

This information is supported by a note on the Department of Environment and Conservation (DEC) site card for site 52-5-0399 compiled by Stuart Huys in 1999 during the Eastern Gas Pipeline investigations. He notes that artefactual deposits identified on the [Toolijooa – Harley Hill] spur are probably representative of ‘sporadic movement’ by Aboriginal people utilising the spurline as an ‘occasional walking route from the coastal hinterland down to the coastline around Gerroa’ (DEC site card site card no. 52-5-0399).

The crest and prominent slopes of the ridgeline are recognised as having cultural significance by contemporary local Aboriginal groups, both for the ridge’s significance as an Aboriginal pathway, and its ecological importance as a wildlife corridor.

Figure 4-13: Panoramic view of Toolijooa Ridge, looking west. Bellawongarah Mountain is located in the upper far distance.

4.4.5 Large and old growth fig trees

Many of the Aboriginal stakeholders who have participated in the consultation program have stated or concurred with a view that large and old growth fig trees within the Illawarra region are of high Aboriginal cultural value (**Figure 4-14**). The reasons for, and justification of this stated value varies across the different stakeholders. The validity of some justifications was disputed by varying stakeholders, and in other cases the informant’s right to speak for, or on the issue was also debated.

In summary some of the stated reasons for the significance of the trees are:

- The well developed buttresses of the mature trees were used by Aboriginal people as shelter and weather breaks, and often therefore used as camp sites. This is a practice remembered to occur well into the twentieth century.
- Fig trees were a good source of food, including figs in season, and the animals that lived on them (possum, fruit bats).
- The trees are associated with the spirit of the Yaroma. The Yaroma is a creature resembling a man but of greater size and strength, with longer teeth and hair all over their body. The Yaroma is described as a strong and dangerous creature that may be concealed within a fig tree and which may ambush unsuspecting passers-by. For ethnographic accounts of the Yaroma see R.H. Mathews (1904:361; 1907:26), A. Mackenzie (1874:250-251), and J. Mathews (1994:132-133). In some cases, marks evident in the tree bark are explained as the result of Yaromas sharpening their long teeth.
- Mature fig trees are associated with birthing and women’s lore (not described here due to cultural sensitivity). In some examples, notches were made along limbs to signify births into a tribe or family group.

Figure 4-14: A large mature fig tree (MFT15) on the eastern bank of Broughton Creek (Broughton Village)

5 Aboriginal archaeological context

5.1 Regional overview

The New South Wales South Coast and its hinterlands has been the subject of extensive archaeological research and impact assessments over the last forty years, much of it concentrated along the coastline and estuaries. These include studies conducted within an academic research framework, recordings by interested amateurs and surveys and assessments of areas under consideration for development.

The results of these surveys vary according to macro and micro topographic and environmental factors, ground surface visibility and the degree of previous landscape disturbance. Site types recorded in this region include rock shelters with art and/or cultural deposit, grinding grooves, artefact scatters, scarred trees, coastal and estuarine middens and burials.

The majority of archaeological sites located in this region date from the last 6,000 years, following the stabilisation of the sea level to approximately the present level (the Holocene Stillstand). Stable sea levels promoted the formation of estuaries, mangrove flats and coastal sand barriers which in turn increased the biomass, ecological diversity, and resource predictability for the Aboriginal residents of the coast and hinterland.

It is likely that this evolution of coastal environments promoted higher population densities and more intensive exploitation patterns. In contrast, occupation in the same areas during the late Pleistocene, that is prior to 10,000 years BP (before present), may have been sporadic and the Aboriginal population relatively small. However, Boot suggests that coastal hinterland sites older than 6000 years BP are more common than previously suggested, and that Pleistocene occupation may not have been as sporadic as previously thought (Boot 1996a).

Sites older than 6,000 years are rarely detected by archaeologists and are mostly limited to deep deposits surviving either in rock shelters or stable aggrading landforms. Occupation in these times may similarly have focused on the coast, which was then lower and situated further east. Sites relating to this occupation have now either been destroyed by rising seas, or are now submerged. To date, two coastal sites, Bass Point (Bowdler 1970) and Burrill Lake (Lampert 1971), provide evidence of Pleistocene Aboriginal occupation of the south coast dating to 17,000 and 20,000 years BP (Before Present) respectively. Prior to the rise in sea levels these sites would have been located some 14 kilometres inland. Excavation of rock shelters near Currarong provided potential occupation to 7,000 BP (Lampert 1971).

Investigations into the occupation of the coastal hinterland have been undertaken with major studies such as those by Bindon (1976), Poiner (1976), Byrne (1983), Sefton (1984), Officer (1991a), Boot (1993, 1994, 1996a, 1996b) and Knight (1996). Boot (1994) concluded that all areas of the hinterland were accessed, but that the major river valleys were favoured over other environments. Major ridgelines were also the focus of activity. He argues that the character of this early inland occupation on the NSW south coast was based on long-term residence rather than “fleeting forays” from the coast.

The most frequently encountered site types in the coastal hinterland are small surface scatters of stone artefacts, referred to sometimes as 'open camp sites' and more recently as surface artefact occurrences. A growing corpus of evidence from archaeological test excavations indicates that most surface scatters are indicative of larger subsurface artefact occurrences. Both surface and subsurface artefact occurrences are closely related to locally elevated, well-drained and low gradient ground adjacent to freshwater sources.

Based on present evidence, the most common lithic materials utilised by the Aborigines of the southern Illawarra and Shoalhaven districts were chert, quartz, silcrete, silicified wood and 'indurated mudstone' (the latter rock type has often been misidentified in the past, and most recordings are probably a form of tuff).

5.2 The local area

Seventy four Aboriginal sites had been recorded in an area 26 x 19 kilometres, around and including the Gerringong to Bomaderry upgrade study area, prior to the commencement of the Gerringong to Bomaderry upgrade cultural heritage studies. Sites comprised 32 artefact scatters, 19 shell middens, seven isolated finds, seven rock shelters with art and/or deposit and/or rock engravings, one natural mythological site, one bora/ceremonial site, one midden/artefact scatter, one PAD, four axe grinding groove sites, and one Aboriginal Place at Foxground.

A review of previous studies conducted in close proximity to the project area is provided below.

5.2.1 The Gerringong to Bomaderry Princes Highway upgrade

A number of cultural heritage assessments have been conducted for the upgrade of the Princes Highway between Gerringong and Bomaderry. Of particular relevance to the current study are the results of the Gerringong upgrade archaeological subsurface testing program.

The program of archaeological collection and subsurface testing was undertaken in 2010 by NOHC. One hundred and thirty seven test pits were excavated by machine within PASAs 32-39 in the Gerringong upgrade. One hundred and forty six stone artefacts were recovered from 42 pits and four PASAs (32-33, 37, 38 and 39), comprising 20 different assemblage elements. No artefacts were recovered from PASA36 or PASA34/35.

Flakes dominated the lithic assemblage at 56 per cent, while flaked pieces were far less common (12 per cent). Microblades and backed artefacts each made up five per cent of the assemblage. The combined 10 per cent of the assemblage comprised on these objects suggests in situ backed artefact production may have taken place at some of the locations investigated during the test excavation program. Most of the remaining artefact types made up less than three per cent of the assemblage.

Chert was the dominant raw material at all sites. Chalcedony and banded chert were rarer. Silcrete was also common, making up a quarter of the assemblage. Quartz and quartzite were present but uncommon, while volcanic stone and sandstone was rare.

Comparison of the relationship between assemblage size and the diversity of artefact types (or 'richness') for 40 eastern Australian sites indicated that all PASA assemblages except PASA39 had higher than average richness. High assemblage richness implies a greater range of technological activities were carried out in these areas than is typical for eastern Australian sites, suggesting that base camps with diverse subsistence and technological activities were present in the Gerringong upgrade corridor.

The positioning of PASAs 32-33, PASA37, and PASA38 next to watercourses and wetlands and on terrain well-suited to habitation is consistent with this interpretation. The positioning of PASA 39 on the crest of a spurline in a mid-valley context some distance from water and presumably in a location of lower resource richness than the other locations, may explain lower than average richness.

The strongest conclusion that could be drawn from the test results from the Gerringong upgrade study area was that the archaeological resource of the Illawarra coastal plain can only be effectively identified and assessed through the combined application of archaeological excavation and the progressive development of predictive modelling.

Although the study area constitutes a very limited sample of the topographies of the coastal plain, there was a strong indication that relatively high archaeological sensitivity could be associated with locally elevated micro-topographies within a 200 metre margin around former wetland basins. Examples include low gradient basal slopes and the crests of low spurs.

5.2.2 Foxground

Caryll Sefton carried out an archaeological survey for a proposed extension to a gravel quarry on Free Selectors Road at Foxground located three kilometres north of the project area (Sefton 1988). No archaeological sites were identified in Sefton's survey.

Officer (1991b) conducted a detailed recording of the Foxground engraving site. The Foxground engraving site is situated on the Illawarra Escarpment, to the north of the project area, and consists of two shallow rock shelters which have formed by cavernous weathering in the sides of a large sandstone tor.

At least 81 art graphics have been recorded at the site, many are now faded or indistinct (**Figure 5-1**). Seventy four of the graphics consist of engravings (shallow surface carvings) with the remainder made using pigment. All of the engravings consist of animal track motifs including kangaroo, emu, and smaller bird and hopping animals. Many of the motifs are arranged as tracks and shown in 'hopping' pairs. The pigment art consists of hand stencils and other mostly indeterminate fragments (Officer 1991b).

The site is considered to have high cultural significance by the local Koori community. The rarity of the site and the isolated location suggests a ritual and restricted purpose. The physical form of the site and the nature of the art are considered to be suggestive of a burial cave and initiation area (Officer 1991b).

The Foxground site is of high regional archaeological significance. This is based on the rarity, and stylistic characteristics of the art it contains, and the future research potential of both the art and archaeological deposits (Officer 1991b).

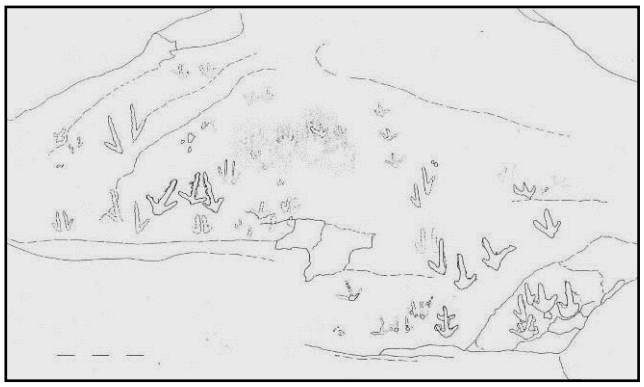

Figure 5-1: A panel of engraved and pigment rock art from the Foxground engraving site (scale interval is 5 x 10 cm) (Officer 1991a and 1991b)

5.2.3 Berry

Four archaeological sites were recorded by Corkill in the vicinity of Berry during fieldwork associated with her thesis on the lower Shoalhaven Valley (Corkill 1986). Three were situated in the area of Moeyan Hill and consisted of an artefact scatter of ten small flakes, a grinding groove and a scarred tree. Another site was identified approximately one kilometre north of the town on Connolly's Creek. This was described as an open camp site consisting of five flakes found in disturbed contexts in an area 100 metres x 30 metres.

In 1991 Donlon conducted a preliminary archaeological survey of the proposed routes for the upgrading of the Princes Highway between Gerringong and Berry (Donlon 1991a). Targeted survey was conducted along portions of the route options considered to be archaeologically sensitive. One site, an isolated find (a hammerstone) was identified in an upper gully on Toolijooa Ridge.

An isolated find was recorded by Kuskie (1998) during the survey of a proposed subdivision on the southwestern margin of Berry. The find was located on a spoil heap adjacent to a channelised and unnamed ephemeral watercourse.

Paton carried out an archaeological study for the Berry sewerage overflow development in 1999. No sites were located during the study (Paton 1999).

Surveys for the Environmental Impact Statement (EIS) for the Eastern Gas Pipeline (EGP) were conducted to the north and west of Berry in 1995 (Kuskie, Navin & Officer 1995). An artefact scatter, NPWS site #52-2-308, was recorded near Connollys Creek in the course of the survey.

Subsequent works relating to the Eastern Gas Pipeline were conducted by Australian Archaeological Survey Consultants (AASC). These included extensive archaeological survey, subsurface testing and salvage. However little or no information is available documenting these works and the OEH states that final reports for the subsurface investigation and salvage programs for the EGP have not been provided (pers. comm. Dr Phillip Boot, OEH February 2007). Consequently data tends to be cursory, preliminary in nature, and inconsistent in the variables reported.

Of the eight EGP subsurface testing locations within the broader Gerringong to Bomaderry route selection study area, all but two returned subsurface artefacts. Test sites consisted almost exclusively of locally elevated topographies adjacent to major creek lines. A test excavation was also conducted on the Toolijooa Ridge crest. The test locations which did not reveal artefacts were located on the bank of Ooaree Creek on Omega Flat, and the bank of Broughton Creek near Broughton Village. Most of the archaeological deposits encountered appeared to consist of very low to low density distributions of stone artefacts, situated within or near riparian corridors. Low density artefact occurrences were also revealed on major ridge crests, such as Toolijooa Ridge.

In 1998 ERM Mitchell McCotter prepared an EIS for a North Berry bypass (1998 draft). An archaeological survey was conducted for the study, however, no Aboriginal sites were identified and this was considered to be a product of poor ground surface visibility. It was concluded that there was moderate to high potential for Aboriginal sites to remain undetected in the study area.

In 2000 NOHC undertook a survey of Woodside Park, a dairy farm of 120 ha located to the east of the township of Berry. One Aboriginal site, a very low density scatter of stone artefacts (referred to as 'Woodside Park 1'), was located in the course of the survey. The artefacts were visible on an unformed farm track on the upper slopes and crest of a major spurline.

No Aboriginal sites were identified in the course of an archaeological survey for the proposed upgrade of the intersection of the Princes Highway and Tindalls Lane, just north of Berry (NOHC 2006).

Table 5-1 provides a list of previously recorded Aboriginal sites within the general region of the project area.

5.3 The project area

5.3.1 Recorded Aboriginal archaeological sites

No Aboriginal sites had been recorded within the project area prior to the commencement of the Gerringong to Bomaderry Princes Highway upgrade project.

5.3.2 Reported Aboriginal sites and places

Information collected from a local community questionnaire for a previous highway upgrade option analysis (Donlon 1991:12-13) revealed the following anecdotal information:

- Aboriginal artefacts have been observed and collected along the banks of Broughton Creek in the vicinity of 'Brookside', Broughton Village.
- A stone arrangement and bora ring is reportedly located in a 'fairly open area associated with Lilli Pilli trees on Toolijooa Hill. The location of this reported site is not known.

Table 5-1: Information relating to Aboriginal sites and archaeological subsurface investigations recorded within the general region of the project area

(Note: map references have been removed from this table to protect site locations)

OEH site number	Site name	Site type	No. of surface artefacts pre-construction	No. of test pits	No. artefacts recovered from test pits (permit docs)	No. of recovered artefacts (OEH site card)	Comments	OEH permit/ consent ID
Recordings made during survey and salvage programs for the Eastern Gas Pipeline								
52-5-0308	EGP 3-29, Connollys Creek	Surface artefact occurrence	5					
52-5-0399	TPA9 [Toolijooa Ridge]	Subsurface artefact occurrence		18	0 (but see site card note)	Site card states low density subsurface material present	Site card states artefacts were recovered from the flat spine of a spur, and that low density *subsurface* artefactual material was present along 100 metre section of route across spur This is the spurline between Toolijooa and Harley Hills	SZCHU0037
52-5-0395	TPA7 Duke 8 [Gembrook]	Surface and subsurface artefact occurrence	8	39	1		Artefacts exposed along vehicle track on small spur adjacent to Broughton Creek	SZCHU0039
52-5-0410	TPA6 [Broughton Mill Creek]	Subsurface artefact occurrence		12	6		Site content information on site card has been lost	SZCHU0041
-	TPA8 [Broughton Creek]	Not a site		6	0		A test pitting location on the west of Broughton Creek near Broughton Village	SZCHU0043
52-5-0396	TPA4 [Bundewallah Creek]	Subsurface artefact occurrence		pits on both creek banks		10	Site card states pits dug on the northern and southern banks of Bundewallah Creek	
52-5-0426	Test Pitting Area 9 (TPA9), northern section [Toolijooa Ridge]	Subsurface artefact occurrence				6 salvaged from surface after pipeline trenching		

OEH site number	Site name	Site type	No. of surface artefacts pre-construction	No. of test pits	No. artefacts recovered from test pits (permit docs)	No. of recovered artefacts (OEH site card)	Comments	OEH permit/ consent ID
Recordings made during other investigations								
52-5-0351	Berry 1	Surface isolated find	1				Located on spoil heap adjacent to excavated creek channel	
52-5-0380	Woodside Park 1	Surface artefact occurrence	6				Located on spurline crest to east of Broughton Creek, Berry	
-	Isolated Find [Toolijooa Ridge]	Surface isolated find	1				A hammerstone located on an eroded bank above a dry gully, on the western side of Toolijooa Ridge; Information from Donlon (1991)	

5.4 Site location model

5.4.1 Influencing factors

The existing Aboriginal site database for the southern Illawarra coastal plain and escarpment slopes is dominated by the visually obtrusive and more eroded sites associated with coastal margin sand bodies and the active littoral zone (primarily middens), and is largely silent regarding hinterland sites.

A review of previous archaeological assessments across the southern Illawarra coastal plain reveals that the conduct of subsurface testing programs as part of environmental assessments has not been consistent across the landforms within the plain. Most excavations have been conducted in rock shelters or within sand bodies along coastal and estuarine margins. Relatively little information exists for the hinterland and basal slopes adjacent to the escarpment.

However, based on the results of previous archaeological investigations within the Gerringong to Bomaderry upgrade study area, the Gerringong upgrade study area, the broader region and comparable landforms elsewhere on the NSW south coast, a set of predictive statements can be made about the nature and incidence of the Aboriginal archaeological resource within the project area.

The following model is necessarily broad, and tends to be inclusive and generic. However, the results of the Gerringong upgrade subsurface testing program have facilitated refinements to the model that was presented in NOHC 2007.

The strongest conclusion that can be drawn from the test results from the Gerringong upgrade study area is that the archaeological resource of the Illawarra coastal plain can only be effectively identified and assessed through the combined application of archaeological excavation and the progressive development of predictive modelling. Based on the results, the relative absence of site recordings from the hinterland can be reliably explained as a consequence of low ground surface visibility rather than a low intensity of Aboriginal activity.

Although the Gerringong upgrade study area constitutes a very limited sample of the topographies of the coastal plain, there is a strong indication that a relatively high archaeological sensitivity can be associated with certain micro-topographies within a 200 metre margin around former wetland basins. The Omega Flat basin has relatively well defined boundaries, which makes the identification of this sensitive zone relatively straightforward. Elsewhere across the plain, the identification of this zone could be more problematic where in some cases there is a low gradient interface between the former wetland and the upstream valley floor alluvium. It is probable that in such contexts archaeological potential would be limited to locally elevated micro-topographies.

The conclusion regarding wetland basin margins has implications for the role of the natural ‘Meadows’ in the Aboriginal habitation of the Southern Illawarra coastal plain. The ‘meadows’, which were an early attraction for Europeans seeking natural pastures for their stock animals, appear to have been a consequence of natural patterns of permanent or intermittent inundation. As such they were probably wetland basins, and may not have been limited to infilled estuaries, such as Omega Flat, Coomonderry Swamp or the Lower Broughton Creek floodplain. The ethno-historical recording of ‘Dicky Wood’s Meadow’ at Broughton Village is one example where a ‘Meadow’ may have occupied a valley floor with no prior estuarine origin. The identification of potentially archaeologically sensitive landforms within the margins of the former meadow lands will be an objective of future archaeological assessment across the Southern Illawarra.

Based on the Gerringong upgrade results, the archaeological sensitivity of the alluvial flats that dominate the valley floor must be considered to be low. The only artefact finds within this category were low in incidence and only where a higher order drainage line (three or greater) was within 50 metres, or where locally elevated basal slopes with archaeological deposits were situated just upslope. Possible reasons for this may include cold air drainage, the presence of dense vegetation, and poorly drained or damp ground.

The predicted increased archaeological sensitivity associated with the riparian zones of higher order streams was, however, not strongly supported by the Gerringong upgrade results. The absence of sites in these areas may partly be explained by the potential periodic loss of the upper profile from flood scouring, however this is not a compelling argument on its own. Further investigation of higher order riparian corridors is required to better define the model in this area. One possible factor is the downstream distance to a wetland basin margin. Most of the higher order streams in the Southern Illawarra drain to a still active or former (now drained) basin prior to discharging into the sea. If the margins of the basins were a focus for Aboriginal occupation (as evidenced by the results of the Gerringong upgrade study), then it could be expected that an associated zone upstream and upslope of this focus may have been correspondingly underutilised for activities such as base and interim camping. This may have been despite the presence of high amenity camping locations.

Along the Eastern Gas pipeline, a relatively consistent correlation emerged for subsurface artefact occurrences in association with most crossings of larger order streams (various unpublished records, reported in NOHC 2007). Although this superficially appears contrary to the riparian corridors tested in the Gerringong upgrade study area, an important difference may be the substantial distance between the majority of the pipeline easement and the lower streamline reaches and their associated wetland basins. Most of the tested riparian corridors were many kilometres from the wetland basins of the coastal plain.

Other factors influencing site location may have been the use of watersheds and other prominent or strategic spurlines as cross-country travel routes. Spurlines may have served as convenient travel routes from the coastal plain to the tops of the ridges and the lowlands beyond.

The following implications were drawn from the results of the Gerringong upgrade study:

- Valley floor contexts, on alluvium and which are not in the proximity of higher order (3rd or greater) riparian zones are likely to have low archaeological sensitivity. Testing within this landform need not be extensive and could be limited to a small number of test pits separated by long intervals along transects.
- Locally elevated, well drained and low gradient micro-topographies situated within the valley floor (such as terrace edges), may be an exception to the low sensitivity of the valley floor alluvium and should be subject to testing.
- Riparian corridors associated with higher order streams require testing to better define archaeological sensitivity and possible geographical determinates of artefact incidence.
- Locally elevated, well-drained and low gradient micro-topographies within 200 metres of known or predicted former wetland basins are likely to have high archaeological sensitivity and should be tested.
- The archaeological sensitivity of ridge and spurline crests and slopes requires further investigation, especially with regard to variables such as possible cross-country travel routes and distance from lower catchment wetland basins.

5.4.2 Micro-topographic variables

Aboriginal archaeological material is likely to be present in varying densities across all broad topographic zones. This material commonly consists of surface or subsurface stone artefacts, but may also include other occupational remains, such as shell midden or hearth material.

Sites where camping or food and other resource processing occurred are often characterised by higher densities of archaeological material and the location of such sites can be predicted by the presence and combination of specific micro-topographic traits. These may include:

- Low gradient or relatively level (valley floor) ground in proximity of higher order (3rd or greater).
- A sheltered context from prevailing harsh weather conditions, such as wind or heat.
- The absence of significant surface rock or gravels.
- Proximity to a freshwater source.
- Proximity to resource zones (such as a littoral or freshwater shoreline).
- A well drained and locally elevated context.

The following landforms are consistent with some or all of these traits and can be classed as archaeologically sensitive:

- Low gradient basal slopes (including colluvial deposits and alluvial fans) adjacent to the valley floor.
- The lower elevation or terminal section of major spurs and ridgelines where they adjoin or traverse the valley floor.
- Level or low gradient ground on the crests of spurs and ridgelines.
- The downslope margin of alluvial terraces.
- The banks of rivers and creeks where they are locally elevated and well drained.
- The locally elevated margins of wetland basins.
- Locally elevated sand bodies outside of coastal barrier or dune systems, such as fossil beach ridges on the margins and flats of infilled estuaries, and source bordering dunes.

5.4.3 General site locations trends and patterns

Due to dense grass cover and low ground surface visibility, most archaeological deposits present within the project area will not be evidenced by visible surface artefacts.

Most Aboriginal archaeological sites tend to be situated at or close to ecotones – the boundaries where different environmental zones meet. This probably relates to the need to find amenable campsites with access to water, and to minimise distances to exploitable resources.

Ridges and spurlines which due to their length, elevation, gradient and alignment, provide effective through-access corridors within and across the coastal plain, are likely to have been used as pathways by travelling Aboriginal people.

As a consequence of transit and interim camping activity, level ground on the crests of these spurs and ridges are likely to include low to moderate density artefact occurrences. The larger and more dominant ridgelines (such as watersheds) are likely to contain more continuous and higher density artefactual material compared to lesser landform corridors. The incidence and density of archaeological material on ridge and spurline crests may increase with proximity to freshwater and the coastal plain.

The crests of ridgeline saddles are likely to contain artefact occurrences, especially where a saddle provides an efficient cross-country travel route due either to its low elevation, or strategic position relative to ridgelines.

The crests and basal slopes of low relief spurs which extend into and across the flood and wetland basins of the lower Shoalhaven valley were likely to have been a focus for Aboriginal occupation. This is due to their well drained and elevated context in close proximity to a range of resource zones and water sources. Sites most likely to occur in these contexts consist of stone artefact occurrences.

Older archaeological deposits including middens and artefact occurrences may occur subsurface on remnant or aggrading landforms such as dunes, fossil beach ridges and shoreline features, alluvial terraces and fans, colluvial slope deposits, and source bordering dunes. Where these deposits occur on or near the boundary between the valley floor and the adjacent bedrock slopes there is potential for archaeological deposits to date from the period when this boundary marked a coastal and then estuarine shoreline following the sea level rise between 6000 and 5000 years ago.

5.4.4 Site types

Artefact occurrences

Artefact occurrences may consist of a surface and/or subsurface distribution of artefacts, which in nearly all cases are limited to stone artefacts. In exceptional cases, (such as in swamp deposits) artefacts made of organic materials such as wood or bone may be present. Subsurface artefacts may be associated with features such as hearth remains. Surface artefact occurrences may be further categorised as isolated finds, or artefact scatters. Subsurface distributions of artefacts, by definition comprise an archaeological deposit. Artefact occurrences outside of rock shelters are sometimes referred to as open camp sites.

Artefact occurrences may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting and gathering activities, domestic camps, or the manufacture and maintenance of stone tools. The density of artefacts represented in these scatters can vary considerably between and across individual sites.

Artefact occurrences, detectable as isolated finds, scatters of surface artefacts, or subsurface distributions (archaeological deposits), are likely to be the most common site type within the project area.

Of the six archaeological deposits with subsurface artefact distributions, investigated to date for the Princes Highway upgrade project, the average artefact incidence per site has ranged from 2.5 to 10.0 artefacts per square metre of tested archaeological deposit. The depth of the artefacts have ranged from the top 100 millimetres to a maximum of 700 millimetres, with most artefacts occurring between the surface and 400 millimetres (refer **Table 5-2**).

Artefact occurrences are most likely to occur on level and well drained ground, and situated adjacent to a source of freshwater (such as a river, creek or wetland), to a resource zone such as a marine or estuary shoreline, or along the crests of spurs and ridgelines.

Isolated finds can occur anywhere in the landscape and may represent the random loss or deliberate discard of artefacts, or the remains of dispersed artefact scatters. Given the low levels of ground surface visibility in the project area, an isolated surface find may be indicative of a larger and subsurface distribution within the underlying soil profile.

Table 5-2: Summary of artefact incidence across archaeological deposits tested to date for the Princes Highway upgrade project

PASA ID	Current site ID	No. of test pits	No of test pits with artefacts	No. of artefacts recovered	Overall artefact incidence (across area of all test pits) a/m^2	Artefact incidence (across area of only pits with artefacts) a/m^2	Depth interval of all artefacts mm	Depth of most artefacts
32-33	A11&10	36	11 (30%)	14	0.76	2.5	100-500	100-200
37	A9	15	8 (53%)	42	5.72	10.0	0-700	200-400
38	A7	44	18 (41%)	76	3.36	8.4	0-600	100-300
39	A8	10	5 (50%)	14	2.80	5.6	0-400	0-200
31	A12	10	5 (50%)	16	2.46	4.0	100-400	200-300

a/m^2 – Artefacts per square meter

Estuarine middens

Estuarine middens are defined as a concentration of artefactual debris that includes a substantial proportion of estuarine shell species. They are located mostly in close proximity to estuarine environments. These middens generally contain a restricted range of shell species and limited stone and faunal material (Navin 1987).

Estuarine middens are most likely to occur on locally elevated, well drained and low gradient, ground which was formerly, or is currently situated close to an estuarine shoreline, especially when in proximity to a freshwater source.

Burials

Burials consist of buried human skeletal remains. They may occur singly or in groups and may display a range of body arrangements, grave goods or associated features such as earth mounding or stone cairns. Some burials of high status individuals were associated with the creation of carved trees and particular grave goods.

Burials of Aboriginal people in the historical period may be associated with encampments, fringe settlements, and mission or reserve lands. European cultural influences may be seen in burial orientation, arrangement, and surface features such as marker stones and ground borders.

The remains of prehistoric burials are most likely to be found in locally elevated landforms with a relatively deep profile of soft sediments such as aeolian dunes, beach ridges, and alluvial deposits such as levees, terraces and creek or river flats. Burials may also occur in association with midden or rock shelter deposits and are mentioned in historic accounts as being placed in hollow trees. Burials are frequently encountered on the South Coast in sand deposits near the entrance to major estuaries.

Stone arrangements and ceremonial grounds

This site type includes the grounds and remains of ceremonial activities, an example being the bunan, a male initiation ceremony (Mathews 1896). This ceremony included the construction of two earthen ring mounds separated by a pathway, along which carved trees and ground sculptures were constructed to instruct the initiates.

The potential archaeological remains from an Aboriginal ceremony may consist of hearths, a low incidence of discarded stone artefacts or ochre, arrangements of stones, low-relief ground features such as ditches, earthen mounds or rings, and scarred or carved trees. All but the stone artefacts are fragile in nature and highly vulnerable to natural processes of erosion, fire, and to gross disturbance from European landuse practices such as logging, vegetation clearance, ploughing, fencing, and the clearing of surface rock from paddocks. All of these factors have resulted in the archaeological manifestation of these sites being very rare.

It is more common on the NSW south coast for ceremonial sites to be known and identified from oral history or documentary accounts, than from archaeological evidence. If evidence of a ceremonial ground were to survive to the present day it may take the form of an arrangement of stones (but only where that land had not been subject to vegetation clearance, ploughing, cropping or other than low intensity stock grazing), or traces of former ground relief features (such as ring mounds, either as ground relief or a subsurface feature manifest as a crop or pasture mark).

Based on ethno-historic accounts and oral tradition, ceremonial grounds in the Southern Illawarra and Shoalhaven regions were situated on a variety of landform types, including coastal dunes, river flats, sandstone rock platforms, spurlines at the base of hills and ranges, and the tops of mountains.

Historical occupation sites

These sites contain evidence of Aboriginal occupation since the time of European occupation and are typically manifest by the presence of camping and occupation debris in industrial materials such as metal, ceramic, and glass. Many of these sites would be indistinguishable from European sites in the absence of oral or documentary evidence.

Sites dating from the late eighteenth to early nineteenth century are sometimes called ‘contact’ sites. This term refers to the short period when traditional Aboriginal society encountered and interacted with the European community and responded with changes in social, economic and occupational patterns. This response included the use and adaptation of new materials, reacting to the loss of territory, resources, and population loss. Evidence from this period could potentially include Aboriginal flaking of glass, art motifs depicting European people or objects, burials with historic grave goods or markers, and debris from 'fringe camps'.

Historical occupation sites typically consist of the remains of encampments, some of which were located adjacent to early European towns or homesteads. Sometimes referred to as fringe camps, these settlements were generally sited adjacent to a fresh water source such as a creek line, and adjacent but separate to the European settlements.

6 Results – field survey

6.1 Summary

Twenty nine Aboriginal heritage items were recorded within the project area as a result of the archaeological field survey component. These, comprised 25 archaeological recordings (archaeological sites and potential archaeologically sensitive areas (PASAs)), and four non-archaeological recordings of places of Aboriginal cultural heritage significance.
The archaeological recordings comprised:

- Twenty three PASAs, (PASA12-29 and 40-44).
- One artefact scatter (G2B A3).
- An isolated surface artefact in association with a PAD (G2B A38).

The non-archaeological recordings comprised: three places relating to historical events or occupation (G2B A13, 14 and 39), and one cultural landscape, the Toolijooa Ridge Aboriginal cultural landscape.

Two generalised Aboriginal cultural heritage values were also recognised; large and old growth fig trees, and Aboriginal burial sites. Twelve large and old growth fig trees have been recorded in or near to the project area (MFT12 – 23).

As a consequence of the test excavation program, 18 of the 21 PASAs subject to testing were determined to contain archaeological deposits (refer section 7.0). Based on these test results and the revised predictive site location model, the two untested PASAs are predicted to also contain archaeological deposits (refer section 7.5). The test results and model have also been applied in the post-field-program identification of a potential archaeological deposit (G2B PAD1). This PAD is situated in a portion of the project which has been revised subsequent to the conduct of the test program (refer Section 7.6).

6.2 Descriptions

There were only two archaeological sites within the project area which were identified on the basis of surface artefacts (G2B A3 and G2B A38). All other archaeological recordings were identified based on predictive modelling, either initially as potential archaeological sensitive areas (PASAs), or as a potential archaeological deposit.

6.2.1 Artefact occurrences

G2B A3

MGA references: [not included in this report version]

The site consists of four stone artefacts exposed within a drainage ditch and an associated excavated platform and upslope embankment. The artefacts are situated on low to moderately graded, north facing slopes which form the lower slopes of a descending spurline off Toolijooa Ridge. Relative to the spur cross section, the artefacts are situated on mid to upper slopes.

The artefacts occur within an interval of 160 metres and have been exposed as a result of mechanical ground disturbance (**Figure 6-1** and **Figure 6-2**). No artefacts were noted outside of mechanical exposures. All artefacts appear to be associated with the upper 10 to 20 centimetres of the exposed soil profile.

At the time of survey (April 2009), the net area of ground surface exposure was around 600 square metres, with an exposure incidence of 90 per cent and an average visibility within those exposures of 95 per cent. Given the high degree of visibility, it is considered that the low areal incidence of artefacts encountered (1/150 square metres), is a reliable indication of the artefact occurrence occurring in adjacent deposits on similar slopes.

The crest of the spur is located approximately 60 metres to the south of this site and, based on the predictive site location model, could be expected to contain a subsurface artefact distribution at a higher areal incidence than encountered on the adjacent slopes. The crest would be subject to direct impact from the bypass and has been identified as PASA 42.

Figure 6-1: G2B A3 - Looking upslope along drainage ditch in which artefacts are exposed

Figure 6-2: G2B A3 – Looking across excavated platform, artefacts are exposed along upslope edge of embankment

G2B A38

MGA reference: Artefact at: [not included in this report version]

This site consists of a single surface stone artefact and an associated area of assessed archaeological potential. It is located within a property being considered for use as an ancillary area (NOHC 2012). The artefact was located on the crest of a south facing, descending minor spur, in a basal slope valley context. The site overlooks an unnamed tributary of the Crooked River (**Figure 6-3**, **Figure 6-4** and **Figure 6-5**).

The surface artefact comprises a large brown, fine grained quartzite retouched flake, 74 x 91 x 29 mm.

The artefact was located within an erosion scald, associated with cattle treadage and sheet wash, approximately 5 x 2 m in area and surrounding a gate. Exposure incidence across the site was approximately 30 per cent, and visibility within these exposures was approximately 50 per cent. Away from the gate exposure, the incidence of exposures and ground visibility dropped to nil.

Given the poor visibility and high archaeological potential of the ground surrounding the find (indicated by its locally elevated, low gradient nature, adjacent to the valley floor and a tributary streamline), an area of archaeological potential has been identified in association with the surface find. This area has approximate dimensions of 100 x 80 metres in area and has a moderate potential to contain Aboriginal objects.

Disturbance to this site includes sheet erosion, vegetation clearance, fence construction and use for grazing and pastoral purposes. Fragments of European ceramics and glass were also identified within the erosion scald at this site.

Figure 6-3: Looking across the location of isolated surface find (G2B A38)

Figure 6-4: Looking towards site G2B A 38 (at gate in middle of picture)

Figure 6-5: Looking from the valley floor towards G2B A38 and the associated basal slopes which constitute a surrounding area of archaeological potential

6.2.2 Potential archaeologically sensitive areas

Twenty three PASAs have been identified within the project area. These are PASAs 12-29 and 40-44.

One of these is associated with a nearby surface artefact distribution (site recording G2B A3 with PASA 42).

Descriptions of each PASA, together with landform and map grid references are presented in **Table 6-1**. The location of each recording is shown in **Figure 6-6**.

It should be noted that:

- Due to the continuity of the landforms involved, ten of the PASA recordings are grouped into three continuous areas.
- Identification of the area of the PASAs has not been attempted outside of the likely area of direct construction impact, as was determined at the time of the recording. In most cases, PASAs are likely to extend beyond the identified boundaries.

Table 6-1: Potential archaeologically sensitive areas (PASAs) within the Foxground and Berry bypass project area [Note that map grid references are not included in this report version]

ID		Location/landform	Representativeness/ Landform category	MGA references		
				Mid point	End point 1	End point 2
PASA12/13	PASA12	Alluvial flats and terrace formations either side of Bundewallah Creek, extending between Broughton Mill Creek and North Street, Berry	Valley floor flats and terraces on either side of 4th order drainage line (Bundewallah Creek - 21km^2 upstream catchment)			
	PASA13	Alluvial flats on either side of Broughton Mill Creek, including a levee deposit on the eastern side), to east of Woodhill Mt Road, Berry	Valley floor flats, and a levee deposit, on either side of a major 4th order drainage line (Broughton Mill Creek - 22.5km^2 upstream catchment)			
	PASA14	Remnant portion of prominent crest and upper slopes of major watershed ridgeline knoll, just S of Berry survey point ('Stewarts Hill')	Crest and upper slopes of major ridgeline knoll, prominent portion of watershed between Broughton Mill and Broughton Creek catchments			
	PASA15	Remnant portion of crest and upper slopes of major watershed ridgeline, just NE of Berry survey point ('Stewarts Hill')	Crest and upper slopes of major ridgeline watershed between Broughton Mill and Broughton Creek catchments			
	PASA16	Crest and upper slopes of a prominent ridgeline knoll, situated SE of Tindalls Lane, Broughton.	Crest and upper slopes of a prominent ridge top knoll, situated on major ridgeline watershed between Broughton Mill and Broughton Creek catchments			
	PASA17	Crest and upper slopes of a broad, east-west aligned spurline adjacent to Tindalls Lane, Broughton.	Crest and upper slopes of a broad spurline descending from major ridgeline watershed between Broughton Mill and Broughton Creek catchments			
	PASA18	Locally elevated ground formed by a minor spurline situated adjacent to an entrenched and minor (unnamed) drainage line (opposite RMS speed camera at Broughton)	Crest of a minor spurline adjacent to a second order streamline (0.2 km^2 upstream catchment). Broader context consist of south facing basal slopes of the Broughton Creek valley			
	PASA19	Alluvial flats and basal slopes on either side of an unnamed tributary draining the Glenvale property, Broughton.	Valley floor flats and adjacent (low spurline) basal slopes on either side of 3rd order streamline (1 km^2 upstream catchment)			

	ID	Location/landform	Representativeness/ Landform category	MGA references		
				Mid point	End point 1	End point 2
PASA20/21/22/23/24	PASA20	Crest and slopes of an elevated spurline adjacent to Broughton Creek and forming basal slopes adjacent to valley floor (southern side of southern crossing)	Elevated spurline forming basal slopes adjacent to valley floor, and locally elevated ground adjacent to major, 5th order, stream (Broughton Creek - 31.2 km^2 upstream catchment), occurs within potential G2B A13 area			
	PASA21	Alluvial flats on either side of Broughton Creek, includes different terrace levels (southern crossing)	Fifth order streamline fluvial corridor (Broughton Creek - 31.2 km^2 upstream catchment), occurs within potential G2B A13 and G2B A14 areas			
PASA20/21/22/23/24	PASA22	Broughton Creek alluvial flats and valley floor (between middle and southern crossing)	Valley floor flats adjacent to major, 5th order, stream (Broughton Creek - 31.2 km^2 upstream catchment), occurs within potential G2B A13 and G2B A14 areas			
	PASA23	Alluvial flats on either side of Broughton Creek (middle crossing)	Fifth order streamline fluvial corridor (Broughton Creek - 31.2 km^2 upstream catchment), occurs within potential G2B A13 and G2B A14 areas			
	PASA24	Broughton Creek alluvial flats and valley floor, includes elevated terrace and terrace edge (northern side of middle crossing)	Valley floor flats and alluvial terrace adjacent to major, 5th order, stream (Broughton Creek - 31.2 km^2 upstream catchment), occurs within potential G2B A13 area			
PASA25/26/27	PASA25	Crest and slopes of a low spur forming basal slopes adjacent to valley floor (western side of northern crossing)	Low spurline forming basal slopes adjacent to valley floor, and locally elevated ground adjacent to major, 5th order, stream (Broughton Creek - 26.7 km^2 upstream catchment), occurs within potential G2B A13 area			
	PASA26	Alluvial flats on either side of Broughton Creek (northern crossing)	Fifth order streamline fluvial corridor, (Broughton Creek - 26.7 km^2 upstream catchment), occurs within potential G2B A13 area			

ID		Location/landform	Representativeness/ Landform category	MGA references		
				Mid point	End point 1	End point 2
	PASA27	Broughton Creek alluvial flats and valley floor, includes unnamed third order streamlines (eastern side of northern crossing)	Valley floor flats adjacent to major, 5th order, stream (Broughton Creek - 26.7 km^2 upstream catchment), and associated 3rd order streamlines (0.7 km^2 upstream catchment) , occurs within potential G2B A13 area			
	PASA28	Crest and Upper slopes of a ridgeline saddle (around 100 metres AHD) on Toolijooa Ridge, a major watershed aligned approximately N-S	Ridgeline saddle, ridgeline has Aboriginal cultural significance and was probable access route from Illawarra Range onto coastal plain, between swamp basins, to coastal margin			
	PASA29	Crest and upper slopes of a major, SE aligned (eastern fall) spurline shoulder, descending from Toolijooa Ridge	Spurline shoulder, spur is a likely access route onto and across Toolijooa Ridge			
	PASA40	Low banks and adjacent flats and slopes of unnamed tributary, just north of Hitchcocks Lane, both sides of the Princes Highway, Berry	Banks and adjacent valley floor flats and slopes adjacent to a minor 2nd order stream (0.6km^2 upstream catchment), Identified as part of Aboriginal stakeholder consultation.			
	PASA41	Low banks and adjacent southern low gradient slopes of unnamed tributary ('Town Creek'), just south of the North Street alignment, Berry	Banks and adjacent low gradient slopes adjacent to a minor 1st order stream (Town Creek - 0.6 km^2 upstream catchment), Identified as part of Aboriginal stakeholder consultation.			
	PASA42	Crest and upper slopes of a minor NW aligned (western fall) spurline, descending from Toolijooa Ridge	Spurline crest, spurline is a likely access route onto and across Toolijooa Ridge due to proximity of ridge top saddle			
	PASA43	Connollys Creek alluvial flats and valley floor	Banks and adjacent valley floor flats, flood channels and terrace features			
	PASA44	Broughton Creek valley floor alluvial flats and adjacent basal slopes on either side of flood channel	Alluvial flats and adjacent basal slopes adjacent to flood channel (former channel of Broughton Mill Creek)			

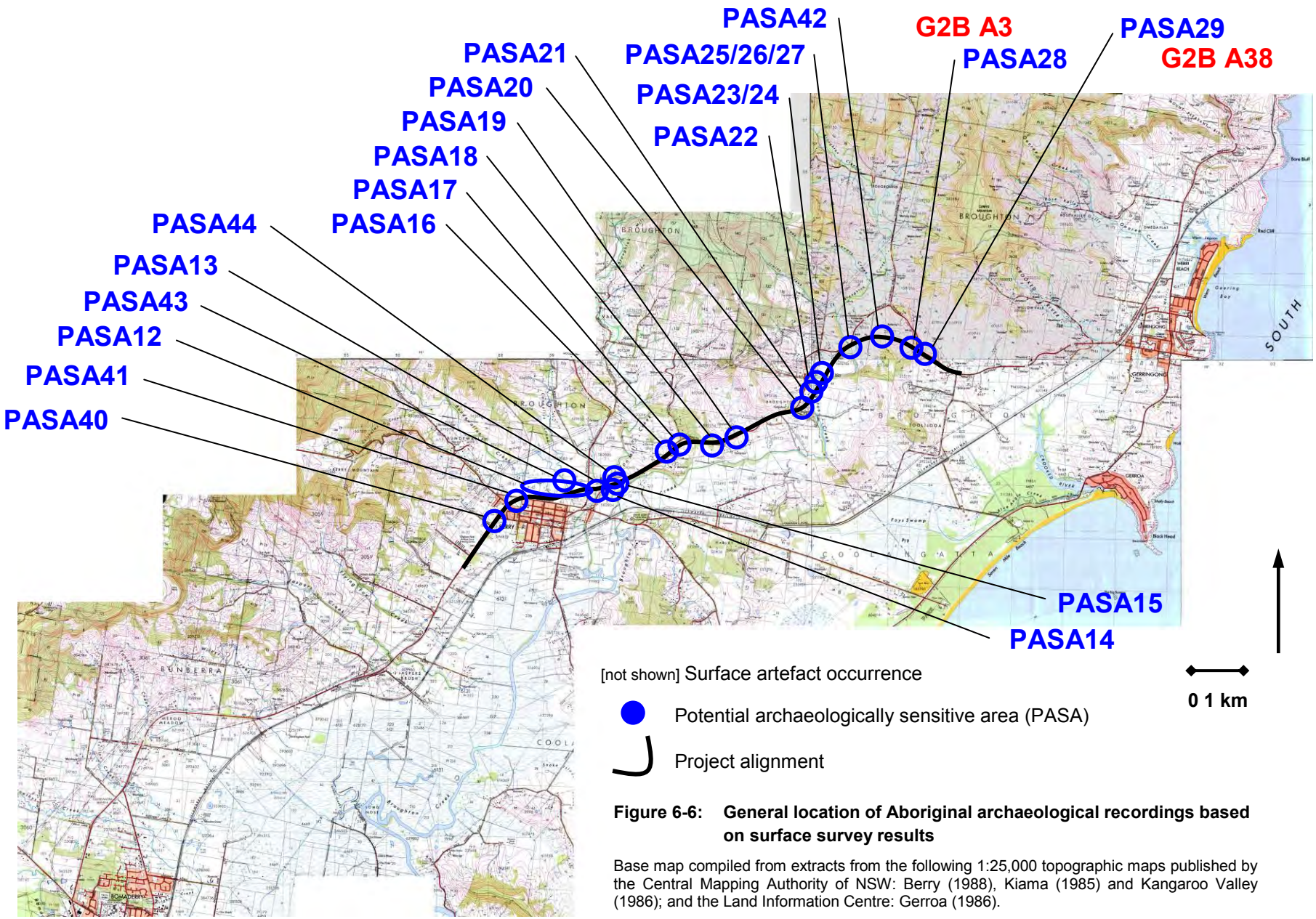

Figure 6-6: General location of Aboriginal archaeological recordings based on surface survey results

Base map compiled from extracts from the following 1:25,000 topographic maps published by the Central Mapping Authority of NSW: Berry (1988), Kiama (1985) and Kangaroo Valley (1986); and the Land Information Centre: Gerroa (1986).

6.2.3 Ethno-historical and oral tradition recordings

Four Aboriginal heritage recordings are based on oral tradition and/or ethno-historical documentation:

- Toolijooa Ridge Aboriginal cultural landscape (TRACL).
- The 'Little Mountain' or 'Dicky Wood's Meadow' battle ground (G2B A13).
- Aboriginal Encampment at 'Brookside' (Broughton Village) (G2B A14).
- Aboriginal Encampments at Berry (G2B A39)

Although each of these recordings may be found to include related archaeological remains, the status of these recordings as places of Aboriginal heritage significance is not dependent on the presence of such remains. Refer to Section 4.4 for detailed descriptions of these recordings.

The general location of these recordings is shown in **Figure 6-7** and **Figure 6-8**.

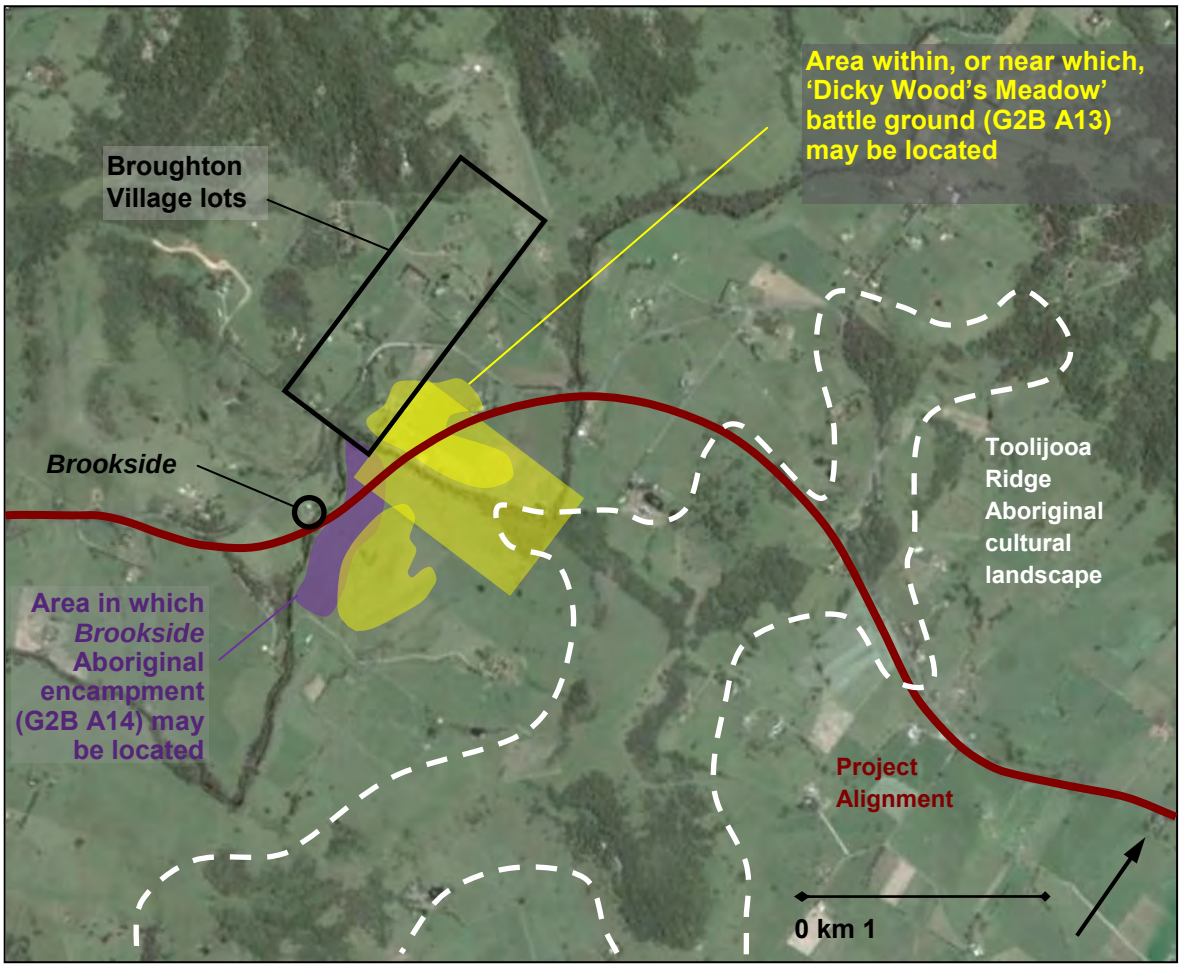

Figure 6-7: Location of ethno-historical and oral tradition recordings within the project area (base image (2006) Google Earth Pro 2011).

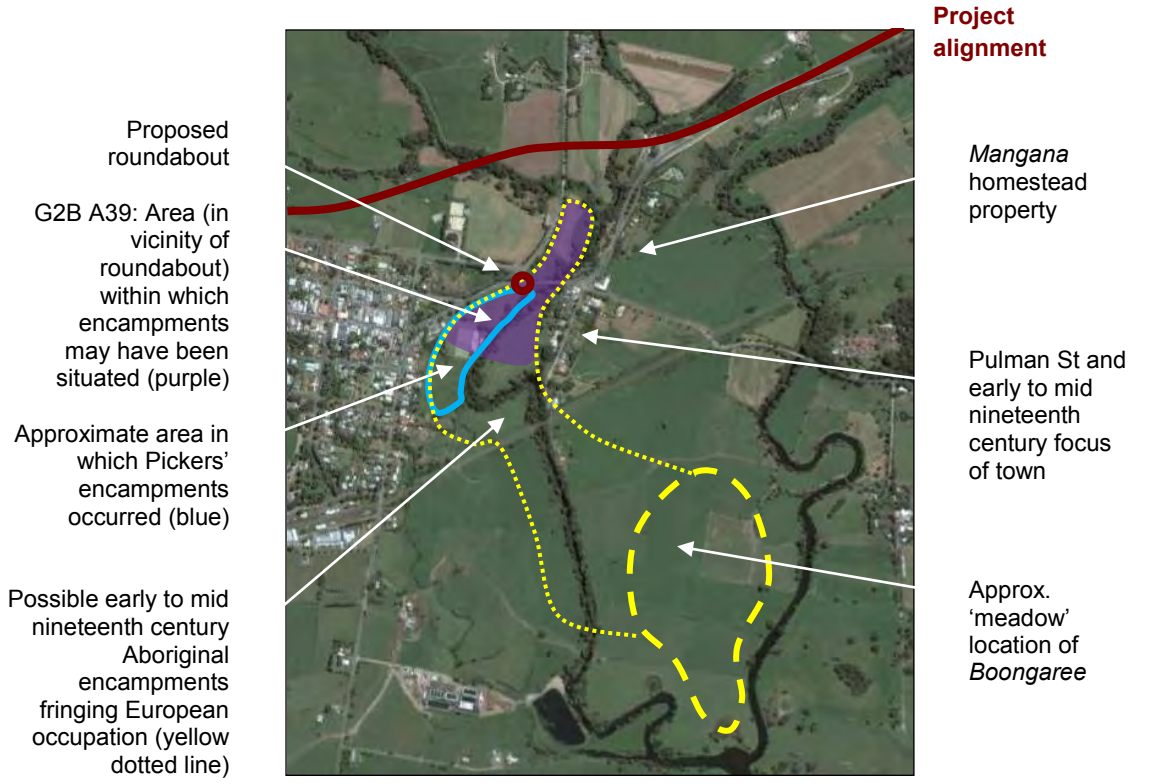

Figure 6-8: **The location of recording G2B A39 (purple), the area (in the vicinity of the proposed roundabout at the intersection of Woodhill Mountain Rd and the current highway), within which Aboriginal encampments may have been situated. These may relate to the twentieth century Pickers' camps or to nineteenth century camps that may have been related to the *Bongaree* settlement.**

The approximate lengths or area of the project interval across these recordings are:

- TRACL – 1.4 kilometres.
- G2B A13 – One kilometre (including a 200 metre buffer).
- G2B A14 – 220 metres (100 per cent overlap with G2B A13 including a 200 metre buffer).
- G2B A39 - Construction of roundabout to occur within an area of 90 x 60 metres (refer Appendix I).

If a 200 metre buffer zone is included around the potential area within which Dick Woods' Meadow may have been situated, the total area of potential is around 136.6 hectares. The project would be situated within 9.4 hectares, or 6.8 per cent of this area.

A 200 metre buffer is considered an appropriate addition to this area of potential in order to:

- Include potential burial locations situated on locally elevated and soft sediment micro-topographies which may be situated adjacent to the former meadow.
- Allow for error in identifying the edge of the former meadow, assuming it was a natural vegetation feature related to a swamp basin. Burials may have preferentially been placed on bordering and elevated ground, rather than the intermittently inundated and dense silts and clays of the meadow basin proper.

6.2.4 Large and old growth fig trees

Many of the Aboriginal stakeholders who have participated in the consultation program have stated or concurred with a view that large and old growth fig trees within the Illawarra region are of high Aboriginal cultural value. Refer section 4.4 for an outline of the cultural values associated with large and old growth fig trees.

To date, twelve large or old growth fig trees (MFT12 – MFT23) have been noted within or near the project area (**Figure 6-9** – **Figure 6-12**). With one exception, all of these are interpreted as trees which have grown and matured within an open grassland environment, after the clearance of the original high canopy forest. This assessment is based on the low and spreading nature of the trees and the absence of any evidence for an early epiphytic phase (i.e. early growth in the canopy branch of another tree and later strangulation of that tree). Based on the location of many of these trees at the sites of extant or former European homesteads, many of these examples are likely to have been planted (**Figure 6-11**).

The exception is MFT22, which, by its growth pattern and height, is clearly an old-growth remnant of a high canopy forest and certainly predates the arrival of Europeans (**Figure 6-10** and **Figure 6-12**).

Table 6-2 provides a summary of the large and/or old growth fig trees identified within or near the project area. The numbering follows consecutively from the Princes Highway Gerringong upgrade Mature Fig Tree (MFT).

Table 6-2: Summary of large and old-growth (mature) fig trees noted within or near the project area [Please note that map grid references are not included in this report version]

ID Code	Tree form	GDA grid reference	Comments
MFT12	Low and spreading		On Toolijooa Ridge crest, This tree has grown substantially since 1958, where it is evident in aerial photography as a relatively small tree
MFT13	Low and spreading		Old homestead site, paired with MFT14
MFT14	Low and spreading		Old homestead site, paired with MFT13
MFT15	Low and spreading		East bank of Broughton Creek
MFT16	Low and spreading		Old homestead site
MFT17	Low and spreading		In grounds of *Sedgeford* homestead paired with MFT18
MFT18	Low and spreading		In grounds of *Sedgeford* homestead paired with MFT17
MFT19	Low and spreading		In creek gully, unlikely to be associated with former homestead
MFT20	Low and spreading		Next to *Hillview* homestead, paired with MFT21
MFT21	Low and spreading		Next to *Hillview* homestead, paired with MFT22
MFT22	Tall and high canopy, clear epiphytic origin		Bundewallah Creek, pre-European forest remnant
MFT23	Low and spreading		In grounds of *Oakleigh*, Berry

Only one of these trees, MFT12, located on the crest of Toolijooa Ridge, is situated within an area of anticipated direct construction impact. A review of aerial photography reveals that this tree has grown substantially since 1958, where it is evident as a relatively small tree (**Figure 6-9**).

Figure 6-9: A low and spreading fig tree (MFT12) on the crest of Toolijooa Ridge. This is the only fig tree within the construction zone.

Figure 6-10: A tall and formerly epiphytic fig tree (MFT22) which is clearly a pre-European, tall canopy forest remnant Note human figure for scale.

Figure 6-11: A low and spreading fig tree which was probably planted as part of farmhouse development (MFT23)

Figure 6-12: View looking up MFT22, showing characteristic 'strangler fig' nature of the tall trunk.

6.2.5 Potential for Aboriginal burial sites

All Aboriginal stakeholders have expressed concern regarding the potential for encountering and impacting Aboriginal burials, both generally, and within areas with identified archaeological potential, or in areas remembered as sensitive in this regard, such as the historical Aboriginal battle ground: G2B A13).

6.3 Survey coverage and visibility variables

The effectiveness of archaeological field survey is to a large degree related to the obtrusiveness of the sites being looked for and the incidence and quality of ground surface visibility. Visibility variables were estimated for all areas of comprehensive survey within the study area. These estimates provide a measure with which to gauge the effectiveness of the survey and level of sampling conducted. They can also be used to gauge the number and type of sites that may not have been detected by the survey.

Ground surface visibility is a measure of the bare ground visible to the archaeologist during the survey. There are two main variables used to assess ground surface visibility, the frequency of exposure encountered by the surveyor and the quality of visibility within those exposures. The predominant factors affecting the quality of ground surface visibility within an exposure are the extent of vegetation and ground litter, the depth and origin of exposure, the extent of recent sedimentary deposition, and the level of visual interference from surface gravels. Two variables of ground surface visibility were estimated during the survey:

- A percentage estimate of the total area of ground inspected which contained useable exposures of bare ground.
- A percentage estimate of the average levels of ground surface visibility within those exposures. This is a net estimate and accounts for all impacting visual and physical variables including the archaeological potential of the sediment or rock exposed.

The obtrusiveness of different site types is also an important factor in assessing the impact of visibility levels. Sites based on rock exposures, such as rock shelters, open engravings and grinding grooves are more likely to be encountered than sites with no surface relief located on, or within, sedimentary matrices. In another example, artefacts made from locally occurring rock such as quartz may be more difficult to detect under usual field survey conditions than rock types that are foreign to the area. The impact of natural gravels on artefact detection was taken into account in the visibility variables estimates outlined above.

The natural incidence of sandstone platforms suitable for grinding grooves or engraving, together with the incidence of old growth trees, are important considerations in identifying both survey effectiveness and site location patterns outside of environmentally determined factors.

Two tables provided in Appendix K present visibility variable data. The table in M.1 summarises estimates for the degree to which separate landforms within the study area were examined and also indicates the exposure incidence and average ground visibility present in each case. The table in M.2 provides a summary based on landform divisions.

A graphic approximation of the survey traverses conducted for the archaeological survey, relative to landform categories, is presented in Appendix K 3.

An area of approximately 200 hectares (198.6 hectares) was the subject of archaeological survey. This area is in excess of the actual project area, due to the inclusion of:

- Areas adjacent to the project area which displayed greater potential for ground surface exposures within equivalent landforms.
- Areas adjacent to the project area which displayed an opportunity to increase coverage of archaeologically sensitive landforms also present within the project area.
- Relevant areas of archaeological survey conducted previously as part of the route selection study.
- Areas of archaeological survey conducted as part of further route-alignment assessments and reviews during the refinement of the concept design.

Thirty eight per cent of the area subject to survey was subject to direct inspection via pedestrian traverses (75.6 hectares).Taking into account survey coverage, archaeologically useable exposures, and visibility variables, the effective survey coverage (ESC) was 2.4 per cent of the total surveyed area. The ESC is a value required and defined by the OEH. The ESC attempts to provide an estimate of the proportion of the total study area that provided a net 100 per cent level of ground surface visibility to archaeological surveyors.

The ESC value per survey unit varies from 0.01 to 15.6, with an average of 1.83. The ESC values per landform category do not vary greatly from the overall project value, and range from 1.2 (mid slopes) to 3.5 (ridgeline crest) (refer table in Appendix K.2).

The ESC achieved is low in value, but typical for surveys conducted in predominantly rural lands on the NSW south coast. The high rainfall which characterises this region has the consequence that pasture grasslands present a dense surface layer of turf, and forest and shrublands include high levels of surface litter. These factors mean that ground surface exposures are typically very low in incidence and limited in extent. During the survey, greatest visibility and surface exposure was afforded by the following:

- Highway embankments.
- Rare instances of ploughed fields.
- Stock paths and associated erosion scalds.
- River and creek banks.
- Rough farm tracks.
- Construction related excavation.

A clear conclusion arising from the low ESC value is that the results of the surface survey cannot be considered to be a reliable indication of the potentially surviving archaeological resource within the project area. This finding supports the conduct, as part of the Foxground and Berry Bypass cultural heritage assessment, of a comprehensive assessment of the potential for subsurface archaeological material.

7 Results – subsurface testing program

7.1 Summary

- Twenty one PASAs were selected for archaeological testing across the project area.

  These were: PASA12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 40, 41, 42, 43 and 44.

- Eighteen of the 21 PASAs subject to testing were determined to contain archaeological deposits.
- Two hundred and ninety eight archaeological test pits were excavated in the 21 PASAs in the project area.
  - Two hundred and ninety seven archaeological test pits were excavated by machine.
  - One archaeological test pit was excavated by hand.
- Two hundred and thirty six lithic artefacts were recovered from 18 PASAs and 92 test pits.
- The lithic assemblage is classifiable into twenty seven distinct types and seven raw materials.
- The lithic assemblage is dominated by flakes (58 per cent), and flaked pieces (19.1 per cent).
- Chert is the dominant raw material (71 per cent), followed by quartz (27 per cent), and minor occurrences of volcanic stone silcrete, chalcedony, mudstone, quartzite, sandstone, glass, ochre, and an unidentified sedimentary stone (<five per cent in total).
- The assemblage shows internal differentiation between PASAs, with differences evident in artefact abundance, activities represented, vertical distribution of artefacts, and assemblage richness.
- The project assemblages show higher than average regional assemblage richness and raw material richness.
- Three PASAs stand out as having higher than average richness: 25, 27 and 29, while four have lower than average richness: 13, 16, 23 and 28.
- PASA 12 has a large and diverse assemblage with abundant subsurface material. Flake manufacture and retouching also appear to be well represented at this location even though the site is not especially rich in comparison to other PASA in the study. These factors make PASA12 probably the most important location identified in the subsurface testing program.
- The assemblage is quite fragmented, with more than half the assemblage broken, and more than half of these by excessive heat. The assemblage nevertheless retains high identifiability and contributes to understanding regional stone procurement, stone artefact manufacture and other behaviours of regional significance such as implement manufacture and reduction.
- The assemblages are all small despite their high regional richness, and this will detract from their overall significance.

7.2 The project assemblage

This section of the report analyses the 236 artefacts recovered from the subsurface test excavation project. The analysis examines assemblage composition from the site/s and evaluates the information potential of the stone artefact assemblage, taphonomic processes, and the richness of the sites in a regional context. Some preliminary information is also provided about stone artefact manufacture and technological characteristics of the project assemblage.

Following sections consider variability in the spatial and vertical arrangement of stone artefacts from the test excavations, followed by a consideration of post-depositional damage and site formation. The site is then placed in regional context. Finally, some preliminary description is offered of the range of technological activities conducted at each site.

7.2.1 Stone artefact classes

The project lithic assemblage consists of 236 stone artefacts recovered from 92 test pits.

Table 7-1 and **Figure 7-1** and **Figure 7-2** show the numbers and percentages of different stone artefact classes recovered from the subsurface testing program.

The assemblage contains 27 different assemblage elements and is dominated by flakes (58 per cent) and flaked pieces (19.1 per cent) (**Table 7-1**).

Heat fragments are among the most numerous of the remaining artefact types at 5.9 per cent of the assemblage, followed by redirecting flakes (three per cent) and pot lids (2.1 per cent) and multiplatform cores (1.3 per cent).

A wide range of artefact types makes up the remaining small percentage of the assemblage.

Retouched artefact types include a single asymmetric backed artefact and several notched and laterally and distally retouched scrapers.

Cores are all of the rotated multiplatform kind. A large split cobble and a large core stand out in an assemblage that otherwise mostly consists of small artefacts.

The possible glass artefact was recovered from a pit which also included other broken bottle glass which provided no evidence for Aboriginal usage (PASA 41, pit 4). The pressure flaking evident on this glass piece could be explained as the result of a vehicle driving over it with rubber tyres/tread. It is less likely however, to be the consequence of impact from the excavator's metal bucket, during the test excavation. In addition, the location of this PASA is consistent with a possible fringe camp location. There is not enough clear evidence to fully discount an Aboriginal origin and this item is thus included as a *possible* Aboriginal artefact.

Table 7-1: Breakdown of artefact classes in the project assemblage

Artefact class	No	%
Flake	137	58.1
Flaked piece	45	19.1
Heat fragment	14	5.9
Redirecting flake	7	3.0
Pot lid	5	2.1
Multiplatform core	3	1.3
Retouched flake fragment	3	1.3
Core	2	0.8
Hammerstone	2	0.8
Asymmetric backed	1	0.4
Bipolar core?	1	0.4
Bipolar flake	1	0.4
Bipolar flake?	1	0.4
Burin spall	1	0.4
Core fragment	1	0.4
End scraper	1	0.4
Fire cracked rock	1	0.4
Flake (split cobble)	1	0.4
Hammerstone and anvil	1	0.4
Microblade	1	0.4
Notch	1	0.4
Notched double side and end scraper	1	0.4
Ochre crayon	1	0.4
Possible glass artefact	1	0.4
Retouched flake	1	0.4
Retouched flaked piece	1	0.4
Ventral side scraper	1	0.4

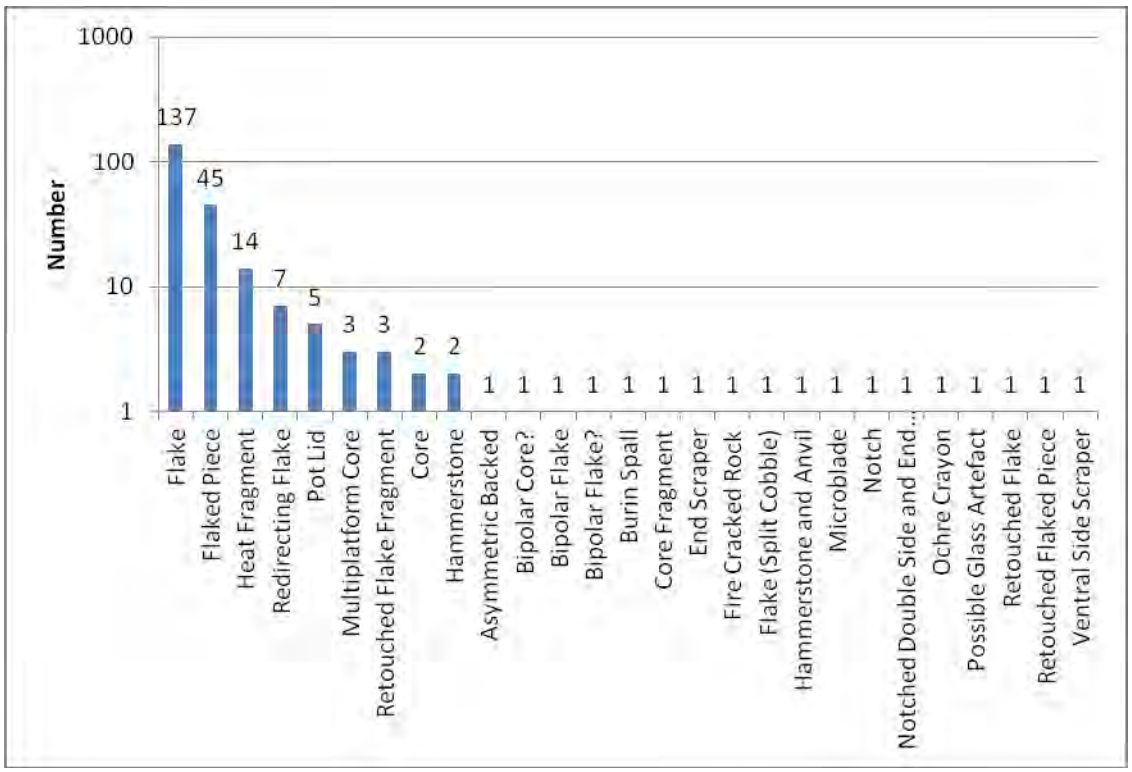

Figure 7-1: Number of items in each technological class from the project assemblage

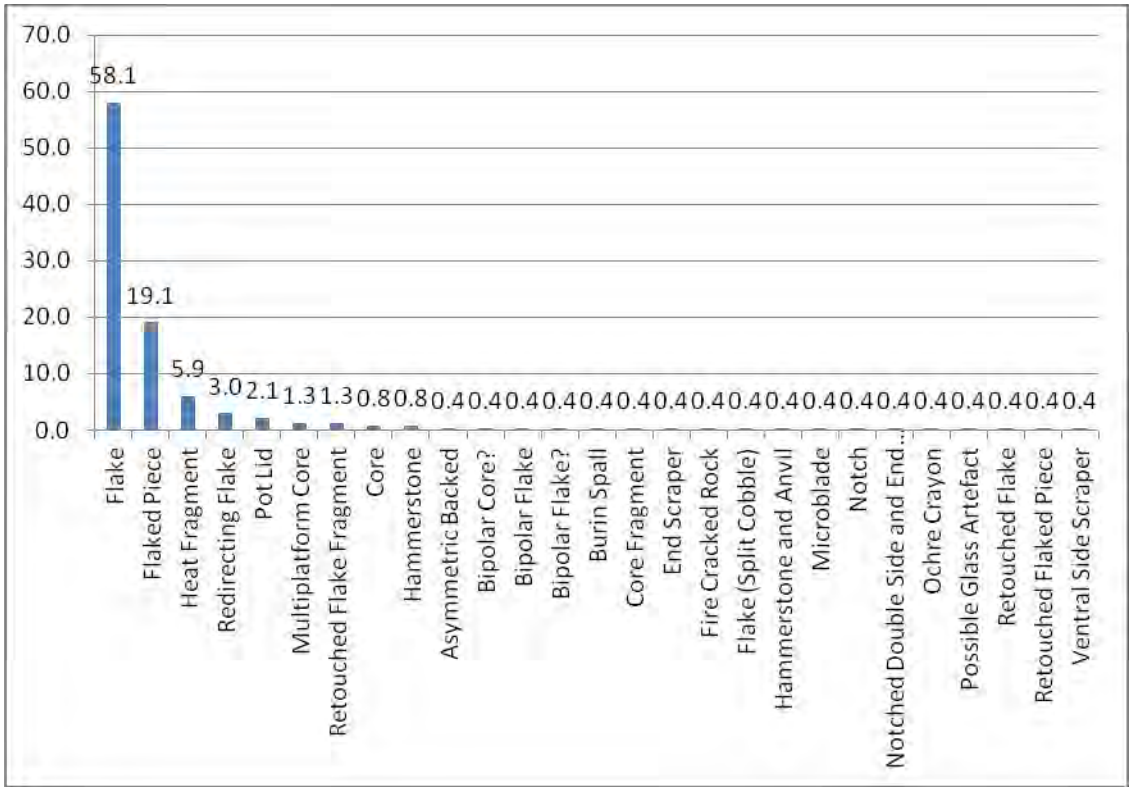

Figure 7-2: Percentage of artefacts in each technological class from the project assemblage

7.2.2 Stone artefact numbers

A breakdown of artefact numbers per PASA is provided in **Table 7-2**.

A breakdown of artefact numbers from each pit and spit for the subsurface assemblage is provided in **Table 7-3**.

A breakdown of artefact types is presented by site and pit in **Table 7-4**.

Table 7-2: Breakdown of artefact numbers per PASA

PASA #	No of lithic items
12	46
13	2
14	18
15	4
16	19
18	2
20	40
21	1
22	0
23	13
24	14

PASA #	No of lithic items
25	15
*26**	7
27	5
28	8
29	13
40	1
41	14
42	0
43	10
44	4

** Note the PASA26 artefacts are grouped with, and identified in this analysis as PASA27*

Table 7-3: Total artefact numbers for pits containing stone artefacts by PASA and pit

	PASA number																		
Pit	**12**	**13**	**14**	**15**	**16**	**18**	**20**	**21**	**23**	**24**	**25**	**27**	**28**	**29**	**40**	**41**	**43**	**44**	**Total**
1				1	1	1					2		2			7	7		14
2					13		2			1			1			1			18
3	1		1	1		1	3			10		4	1	3		1			26
4					5		3				1					1		4	14
5				2			2				2	1		1		1			9
6			2							2	2					1			7
7										1	3			4					8
8			9					1			5		2			1			18
9			3				2							1					6
10	1		1				1												3
11			1				4												5
12			1				6					7							14
13		1					2						1			1			5
14							1												1
15														1					1
16							1		1					2	1				5
17							2		1					1					4
18							1		11										12
19							2												2
20							7										1		8
21													1						1
22		1																	1
23							1												1
24	2																		2
25	1																		1
27	1																		1

	PASA number																		
Pit	**12**	**13**	**14**	**15**	**16**	**18**	**20**	**21**	**23**	**24**	**25**	**27**	**28**	**29**	**40**	**41**	**43**	**44**	**Total**
30	0																8		8
31																	1		1
36	2																		2
39	4																		4
40	10																		10
41	2																		2
42	8																		8
44	5																		5
46	1																		1
47	4																		4
48	1																		1
50	3																		3
Total	**46**	**2**	**18**	**4**	**19**	**2**	**40**	**1**	**13**	**14**	**15**	**12**	**8**	**13**	**1**	**14**	**10**	**4**	**236**

Table 7-4: Breakdown of artefact types by PASA and pit for the entire assemblage

PASA	Pit	Asymmetric Backed	Bipolar Core?	Bipolar Flake	Bipolar Flake?	Burin Spall	Core	Core Fragment	End Scraper	Fire Cracked Rock	Flake	Flake (Split Cobble)	Flaked Piece	Hammerstone	Hammerstone and Anvil	Hammerstone?	Heat Fragment	Microblade	Multiplatform Core	Notch	Notched Double Side and End Scraper	Ochre Crayon	Possible Glass Artefact	Pot Lid	Redirecting Flake	Retouched Flake	Retouched Flake Fragment	Retouched Flaked Piece	Ventral Side Scraper	Total
12	10										1																			1
12	24										1													1						2
12	25										1																			1
12	27												1																	1
12	3										1																			1
12	36				1																1									2
12	39							1			1						1												1	4
12	40										6		3											1						10
12	41										2																			2
12	42										3		4											1						8
12	44										5																			5
12	46										1																			1
12	47										2						1								1					4
12	48												1																	1
12	50										2						1													3
13	13										1																			1

PASA	Pit	Asymmetric Backed	Bipolar Core?	Bipolar Flake	Bipolar Flake?	Burin Spall	Core	Core Fragment	End Scraper	Fire Cracked Rock	Flake	Flake (Split Cobble)	Flaked Piece	Hammerstone	Hammerstone and Anvil	Hammerstone?	Heat Fragment	Microblade	Multiplatform Core	Notch	Notched Double Side and End Scraper	Ochre Crayon	Possible Glass Artefact	Pot Lid	Redirecting Flake	Retouched Flake	Retouched Flake Fragment	Retouched Flaked Piece	Ventral Side Scraper	Total
13	22										1																			1
14	10										1																			1
14	11										1																			1
14	12																							1						1
14	3										1																			1
14	6										2																			2
14	8										6		1				2													9
14	9										1		1												1					3
15	1												1																	1
15	3										1																			1
15	5										2																			2
16	1										1																			1
16	2										9		2				1	1												13
16	4										2		3																	5
18	1										1																			1
18	3												1																	1

PASA	Pit	Asymmetric Backed	Bipolar Core?	Bipolar Flake	Bipolar Flake?	Burin Spall	Core	Core Fragment	End Scraper	Fire Cracked Rock	Flake	Flake (Split Cobble)	Flaked Piece	Hammerstone	Hammerstone and Anvil	Hammerstone?	Heat Fragment	Microblade	Multiplatform Core	Notch	Notched Double Side and End Scraper	Ochre Crayon	Possible Glass Artefact	Pot Lid	Redirecting Flake	Retouched Flake	Retouched Flake Fragment	Retouched Flaked Piece	Ventral Side Scraper	Total
20	10										1																			1
20	11										3		1																	4
20	12										3		2	1																6
20	13										1														1					2
20	14										1																			1
20	16																								1					1
20	17										1																1			2
20	18										1																			1
20	19										1		1																	2
20	2															1						1								2
20	20		1								2		2				2													7
20	23										1																			1
20	3										1		1				1													3
20	4														1		2													3
20	5										2																			2
20	9										2																			2

PASA	Pit	Asymmetric Backed	Bipolar Core?	Bipolar Flake	Bipolar Flake?	Burin Spall	Core	Core Fragment	End Scraper	Fire Cracked Rock	Flake	Flake (Split Cobble)	Flaked Piece	Hammerstone	Hammerstone and Anvil	Hammerstone?	Heat Fragment	Microblade	Multiplatform Core	Notch	Notched Double Side and End Scraper	Ochre Crayon	Possible Glass Artefact	Pot Lid	Redirecting Flake	Retouched Flake	Retouched Flake Fragment	Retouched Flaked Piece	Ventral Side Scraper	Total
21	8	1																												1
23	16										1																			1
23	17										1																			1
23	18										4		6												1					11
24	2												1																	1
24	3										9														1					10
24	6											1							1											2
24	7																		1											1
25	1												1												1					2
25	4										1																			1
25	5										1								1											2
25	6										2																			2
25	7										2																1			3
25	8						1				4																			5
27	12								1		4														1		1			7
27	3										2		2																	4

PASA	Pit	Asymmetric Backed	Bipolar Core?	Bipolar Flake	Bipolar Flake?	Burin Spall	Core	Core Fragment	End Scraper	Fire Cracked Rock	Flake	Flake (Split Cobble)	Flaked Piece	Hammerstone	Hammerstone and Anvil	Hammerstone?	Heat Fragment	Microblade	Multiplatform Core	Notch	Notched Double Side and End Scraper	Ochre Crayon	Possible Glass Artefact	Pot Lid	Redirecting Flake	Retouched Flake	Retouched Flake Fragment	Retouched Flaked Piece	Ventral Side Scraper	Total
27	5												1																	1
28	1										2																			2
28	13										1																			1
28	2										1																			1
28	21																1													1
28	3																1													1
28	8										2																			2
29	15										1																			1
29	16												1											1							2
29	17										1																			1
29	3										1		1							1											3
29	5			1																										1
29	7										3																	1		4
29	9										1																			1
40	16										1																			1
41	1									1	5		1																	7
41	13										1																			1
41	2						1																							1

PASA	Pit	Asymmetric Backed	Bipolar Core?	Bipolar Flake	Bipolar Flake?	Burin Spall	Core	Core Fragment	End Scraper	Fire Cracked Rock	Flake	Flake (Split Cobble)	Flaked Piece	Hammerstone	Hammerstone and Anvil	Hammerstone?	Heat Fragment	Microblade	Multiplatform Core	Notch	Notched Double Side and End Scraper	Ochre Crayon	Possible Glass Artefact	Pot Lid	Redirecting Flake	Retouched Flake	Retouched Flake Fragment	Retouched Flaked Piece	Ventral Side Scraper	Total
41	3										1																			1
41	4																						1							1
41	5										1																			1
41	6										1																			1
41	8										1																			1
43	20												1																	1
43	30					1					4		3																	8
43	31										1																			1
44	4										1		2				1													4
Total	**10**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**137**	**1**	**45**	**1**	**1**	**1**	**14**	**1**	**3**	**1**	**1**	**1**	**1**	**5**	**7**	**1**	**3**	**1**	**1**	**236**

7.2.3 Raw materials

Twelve raw materials are present in the assemblage.

The numbers and percentages for different material types are provided for the whole assemblage in **Table 7-5**, and by PASA and pit in **Table 7-6**.

The assemblage is mostly comprised of:

- Chert (typically red or grey in colour) (71.6 per cent).
- Followed by quartz (11.4 per cent).

All other raw materials are rare and make up less than five per cent of the total assemblage. These include:

- Volcanic stone.
- Silcrete.
- Chalcedony.
- Mudstone.
- Quartzite.
- Sandstone, a dense metamorphic rock used for hammerstones.
- Glass.
- Ochre.
- An unidentified sedimentary stone.

Table 7-5: Number and percentage of each raw material type in the assemblage

Type	Number	Per cent
Chert	169	71.61
Quartz	27	11.44
Volcanic	10	4.24
Silcrete	7	2.97
Chalcedony	6	2.54
Mudstone	6	2.54
Quartzite	3	1.27
Sandstone	3	1.27
Metamorphic	2	0.85
Glass	1	0.42
Ochre	1	0.42
Sedimentary	1	0.42
Total	**236**	**100.00**

Table 7-6: Number of each raw material type per site and pit

PASA	Pit	Chalcedony	Chert	Glass	Metamorphic	Mudstone	Ochre	Quartz	Quartzite	Sandstone	Sedimentary	Silcrete	Volcanic	Total
12	10							1						1
12	24		2											2
12	25		1											1
12	27		1											1
12	3		1											1
12	36	1						1						2
12	39		4											4
12	40		8										2	10
12	41		1					1						2
12	42		6					1				1		8
12	44		5											5
12	46		1											1
12	47		4											4
12	48		1											1
12	50		3											3
13	13		1											1
13	22		1											1
14	10		1											1
14	11		1											1
14	12		1											1
14	3		1											1
14	6		2											2
14	8	2	7											9
14	9		3											3
15	1		1											1
15	3		1											1
15	5	1	1											2
16	1		1											1
16	2		12									1		13
16	4		1					4						5
18	1		1											1
18	3		1											1
20	10							1						1
20	11		2						1				1	4
20	12		4		1							1		6
20	13		2											2
20	14									1				1
20	16		1											1

PASA	Pit	Chalcedony	Chert	Glass	Metamorphic	Mudstone	Ochre	Quartz	Quartzite	Sandstone	Sedimentary	Silcrete	Volcanic	Total
20	17		1					1						2
20	18												1	1
20	19		2											2
20	2				1		1							2
20	20		6							1				7
20	23							1						1
20	3		1					2						3
20	4		2			1								3
20	5		1					1						2
20	9		2											2
21	8		1											1
23	16		1											1
23	17		1											1
23	18		2					5					4	11
24	2		1											1
24	3		5			1		4						10
24	6					1			1					2
24	7		1											1
25	1		1			1								2
25	4		1											1
25	5		1			1								2
25	6		1					1						2
25	7		2									1		3
25	8		3			1		1						5
27	12	1	5									1		7
27	3		4											4
27	5							1						1
28	1									1			1	2
28	13		1											1
28	2		1											1
28	21		1											1
28	3		1											1
28	8		2											2
29	15											1		1
29	16		2											2
29	17		1											1
29	3		3											3
29	5											1		1
29	7		4											4
29	9	1												1
40	16		1											1

PASA	Pit	Chalcedony	Chert	Glass	Metamorphic	Mudstone	Ochre	Quartz	Quartzite	Sandstone	Sedimentary	Silcrete	Volcanic	Total
41	1		5					1			1			7
41	13		1											1
41	2								1					1
41	3		1											1
41	4			1										1
41	5		1											1
41	6		1											1
41	8		1											1
43	20		7										1	8
43	30		1											1
43	31		1										1	1
44	4		4											4
Total	**10**	**6**	**169**	**1**	**2**	**6**	**1**	**27**	**3**	**3**	**1**	**7**	**10**	**236**

7.2.4 Spatial distribution of the assemblage

Relatively few artefacts were recovered from any of the PASA test pits.

The majority of artefacts were recovered from PASA 12 (N = 46) and PASA 20 (N = 40) (**Table 7-7**, **Figure 7-3**).

The remaining PASAs each had less than 20 artefacts, with the minimum being one artefact (PASAs 21 and 40).

For individual pits, the greatest number of artefacts comes from PASA 16 Pit 2 (N = 13), PASA 23 Pit 18 (N = 11), PASA 12 Pit 40 (N = 10) and PASA 24 Pit 3 (N = 10).

The remaining pits have less than ten artefacts, with more than half of the test pits (N = 48) contain only a single artefact.

In terms of activity differentiation between PASA, no overlap appears to occur in the kinds of activities suggested by distinctive artefact types such as cores, retouched flakes and hammerstones.

Cores are most abundant in PASA 24 and 25 (making up 13 and 14 per cent of each PASA).

Hammerstones and anvils are only found at PASA 20 (making up seven per cent of this PASA).

Table 7-7: Assemblage diversity by PASA

PASA	Asymmetric Backed	Bipolar Core?	Bipolar Flake	Bipolar Flake?	Burin Spall	Core	Core Fragment	End Scraper	Fire Cracked Rock	Flake	Flake (Split Cobble)	Flaked Piece	Hammerstone	Hammerstone and Anvil	Hammerstone?	Heat Fragment	Microblade	Multiplatform Core	Notch	Notched Double Side and End Scraper	Ochre Crayon	Possible Glass Artefact	Pot Lid	Redirecting Flake	Retouched Flake	Retouched Flake Fragment	Retouched Flaked Piece	Ventral Side Scraper	Total	Assemblage Diversity
12				1			1			26		9				3				1			3		1			1	46	9
13										2																			2	1
14										12		2				2							1	1					18	5
15										3		1																	4	2
16										12		5				1	1												19	4
18										1		1																	2	2
20		1								20		7	1	1	1	5					1			2		1			40	10
21	1																												1	1
23										6		6												1					13	3
24										9	1	1						2						1					14	5
25						1				10		1						1						1		1			15	6
27								1		6		3												1		1			12	5
28										6						2													8	2
29			1							7		2							1				1				1		13	6
40										1																			1	1
41						1			1	10		1										1							14	5
43					1					5		4																	10	3
44										1		2				1													4	3
Total	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**137**	**1**	**45**	**1**	**1**	**1**	**14**	**1**	**3**	**1**	**1**	**1**	**1**	**5**	**7**	**1**	**3**	**1**	**1**	**236**	**28**

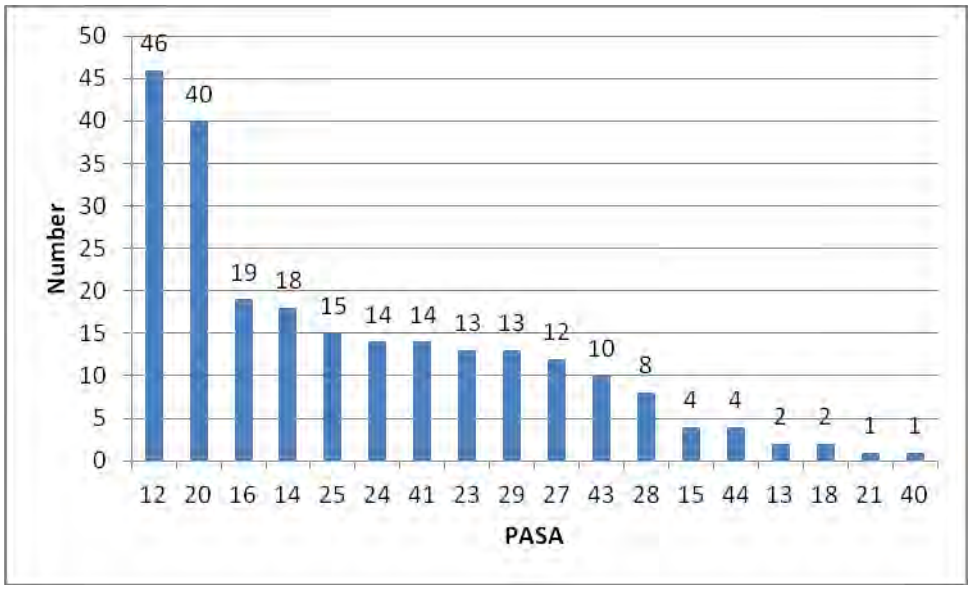

Figure 7-3: Total artefact numbers recovered from each PASA

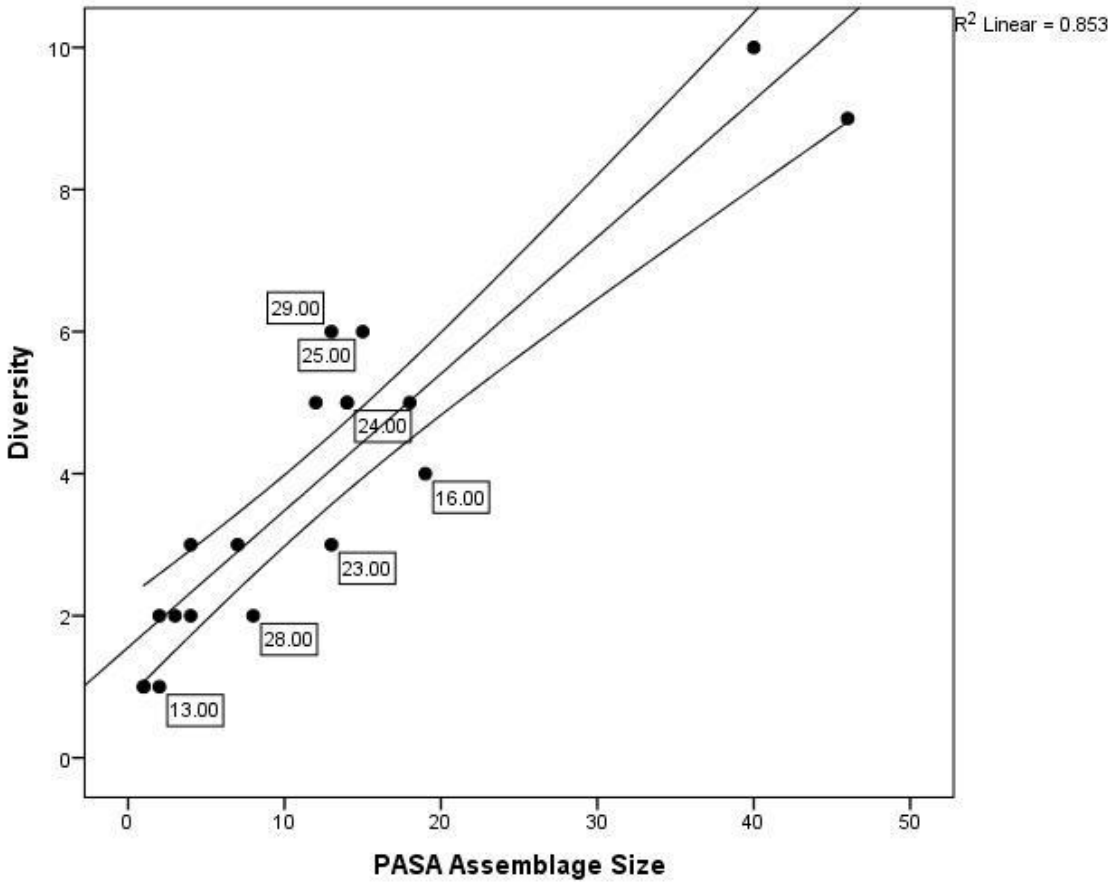

Figure 7-4: Relationship between assemblage size and artefact diversity, revealing two different richness relationships (i.e. high and low diversity for a given sample size). PASA with high or low ranges are labelled.

A scatter plot of assemblage size against the diversity of technological classes (i.e. number of different classes present) in each pit – a relationship known as richness - reveals a strong correlation between assemblage size and raw material diversity (r2 = 0.853) (**Figure 7-4**). This richness relationship represents the diversity of artefact classes for a given sample size (but makes no statement about the uniqueness or rarity of specific classes per se), and is a robust measure of assemblage diversity that can be used to compare assemblages of different sizes. Also shown in **Figure 7-4** is the line of best fit and the 95 per cent confidence interval around the mean. Artefacts above the 95 per cent CI can be thought of as significantly richer and those below as significantly less rich. It must be noted that sample size is small for most PASA, reducing the strength of this relationship to some degree as the effects of the vagaries of sampling are often stronger on smaller assemblages. In this case it is best to focus on the larger assemblages that show slightly higher than average richness, although even in these cases assemblage size is still small.

Three PASAs stand out as having higher than average richness: 25, 27 and 29. Four PASAs have lower than average richness: 13, 16, 23 and 28.

Differences in assemblage size, density and richness can reflect either:

- Past accumulations of artefacts at various locations where people chose to camp and discarded domestic debris including stone artefacts.
- Places where artefacts were manufactured (particularly if close to a source of flakeable stone).
- Locations where artefacts accumulated due to fluvial or colluvial transport and deposition.

The condition of artefacts and signs of post-depositional movement and size sorting, along with evidence for in situ stone knapping can help determine which of these scenarios is most likely for each site, and these are further explored below.

7.2.5 Vertical distribution of the assemblage

Although PASA are often far apart, a general pattern of decreasing artefacts numbers with depth can be seen for the PROJECT assemblage (**Figure 7.5**). A second small peak also appears in Spit 6. However, as assemblages occur in different landforms with different stratigraphic profiles, it is necessary to examine each PASA separately to determine whether this second peak is widespread or occurs in only one locality.

Figure 7-6 plots spit counts for each PASA and reveals that the vertical distribution of artefacts is quite variable between PASAs. It also reveals that the separate lower peak in Spit 6 is only found at PASA 24. In fact this peak is only observed in Pit 3 of PASA 24 – a pit that contains no artefacts above or below this spit. This may suggest that a buried occupation zone occurs at this locality. **Figure 7-6** also reveals two other PASA that depart from the general pattern - 27 and 41 - which both show slightly increasing artefact numbers down to Spit 3 or 4.

Not surprisingly, the pattern of decreasing artefact numbers with depth is most evident at PASA12 and PASA20 where the largest assemblages were recovered, hence reducing sample size effects.

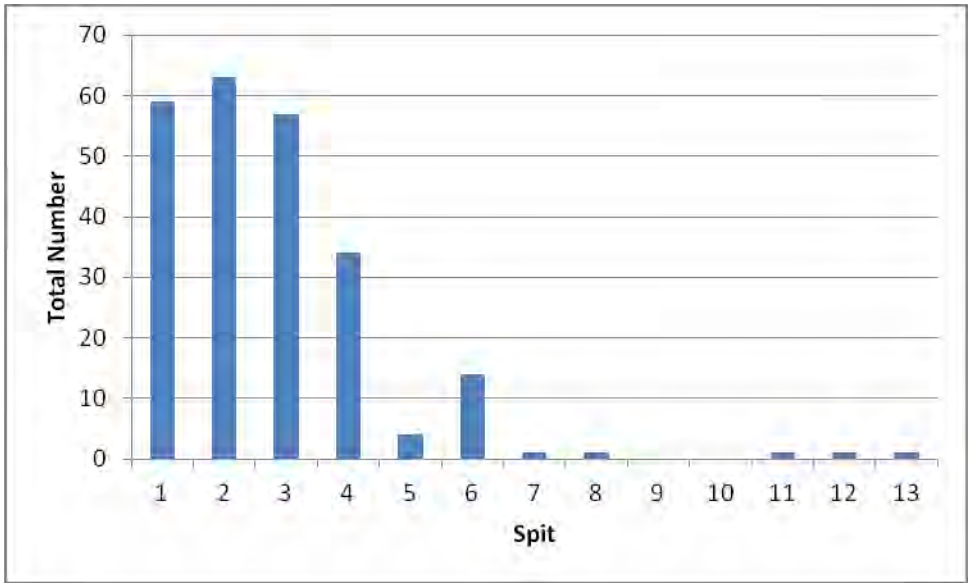

Figure 7-5: Vertical distribution of the assemblage across all PASAs

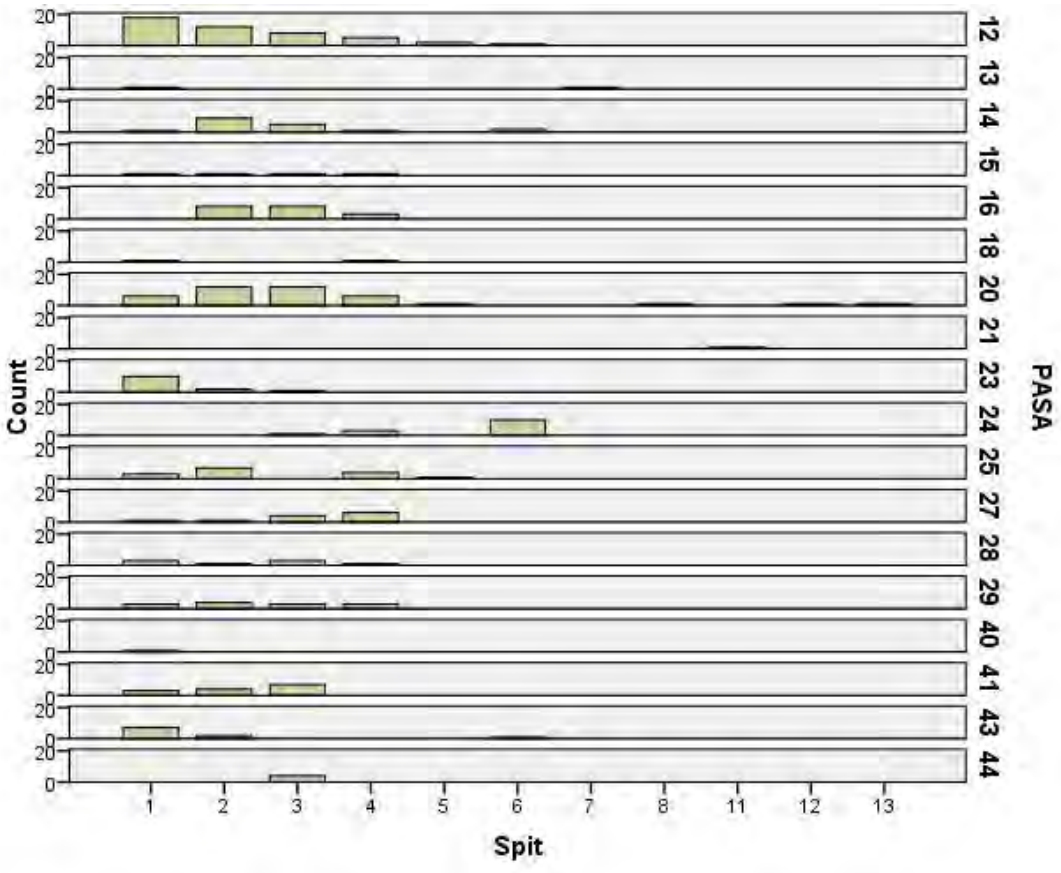

Figure 7-6: Spit counts by PASA

The general pattern of greatest artefact deposition in the top three spits and steeply declining artefact number below that depth could result from the downward movement of artefacts through bioturbation, or it could result from active depositional environments burying artefacts in correct stratigraphic position. Examining the data for evidence of size sorting may help determine whether processes such as bioturbation have altered the vertical distribution of artefacts at the site.

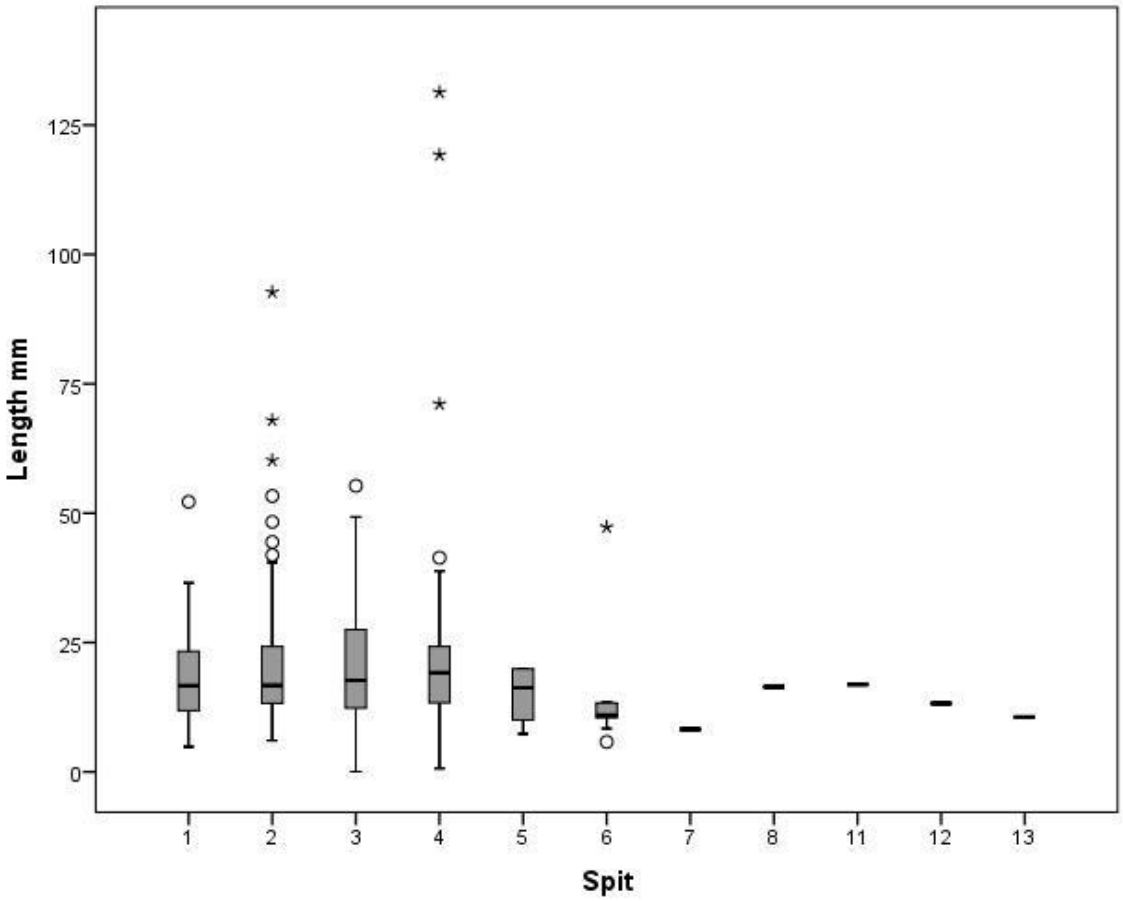

Figure 7-7: Boxplot of variation in artefact length by spit. Boxes represent the inner quartiles, whiskers represent the outer quartiles, circles represent outliers and stars represent extreme values.

A box plot of variation in artefact length is plotted for each spit for the total assemblage in **Figure 7-7**.

The largest artefacts are found in the top four spits, however, size range does not vary much over the depth for the entire assemblage. Sample size is very small for the lowermost spits, hence only individual artefact lengths are plotted for Spits 7-13.

Mean artefact length is plotted by spit for each PASA in **Figure 7-8**. This graph reveals quite variable patterns for each PASA, as for artefact numbers, but no overall pattern of size sorting is seen. Mean artefact size is also not correlated with sample size ($r^2 = 0.03$).

PASA 24 again stands out in having the largest artefacts found low in the profile in Spit 6.

Artefact size sorting therefore seems unlikely to have taken place at any of the PASA in the study, and each PASA appears to show its own specific pattern unrelated to depth.

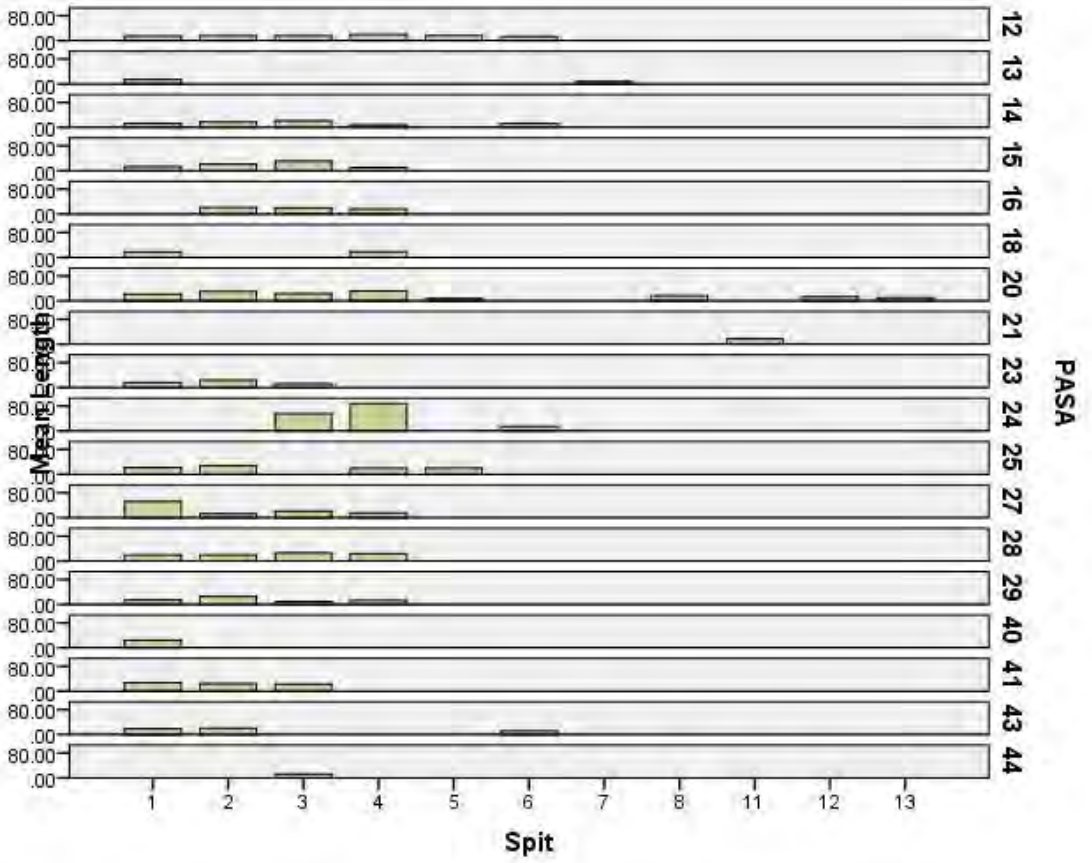

Figure 7-8: Mean artefact length by spit for each PASA

7.2.6 Site richness in regional context

Figure 7-9 compares the richness of the total assemblage (i.e. diversity / assemblage size) in comparison to 39 other open assemblages from the coastal and sub-coastal zone of southeastern Australia (including NSW, VIC and southeast QLD), collected using similar techniques (excavation combined with some surface collection) and analysed using the same classificatory techniques. (Refer **Appendix L** for project names and assemblage statistics). A line of best fit has been added to help determine average richness in southeastern Australia, with sites sitting above the line being richer and those below the line poorer for a given sample size.

The 95 per cent confidence intervals are shown as lines above and below the line of best fit. These help identify assemblages that are statistically significantly different from the average. Hence sites sitting outside the 95 per cent confidence region are either richer (above) or poorer (below) than the average.

The project assemblages as a whole sit well above the line of best fit. This indicates that the project assemblage is significantly richer than average for southeastern Australian assemblages, and is among the richest in the assemblage.

However, an issue that arises that is further discussed below is that several assemblage types relate to heat damage, and are not representative of cultural factors creating assemblage diversity. Even with heat damage components removed from the assemblage diversity count, the project assemblage remains above the 95 per cent confidence interval.

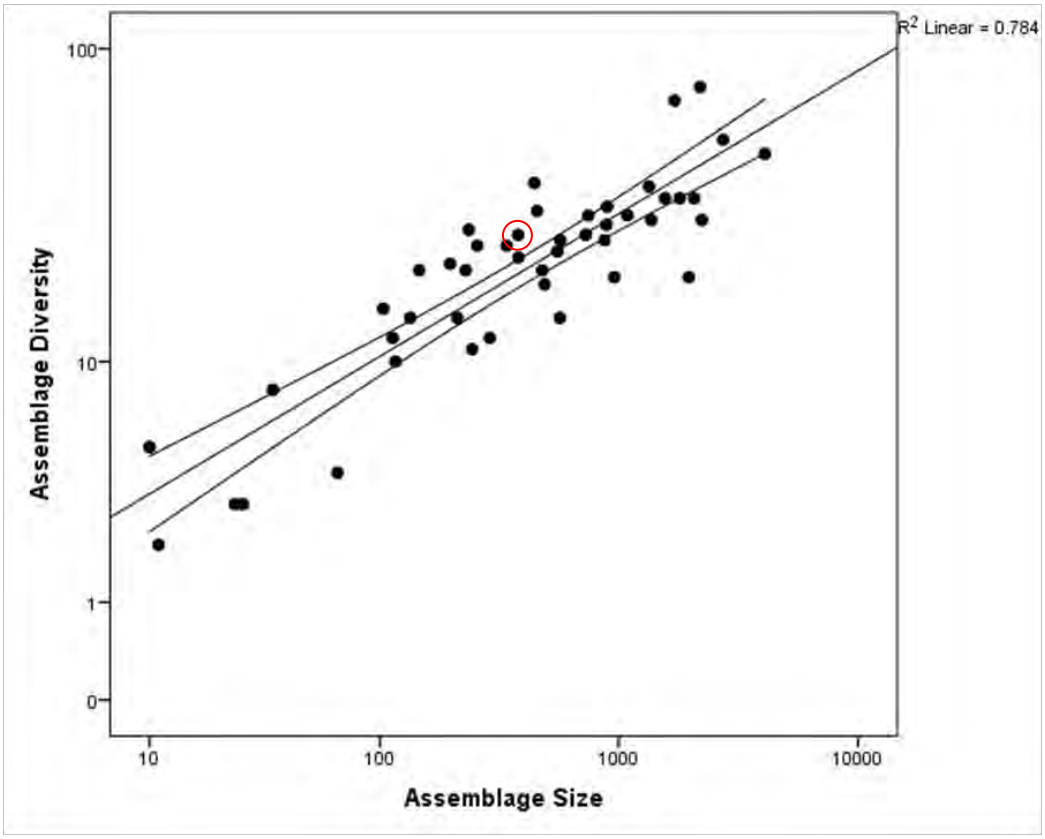

Figure 7-9: **Assemblage richness for the project study (red circle) in comparison to 39 assemblages from southeastern Australia.**

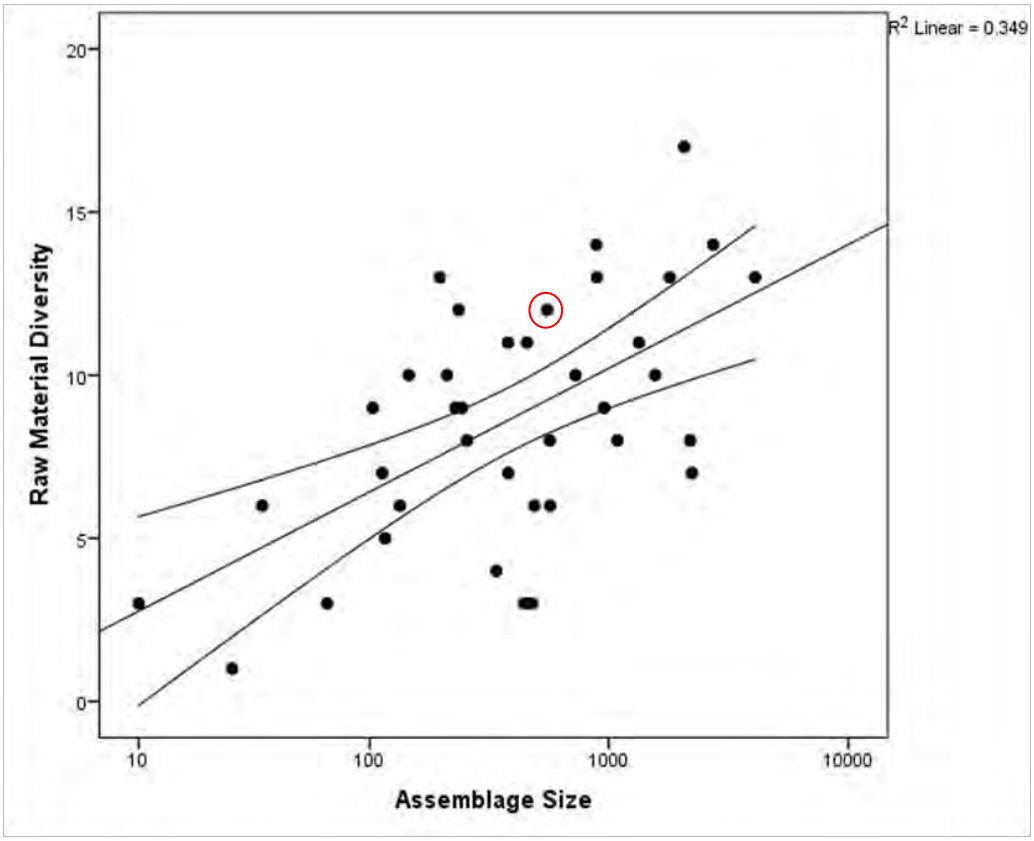

Figure 7-10: **Raw material richness for C2B excavated artefacts (red circle) in comparison to 38 assemblages from southeastern Australia.**

Figure 7-10 plots the same relationship for raw material richness in comparison to 38 south eastern Australian assemblages.

Unlike assemblage diversity, assemblage size is not a good predictor of raw material diversity in south eastern Australia (r2 = 0.349) as this is largely determined on local geology, although settlement pattern and site function can also affect raw material diversity (Clarkson 2007).

The graph nevertheless indicates very high raw material diversity for the project assemblage in comparison to numerous other south eastern Australian assemblages (i.e. well above the line of best fit and outside of the 95 per cent CI). This suggests that the local geology is rich in flakeable stone types. A possible explanation for this diversity can be found in the conglomerates and sandstones exposed in the Illawarra Range, upstream of the project area. These typically include pebbles and cobbles of highly siliceous rock types and once eroded from their rock matrix are concentrated in the beds of downstream drainage corridors. All of the drainage lines crossed by the project area have catchments originating from the escarpment.

7.2.7 Intactness of the assemblage

The majority of artefacts from the project assemblages are broken (63.6 per cent), with breakage rates varying by PASA and pit (**Table 7-8**). Most PASA have proportions of broken artefacts above 50 per cent, with PASA18, 29, 40 and 44 have 100 per cent breakage, and PASA 15, 28, 29 and 41 having breakage proportions between 75 per cent and 85 per cent. A breakage rate of 1.8 broken artefacts to every complete artefact is below the average of 2.46 for a sample of 32 south eastern Australian assemblages.

Many of the broken artefacts in the project assemblage have heat-related damages are either pot lids (40 per cent) or heat shattered in some way (50 per cent). PASA 44 and 40 have the highest proportions of heat damage (**Table 7-9**), although sample sizes are very small for these PASA, suggesting such high percentages could simply reflect sample size effects.

Table 7-8: Proportions of broken artefacts in each PASA

PASA	Broken	Total	% Broken
12	24	46	52.2
13		2	0.0
14	11	18	61.1
15	3	4	75.0
16	14	19	73.7
18	2	2	100.0
20	26	40	65.0
21		1	0.0
23	9	13	69.2
25	5	15	33.3
24	8	14	57.1
27	8	12	66.7
28	6	8	75.0
29	11	13	84.6
40	1	1	100.0
41	11	14	78.6
43	6	10	37.3
44	4	4	100.0
Total	**149**	**236**	**63.1**

Table 7-9: Proportions of heat damaged artefacts by PASA

PASA	Heat damaged	Total	% Heat damaged
12	9	46	19.6
13		2	0.0
14	4	18	22.2
15		4	0.0
16	1	19	5.3
18		2	0.0
20	6	40	15.0
21		1	0.0
23	1	13	7.7
24		14	0.0
25	2	15	13.3
27	2	12	16.7
28	3	8	37.5
29	2	13	15.4
40	1	1	100.0
41	5	14	35.7
43	2	10	33.3
44	2	4	50.0
Total	**40**	**236**	**16.9**

Transverse breaks are more common (50 per cent) than either longitudinal breaks (12 per cent) or combined transverse and longitudinal breaks (27 per cent) (**Table 7-10**). This is suggestive of end shock and heat shatter as the main causes of artefact breakage rather than manufacturing errors resulting from excessive force application. However, many of the broken fragments at sites are in fact flaked pieces that cannot be identified to type. This makes accurate determination of the causes of fracture more difficult.

A very low rate of edge damage on artefacts of only 0.3 per cent likely rules out heavy trampling or disturbance as a source of fragmentation.

In summary, it is likely fragmentation in the project assemblages is caused by manufacturing errors and excessive heating from campfires or bushfires.

Table 7-10: Fragment types in the assemblage

Orientation	Transverse			Longitudinal		Transverse and longitudinal						
Type	Distal	Medial	Proximal	Left	Right	Left Distal	Left Proximal	Marginal	Mesial	Proximal Mesial	Right Proximal	Total
Number	15	4	17	4	8	1	2	18	2	1	3	75
%	20.0	5.3	22.7	5.3	10.7	1.3	2.7	24.0	2.7	1.3	4.0	100.0

7.2.8 Attribute analysis of the project assemblage

This section examines artefact manufacturing and reduction patterns for the project sites. Technological attributes were recorded in detail on complete artefacts (N=83), and relevant information was also recorded on intact portions of broken artefacts where appropriate. It is possible using this information to examine some technological features of flakes and cores from sites and to make some comments about manufacturing technology in the area. Cortex proportions are highest on quartzite and mudstone flakes and remain at or close to zero on all other raw materials.

Flakes

Table 7-11 provides summary statistics for complete flakes (N=66) from the project assemblages (**Figure 7-11** and **Figure 7-12**). It can be observed from this table that flakes made from most raw materials excepting quartzite and mudstone are small, with chalcedony being the smallest.

Flakes are all of widely varying shape and size however, with most being squat and somewhat parallel sided. Silcrete flakes stand out as having higher than average elongation, and indeed one microblade of silcrete was found in the assemblage (**Figure 7-11**).

Flakes made from most raw materials except chalcedony have one dorsal ridge on average and platform angles in the normal range.

Platform types are mostly single conchoidal (58 per cent) or focalized (12 per cent), while cortical and faceted platforms account for six per cent each. Platforms are most commonly unprepared (56 per cent), but overhang removal is common (39 per cent) and faceting rare (six per cent).

Terminations are most commonly feather (77 per cent), less commonly hinge (17 per cent) and rarely stepped (six per cent).

Dorsal scar orientations are typically oriented from the proximal (76 per cent) with all other orientations making up less than five per cent of flakes each.

Figure 7-12 provides examples of complete flakes found in the project assemblage.

Figure 7-11: Silcrete microblade (No.27)

Table 7-11: Summary statistics for complete flakes from the C2B sites (N = number of items, S.D.= Standard deviation)

Raw Material		Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	No. Dorsal Ridges	Platform Width	Platform Thickness	Platform Angle	% Cortex	Platform Cortex	Marginal Angle	Elongation
Chalcedony	Mean	0.99	17.30	14.82	14.89	14.66	2.91		9.23	1.80	66.00	0.00	0.00	-6.68	1.15
	N	2	2	2	2	2	2		2	2	2	2	2	2	2
	S.D.	0.38	5.49	9.41	3.28	4.82	0.59		9.57	0.91	9.90	0.00	0.00	47.82	0.12
Chert	Mean	4.97	18.42	13.40	33.01	12.30	5.64	1.00	10.43	4.97	71.74	7.06	5.92	2.71	1.23
	N	51	51	51	51	51	51	8	48	48	46	51	49	51	51
	S.D.	12.03	12.07	11.82	124.83	7.81	4.07	0.00	6.98	8.52	10.13	23.00	23.44	32.10	0.55
Mudstone	Mean	11.10	47.31	25.79	20.49	0.00	7.69	1.00	26.14	7.74	65.00	10.00	100.00	30.49	2.31
	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	S.D.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quartz	Mean	0.44	12.57	5.70	210.47	7.07	2.73		6.26	1.77	70.50	2.00	0.00	-6.79	0.88
	N	5	5	5	5	5	5		4	4	4	5	5	5	5
	S.D.	0.24	3.82	1.41	446.40	2.83	0.94		1.18	0.46	10.34	4.47	0.00	21.99	0.60
Quartzite	Mean	790.00	131.33	120.81	140.15	88.96	22.94		78.54	21.44	33.00	100.00	100.00	13.83	0.94
	N	1	1	1	1	1	1		1	1	1	1	1	1	1
	S.D.	.	.	.	.	.	.		.	.	.	.	.	.	.
Silcrete	Mean	1.04	21.30	4.85	9.53	6.38	3.77	1.50	4.74	2.21	79.67	0.00	0.00	-2.22	2.64
	N	3	3	3	3	3	3	2	3	3	3	3	3	3	3
	S.D.	0.72	8.96	3.40	5.41	2.93	1.48	0.71	3.58	0.65	9.07	0.00	0.00	6.75	1.54
Volcanic?	Mean	2.58	16.97	11.49	16.23	9.89	5.50	1.00	11.15	4.50	70.50	0.00	0.00	17.67	1.02
	N	3	3	3	3	3	3	1	2	2	2	3	2	3	3
	S.D.	1.99	8.91	3.08	7.29	7.79	2.49	.	5.64	3.32	10.61	0.00	0.00	43.57	0.11
Total	Mean	16.20	20.16	14.20	45.51	12.57	5.54	1.08	11.23	4.82	71.05	7.27	7.78	2.75	1.27
	N	66	66	66	66	66	66	12	61	61	59	66	63	66	66
	S.D.	97.30	18.09	17.23	163.53	12.11	4.33	0.29	11.15	7.94	11.06	23.44	26.73	30.86	0.67

N = number of items, S.D.= Standard Deviation

Figure 7-12: Some examples of complete chert flakes

Cores

Six cores and core fragments were recovered from the project test excavations. Two are made from chert, three are of mudstone and one is made from quartzite.

Summary statistics for cores are provided in **Table 7.12** by raw material type.

Mudstone cores are much larger on average than other materials, with chert the smallest. Mudstone also preserves the most exterior cortex and the least number of scars.

Step terminations are frequent on the extensively rotated chert core. The chert core is the only core to preserve an elongate parallel-sided flake scar. Final platform angles are low except on the mudstone cores.

Figure 7-13 provides examples of cores from the assemblage.

Table 7-12: Summary statistics for cores (N = number of items, S.D.= Standard Deviation)

Raw material	Chert			Mudstone			Quartzite			Total		
	Mean	N	S.D.	Mean	N	S.D.	Mean	N	S.D.	Mean	N	S.D.
Weight	37.3	2	37.6	357.5	3	257.8	45.3	1	.	198.7	6.0	239.0
Length	40.9	2	20.4	73.8	3	42.9	48.3	1	.	58.6	6.0	33.2
Medial Width	38.8	1	.	78.8	3	20.2	37.2	1	.	62.5	5.0	26.5
Thickness	38.4	1	.	45.5	3	18.2	24.9	1	.	40.0	5.0	15.7
% Cortex	0.0	1	.	60.0	3	10.0	40.0	1	.	44.0	5.0	27.0
Number of Scars	6.0	1	.	3.7	3	1.5	6.0	1	.	4.6	5.0	1.7
Number of Rotations	5.0	1	.	0.7	3	0.6	1.0	1	.	1.6	5.0	1.9
Longest Face	35.3	1	.	48.9	3	33.3	48.3	1	.	46.1	5.0	24.3
Core Platform Thickness	27.8	1	.	45.2	3	10.9	17.5	1	.	36.2	5.0	15.0
Base Thickness	0.0	1	.	43.9	2	16.9	0.0	1	.	21.9	4.0	27.1
Core Platform Width	43.1	1	.	81.8	3	23.9	35.3	1	.	64.7	5.0	28.9
No. Non-Feather	6.0	1	.	1.7	3	1.5	2.0	1	.	2.6	5.0	2.2
No. Parallel-Sided	1.0	1	.	0.0	3	0.0	0.0	1	.	0.2	5.0	0.4
No. Platform Quadrants	1.0	1	.	2.0	3	1.0	2.0	1	.	1.8	5.0	0.8
Final Core EPA	68.0	1	.	83.7	3	9.3	66.0	1	.	77.0	5.0	11.3

Figure 7-13: Examples of cores from the project assemblage. No.146 is an extensively rotated chert core. Number 3 is a quartzite core with a conchoidal platform

Retouched flakes

The retouched component of the C2B assemblages comprises nine scrapers or scraper fragments and one asymmetric backed artefact.

A burin spall also attests to burin retouch, but no burinated flake was found.

The scrapers are made mostly from chert with one of chalcedony and one of silcrete.

One scraper has retouch on the distal end, one has retouch on the ventral surface, and two have deep notches. The backed artefact is made from chert and shows bidirectional backing along the edge.

Scrapers are on average very squat in shape (mean elongation = 1.05), heavier than complete quartz flakes and retouched to widely varying degrees with some cortex (**Table 7-13** and **Figure 7-14**).

Two scrapers are extensively retouched, one with a huge final notch and the other has likely broken during retouching.

Retouch tends to be fairly straight and marginal and extends around a quarter of the way around the flake on average.

Table 7-13: Summary statistics for scrapers

Attribute	N	Minimum	Maximum	Mean	Std. Deviation
Weight	11	8.71	58.17	20.04	14.04
Length	11	21.65	49.56	32.13	7.97
Proximal width	10	18.07	34.18	25.78	5.33
Width	11	17.78	41.15	31.15	7.00
Distal width	11	10.07	38.97	23.55	8.69
Thickness	11	7.23	22.68	14.12	4.89
No ridges	2	1.00	2.00	1.50	0.71
Platform width	7	14.33	29.59	22.45	5.42
Platform thickness	7	3.96	10.76	7.70	2.59
Platform angle	7	70.00	87.00	76.71	5.77
% Cortex	11	0.00	100.00	14.55	32.05
Number of retouched segments	9	1.00	4.00	2.44	1.13
Marginal angle	11	-27.66	38.16	1.97	23.63
Invasiveness index	9	0.03	0.25	0.12	0.07
Retouch perimeter	11	0.00	60.00	25.18	20.64
Retouched edge curvature	8	-0.10	0.28	0.10	0.16
Kuhn index	11	0.00	0.71	0.28	0.27
Retouch edge angle	11	0.00	88.67	55.45	36.48
Elongation	11	0.75	1.40	1.05	0.21

Figure 7-14: Retouched flakes from the project assemblages. 235: Notched double side and end scraper, 197: extensively retouched broken scraper, 115: asymmetric backed artefact, 151: end scraper, 165: notched broken scraper.

Hammerstones and anvils

Three hammerstones were found at PASA 20.

Two are small hammerstones made from unidentified dense rock (probably plutonic or metamorphic) weighing around 70 grams (**Figure 7-15**). Both have broken areas that are suggestive of impact damage. The other hammerstone also shows impact pitting and was likely also used as an anvil. It is much larger and is made from softer stone, most likely mudstone.

Figure 7-15: Hammerstones and anvils. No. 59: Hammerstone and No.65: hammerstone with anvil pitting.

Ochre

A single large piece of yellow ochre, now stained black on the external surface, was found in Pit 2, Spit 4 at PASA 20 (**Figure 7-16**). Although no striations were visible under a hand lens, faint lineations do appear to be present; it seems likely that this piece is a crayon that smoothed and shaped by rubbing against a hard surface to apply colourant.

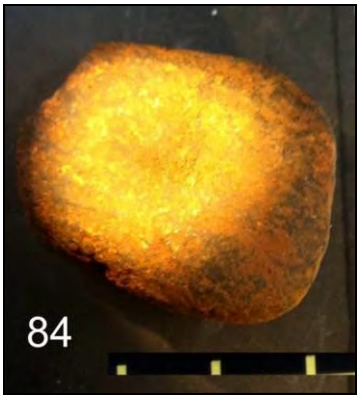

Figure 7-16: Yellow ochre crayon

7.2.9 Artefact incidence

Artefact incidence varied considerably across the 23 confirmed subsurface artefact occurrences. The lowest levels of artefact incidence were 2/m2 at G2BA15, G2BA17, G2BA21 and G2BA25.

The majority of sites were characterised by low to moderate levels of artefact incidence, with a maximum areal density of <10/m2 at: G2BA19, G2BA20, G2BA23, G2BA27, G2BA29, G2BA34, G2BA35, G2BA36 and G2BA37; and a density of 10-19/m2 at: G2BA16, G2BA18, G2BA26, G2BA28, G2BA32, G2BA33.

Four sites displayed an artefact incidence of 20 or more artefacts per square metre. These sites are:

- G2BA18 – where artefact incidence varied from 2/m^2 to 20/$m^{2,}$ and most pits that contained artefacts had an incidence of >8/m^2.
- G2BA24 – which had the highest artefact incidence of any of the sites investigated (26/m2 in one pit) and an average of 12.6/m^2.
- G2BA30 – which had an average artefact incidence of 8.6/m2 and a maximum of 20/m^2.
- G2BA31 – where artefact incidence was generally low (2-4/m^2 in three of the four pits containing artefacts) but peaked at 20/m^2 in the remaining pit.

7.3 Site location trends and implications for the regional model

7.3.1 Previous conclusions

The results of subsurface investigations for the project area confirm conclusions from previous studies that “the archaeological resource of the Illawarra coastal plain can only be effectively identified and assessed through the combined application of archaeological excavation and the progressive development of predictive modelling” (NOHC 2010: 44). The program of subsurface testing undertaken across the Foxground and Berry bypass was guided by the results of previous subsurface investigations for the Gerringong upgrade component of the Gerringong to Bomaderry highway upgrade (NOHC 2010b, 2011a). That study concluded that:

- Valley floor contexts, on alluvium and which are not in the proximity of higher order (3rd or greater) riparian zones are likely to have low archaeological sensitivity.
- Locally elevated, well drained and low gradient micro-topographies situated within the valley floor (such as terrace edges), may be an exception to the low sensitivity of the valley floor alluvium and should be subject to testing.
- Riparian corridors associated with higher order streams require testing to better define archaeological sensitivity and possible geographical determinates of artefact incidence.
- Locally elevated, well drained and low gradient micro-topographies within 200 metres of known or predicted former wetland basins are likely to have high archaeological sensitivity and should be tested.
- The archaeological sensitivity of ridge and spurline crests and slopes requires further investigation, especially with regard to variables such as possible cross-country travel routes and distance from lower catchment wetland basins.

On the basis of archaeological survey across the Foxground and Berry bypass project area and the results of the previous investigations for the Gerringong upgrade (NOHC 2010, 2011) the following landforms were predicted to be archaeologically sensitive:

- Valley floor contexts, on alluvium and which are in proximity of higher order (3rd or greater) riparian zones.
- The lower elevation or terminal section of major spurs and ridgelines where they adjoin or traverse the valley floor.
- Level or low gradient ground on the crests of spurs and ridgelines.
- The down-slope margin of alluvial terraces.
- The banks of rivers, creeks and terrace edges where they are locally elevated and well-drained.
- Locally elevated, well-drained and low gradient micro-topographies within 200 m of known or predicted former wetland. This criteria may be of particular relevance to the margins of the former 'Meadow' areas (now-drained swamp basins).
- Locally elevated sand bodies outside of coastal barrier or dune systems, such as fossil beach ridges on the margins and flats of infilled estuaries, and source bordering dunes.

7.3.2 Summary of results from PASAs in the project area

Subsurface artefacts were recovered from 18 of the 21 PASAs tested for the project. Essentially, sites were confirmed in examples of most landscape contexts, the only exception being the minor spurline crest descending from Toolijooa Ridge at PASA42. The only other minor spurline to be tested was a spur crest adjacent a second order stream at PASA18. Two artefacts were recovered from one of the eight pits excavated at this PASA, which confirms the prediction for low archaeological sensitivity in association with the lower order creeks. The results from PASA42 and PASA18 also suggest low archaeological sensitivity across the more minor spurlines of the coastal hinterland.

The richest artefact assemblages were found to occur on a major spurline crest descending from Toolijooa Ridge (PASA29) and the spurline basal slopes (PASA25) and alluvial flats (PASA27) associated with the valley floor adjacent Broughton Creek. In the case of the spurline crest, the overall artefact distribution was relatively sparse and patchy, a pattern that was also displayed across similar landscape contexts at PASA28 and PASA15, where artefact numbers and assemblage richness were also noticeably lower.

The basal slopes and alluvial flats at PASA25 and 27 both displayed a trend for increasing artefact incidence with proximity to Broughton Creek. However, the basal slopes at PASA25 were characterised by a much more consistent artefact distribution, with six of the nine pits containing artefacts, while the alluvial flats at PASA27 were characterised by a patchier artefact distribution with artefacts present in only four of the 15 pits excavated. In this instance, the presence of artefacts appears to correspond more to locally elevated micro-topographic features, which is in keeping with the prediction regarding increased archaeological sensitivity across locally elevated, well drained and low gradient micro-topographies situated within the valley floor.

Localised examples of higher artefact incidence were found to occur on the alluvial flats adjacent Broughton Creek at PASA23 and PASA24. The crest and upper slopes of the prominent ridgeline knoll at PASA16, situated on a major ridgeline watershed between Broughton Mill and Broughton Creek catchments, also displayed an example of localised high artefact incidence.

Of note is the fact that no artefacts were recovered from the alluvial flats and valley floor at PASA22 and PASA26 and, even the alluvial terraces and levees on the flats at PASA21 and PASA13 displayed a very low incidence of artefacts. At PASA21, a single artefact was recovered from a pit on the terrace immediately adjacent Broughton Creek. Similarly, at PASA13, two artefacts were recovered from the pit on the eastern margin of Broughton Mill Creek, in a locally elevated levee context. This is contrasted by a relatively consistent and high artefact incidence across the crest and upper slopes of the watershed ridgeline within PASA14, which extends upslope to the north of the valley floor at PASA13.

The two largest and spatially most extensive assemblages were from PASA12 (46 artefacts across 16 of 55 pits) and PASA20 (40 artefacts across 15 of 20 pits). At PASA12, testing was undertaken across alluvial flats and terrace formations either side of Bundewallah Creek. In this instance, the more elevated terraces on the eastern side were characterised by higher artefact incidence and a more consistent presence of artefacts (G2BA18), while the lower alluvial flats along both sides of the creek displayed a patchier and lower artefact incidence (G2BA19).

The majority of test pits across the elevated spurline and basal slopes at PASA20 were found to contain low numbers of artefacts. Slightly higher incidences of artefacts were also encountered in one of the midslope test pits and the hand excavated pit on the locally elevated terrace remnant.

7.3.3 Conclusions regarding site location trends

On the basis of the Foxground and Berry bypass testing program, the main conclusions regarding trends in site location are as follows:

- Higher artefact incidence and/or assemblage richness tends to coincide with major spurlines and low gradient basal slopes above, and set back from, the valley floor.
- The valley floors, and in particular the alluvial flats, are generally characterised by intermittent and low incidences of artefacts.
- Micro-topographic features such as locally elevated terraces and creek banks, within the broader valley floor context, tend to contain a higher incidence of artefacts.
- The ridgeline crests and saddles tend to be characterised by intermittent and low incidences of artefacts, with higher incidences occurring in association with features such as low gradient knoll crests and break of slope interfaces.

Based on this study's results, the archaeological sensitivity of the alluvial flats that dominate the valley floor must be considered to be low. The only artefact finds within this category were low in incidence and only where a higher order drainage line (three or greater) was within 50 metres, or where locally elevated basal slopes with archaeological deposits were situated just upslope. Possible reasons for this may include cold air drainage, the presence of dense vegetation, and poorly drained or damp ground.

The larger and more dominant ridgelines (such as watersheds) have been confirmed to contain more continuous and higher density artefactual material compared to lesser landform corridors. The crests of ridgeline saddles have also been confirmed to contain artefact occurrences, especially where a saddle provides an efficient cross-country travel route due either to its low elevation, or strategic position relative to ridgelines.

The crests and basal slopes of low relief spurs which extend into and across the flood and wetland basins of the lower Shoalhaven valley have been confirmed as a focus for Aboriginal occupation. This is due to their well drained and elevated context in close proximity to a range of resource zones and water sources.

7.4 Site designations

The results of this investigation, and the landscape approach inherent within its methodology, provide a basis for moving beyond the limitations of a site based understanding of the archaeological resource, towards a landscape model of artefact incidences and characteristics relative to landform variables and past cultural interactions across those variables.

Despite this, the statutory and policy framework which manages and authorises impact to Aboriginal objects (artefacts) within NSW remains structured around sites and defined boundaries of artefact incidence. For this reason, the recorded locations of subsurface artefact occurrences detected by the testing program have been assigned site names. It should be remembered that these sites, although defined according to the sampling limitations dictated by the confines of the project construction footprint, are most likely manifestations of wider subsurface artefact occurrences, associated with landforms and which extend beyond the project area.

Of the twenty one PASAs subject to testing, eighteen were found to include subsurface artefact occurrences (PASA12, 13, 14, 15, 16, 18, 20, 21, 23, 24, 25, 27, 28, 29, 40, 41, 43 and 44).

Table 7-14 lists the various site designations outlined above.

Table 7-14: New site name and code designations for PASAs where artefacts were detected. [Please note that some locational information is not included in this report version]

PASA ID	Pit nos.	Site designation	Landform description
12	39-42, 44, 46-48	G2B A18	Upper level, embankment edge and immediate fringing lower slopes of a high terrace situated on the southern side of the valley floor floodplain
12	3, 10, 24-25, 27, 35, 51	G2B A19	Current banks, active flood plain and low terraces associated with a creek corridor
13	22	G2B A21	Levee bank and associated creek flats
14	3-12	G2B A22	Crest and upper slopes of a prominent spurline knoll
15	1-5	G2B A23	Crest and upper slopes of a prominent spurline shoulder
16	1-4	G2B A24	Crest and southwestern slopes of a prominent spurline knoll
18	1-3	G2B A25	Elevated west bank of a small unnamed tributary on the situated on the northern basal slopes of a creek valley
20	20	G2B A26	Locally elevated valley floor infill remnant (terrace remnant) situated between two tributary gullies
20	2-5	G2B A27	Crest and upper slopes of prominent ridgeline
20	9-16	G2BA28	Moderately graded crest of a north facing spur situated on the midslopes of a prominent ridgeline

PASA ID	Pit nos.	Site designation	Landform description
20 & 21 (incl. in 23)	17-19 23	G2BA29	Banks and adjacent flats on either side of a major creek (valley floor floodplain)
21 (incl. in 23)	16-18	G2B A30	Upper level embankment and adjacent lower slopes of a terrace situated on a valley floor floodplain
24	2-7	G2B A31	Northern bank of a major creek and adjacent flats (valley floor floodplain)
25	1-9	G2B A32	Crest and slopes of a low spurline adjacent to the west bank of a major creek
26 (incl. in 27)	12	G2B A33	Locally elevated western bank of an unnamed tributary on the valley floor of a major creek floodplain
27	3, 5	G2B A34	Flats associated with (east of) unnamed tributary on the valley floor of a major creek floodplain
28	1-13	G2B A35	Saddle floor and southern adjoining slopes on the crest of a major ridgeline
29	3-18	G2B A36	Crest and upper slopes of a prominent spurline shoulder forming part of the eastern slopes of a major ridgeline
40	16	G2B A15	Southwest facing low gradient basal slopes on a spurline adjacent to an unnamed tributary
41	1-8	G2B A16	Crest and north-east facing slopes of a low spurline adjacent to a creek
41	13	G2B A17	Locally elevated eastern bank of a creek, part of valley floor floodplain
43	30-31, 20	G2B A20	Locally elevated and western bank of a creekline
44	4	G2B A37	Bench formation on north facing basal slopes adjacent to a flood channel

7.5 PASAs 17 and 19

No test pits were conducted in PASAs 17 and 19. These locations were excluded given that project impact would only occur across PASA17 in already substantially disturbed deposits, and that direct impact to PASA19 could be avoided (refer section 2.4.4).

Based on the results achieved from the tested PASAs, it is expected that archaeological deposits are present at both PASA locations. In each case, the deposit is predicted to consist of a low, or low to moderate, discontinuous subsurface incidence of stone artefacts. The PASA 17 deposit may be comparable to those detected at PASA 15 (G2BA23) & PASA16 (G2BA24), and PASA19 comparable to PASA18 (G2B A25).

7.6 G2B PAD1

Subsequent to the drafting, review and finalisation of the test excavation program, a proposal to change access infrastructure in the area just south of Broughton Village was added to the project. The proposal includes, as part of a re-configuration of the Austral Park Road intersection, an eastwards extension of the existing road along an undeveloped public easement, to an elevated spur running parallel to Broughton Creek. At this point the new road would join an existing public road that descends to, and crosses, Broughton Creek. A u-turn facility would be constructed at the point where the new road met the existing public road on the creek-side spurline.

The landform on which the proposed u-turn facility and the intersection of the new and existing roads are proposed is the crest and upper slopes of a locally elevated spurline crest, situated parallel and adjacent to, Broughton Creek, and occupying a basal slope valley context. As such, this topography represents a sensitive landform with high potential to contain Aboriginal archaeological deposits, according to the current model of Aboriginal archaeological site location.

Given the locally tested and revised status of the current model, the predicted sensitivity of this landform can be considered to have a high degree of probability. Accordingly, that portion of the landform within and near to the project area can be identified as a PAD, the first such identification for the Gerringong to Bomaderry Princes Highway Upgrade projects. This PAD is identified as G2B PAD1, its location is shown in the mapping provided in **Appendix C**. The archaeological potential of the deposit is predicted to be moderate or high (refer **Appendix B** for an explanation of this classification). The main point of proposed development impact on the PAD is around the map grid reference 294277.6151235 (GDA).

8 Significance assessment

8.1 Assessment criteria

The Burra Charter of Australia defines cultural significance as 'aesthetic, historical, scientific or social value for past, present and future generations' (Aust. ICOMOS 1987). The assessment of the cultural significance of a place is based on this definition but often varies in the precise criteria used according to the analytical discipline and the nature of the site, object or place.

In general, Aboriginal archaeological sites are assessed using five potential categories of significance:

- Significance to contemporary aboriginal people.
- Scientific or archaeological significance.
- Aesthetic value.
- Representativeness.
- Value as an educational and/or recreational resource.

Many sites will be significant according to several categories and the exact criteria used will vary according to the nature and purpose of the evaluation. Cultural significance is a relative value based on variable references within social and scientific practice. The cultural significance of a place is therefore not a fixed assessment and may vary with changes in knowledge and social perceptions.

Cultural significance can be defined as the cultural values of a place held by and manifest within the local and wider contemporary Aboriginal community. Places of significance may be landscape features as well as archaeologically definable traces of past human activity. The significance of a place can be the result of several factors including: continuity of tradition, occupation or action; historical association; custodianship or concern for the protection and maintenance of places; and the value of sites as tangible and meaningful links with the lifestyle and values of community ancestors. Aboriginal cultural significance may or may not parallel the archaeological significance of a site.

Scientific significance can be defined as the present and future research potential of the artefactual material occurring within a place or site. This is also known as archaeological significance.

There are two major criteria used in assessing scientific significance:

1. The potential of a place to provide information which is of value in scientific analysis and the resolution of potential research questions. Sites may fall into this category because they: contain undisturbed artefactual material, occur within a context which enables the testing of certain propositions, are very old or contain significant time depth, contain large artefactual assemblages or material diversity, have unusual characteristics, are of good preservation, or are a constituent of a larger significant structure such as a site complex.
2. The representativeness of a place. Representativeness is a measure of the degree to which a place is characteristic of other places of its type, content, context or location. Under this criteria a place may be significant because it is very rare or because it provides a characteristic example or reference.

The value of an Aboriginal place as an educational resource is dependent on: the potential for interpretation to a general visitor audience, compatible Aboriginal values, a resistant site fabric, and feasible site access and management resources.

The principal aim of cultural resource management is the conservation of a representative sample of site types and variation from differing social and environmental contexts. Sites with inherently unique features, or which are poorly represented elsewhere in similar environment types, are considered to have relatively high cultural significance.

The cultural significance of a place can be usefully classified according to a comparative scale which combines a relative value with a geographic context. In this way a site can be of low, moderate or high significance within a local, regional or national context. This system provides a means of comparison, between and across places. However it does not necessarily imply that a place with a limited sphere of significance is of lesser value than one of greater reference.

The following assessments are made with full reference to the scientific, aesthetic, representative and educational criteria outlined above. Reference to Aboriginal cultural values has also been made where these values have been communicated to the consultants. It should be noted that Aboriginal cultural significance can only be determined by the Aboriginal community, and that confirmation of this significance component is dependent on written submissions by the appropriate representative organisations.

8.2 Aboriginal cultural values in the project area

A specific study of Aboriginal cultural values associated with the Princes Highway upgrade study area was conducted in 2009 (NOHC 2009b). This assessment sought to record sites and places with Aboriginal cultural significance and involved a review of ethno-historical sources, oral histories, and heritage studies, as well as the conduct of stakeholder interviews and field inspections. Both place-specific and more general cultural values were documented.

Three specific places of identified Aboriginal cultural significance occur within the Foxground and Berry bypass project area: “Dicky Wood’s Meadow” battle ground (G2B A13), an historical Aboriginal encampment at Brookside, Broughton Village (G2B A14), and the Toolijooa Ridge (classified as a cultural landscape: TRACL). These places were considered to have significance due to their importance in traditional lore, as evidence of past occupation patterns, their association with lives and memories of people’s ancestor’s, and their historical importance.

Archaeological sites, not necessarily of remembered or documented places, were also considered to have value for their importance in traditional lore, as evidence of past occupation patterns, their association with lives and memories of people’s ancestor’s. Due to low site detection rates during surface archaeological surveys, and a limited number of previous archaeological excavation programs, information on the nature and incidence of Aboriginal archaeological sites remained sketchy. Despite this, Aboriginal stakeholders acknowledged the cultural values of all artefacts encountered and emphasised the need to conserve and effectively manage all archaeological deposits.

The outcomes of the on-going project consultation program with Aboriginal stakeholders has confirmed these positions on significance, although opinions regarding preferred management strategies can vary across the stakeholder groups.

8.3 Archaeological recordings

8.3.1 Archaeological significance – deposits subject to testing

Low - local

The following sites are assessed as having low significance within a local context based on the low technological diversity and the relatively low, and discontinuous, artefact incidence encountered at these locations:

- G2BA15.
- G2BA17.
- G2BA19.
- G2BA20.
- G2BA21.
- G2BA23.
- G2BA25.
- G2BA34.
- G2BA35.
- G2BA37.

These sites correspond primarily to valley floor contexts, although G2BA23 and G2BA35 correspond to a spurline shoulder and saddle floor respectively; they are relatively common site types with limited research potential.

Site G2BA27 has also been assessed to be of low significance within a local context due to its limited research potential as a site with a low, albeit relatively continuous, artefact incidence.

Moderate - local

The following sites are assessed as having moderate significance within a local context based primarily on their greater research potential due to higher artefact incidences and/or higher than average assemblage richness:

- G2B A16.
- G2B A18.
- G2B A22.
- G2B A24.
- G2B A26.
- G2B A28.
- G2B A32.
- G2B A33.
- G2B A36.

These sites correspond to spurlines, basal slopes bordering valley floors and locally elevated micro-topographic features within the valleys. They are representative of locations that appear to have been a focus of Aboriginal activity and they have scientific and educational value due to their research potential.

Moderate to high - local

The following sites are identified as having moderate to high significance within a local context based on their potential association with the Brookside Aboriginal encampment and "Dicky Wood's Meadow" battleground:

- G2BA29.
- G2BA30.
- G2BA31.

These three sites also display higher artefact incidences (G2B A30 and G2B A31) or higher than average assemblage richness (G2B A29). These attributes, combined with the sites' potential association with Brookside and "Dicky Wood's Meadow", has contributed to an assessment of moderate to high scientific research value.

8.3.2 Archaeological significance – other recordings

There are three archaeological recordings (apart from PASAs) which were not subject to archaeological testing. These are:

- G2B A3, a site exposed by earthworks unrelated to this project and which falls outside of the project area.
- G2B A38, a site and associated PAD which is situated within a proposed ancillary area.
- G2B PAD1, a recording identified following the finalisation of the test excavation program.

Site G2B A3

This site is assessed as having low archaeological significance within a local context. This is based on:

- The very low artefact incidence evidenced across the available ground exposures (1/150 square metres).
- The low technological diversity evident in the recorded artefacts.
- The absence of subsurface artefacts 60 metres further upslope on an adjacent spurline crest (PASA 42).
- The substantially disturbed nature of the area, resulting from earthworks to create a house platform.

Site G2B A38

This recording consists of a single artefact, which is associated with an area of predicted archaeological potential, which remains untested. The PAD area consists of locally elevated, low gradient basal slopes adjacent to valley floor flats and associated nearby tributary streamlines. The site is situated in a moderately disturbed context due to sheet erosion, vegetation clearance, fence construction and use for grazing and pastoral purposes.

Based on the confirmed site content (one surface artefact), this site has only low archaeological significance within a local context. This assessment relates to the value of the site description in contributing towards a larger store of data, which may further scientific understanding of Aboriginal hinterland sites in the Southern Illawarra.

An assessment of the significance of the associated archaeological deposit cannot be conducted without reference to test excavation results. Despite this, it should be noted that archaeological deposits detected within similar local landforms have been assessed as having moderate to high significance within in a local context. Based on the predictive site location model, the potential of this PAD is considered to be moderate or high (refer **Appendix B**).

G2B PAD1

The identification of the potential archaeological deposit, G2B PAD1, post-dates the finalisation of the test excavation program, and is a result of the application of the predictive site location model to a concept design revision. In the absence of any surface or subsurface artefact data, it is not possible to provide a significance assessment for this recording. However, based on the test excavation results and the predictive site location model, the potential for this landform to contain archaeological material is considered to be high, and the potential archaeological significance of that material may be low, moderate or high within a local context. Key determinates in this assessment are:

- The proximity of the Broughton Creek, which is a high order and regionally important drainage line.
- The locally elevated and well drained nature off the landform.
- The presence of artefacts detected in PASA 20/site G2B A27, situated 500 metres further upslope on a higher portion of the same spurline.
- The presence of farm sheds and an existing access track along a portion of the spurline, may indicate potentially damaging levels of ground disturbance.

8.3.3 Aboriginal cultural significance

Discussion with Aboriginal stakeholders during fieldwork and AFG meetings indicate that all archaeological recordings within the project area are of Aboriginal cultural significance, however to date no detailed responses have been received with regard to individual sites.

8.4 Ethno-historical and other recordings

Brookside Aboriginal Encampment (G2B A14)

This recording is based on a non-Aboriginal oral account of Aboriginal people camping on the banks of Broughton Creek, opposite Brookside. As yet, this recording consists of a place only. No archaeological evidence has, to date, been found to augment the oral account.

This place has Aboriginal cultural significance due to its association with the actions and destinies of local community ancestors and their families in the late nineteenth century. This site relates in particular to the interrelation between Aboriginal and European people, and camping adjacent to homesteads.

Historical Aboriginal Encampments at Berry (G2B A39)

This recording comprises an area within which two phases of Aboriginal camping activity is known, or thought likely, to have occurred. It is surmised that nineteenth century camping may have occurred in this area, upstream of the Boongaree encampment, possibly as a response to the European ‘Broughton Creek’ village built on the adjacent spurline. Numerous oral accounts record that in the twentieth century, up to at least the 1960s, Aboriginal people regularly camped on the creek flats during seasonal employment as crop pickers.

The location of the Boongaree encampment, which was centred on the former meadow lands at the intersection of Broughton and Broughton Mill Creeks (outside of the project area), has high Aboriginal cultural significance within a regional context. This is due to multiple factors including:

- It's cultural, spiritual and historical importance as an Aboriginal encampment recorded at the time of European contact, and the home of important local identities Toodwick (known to Europeans as Broughton) and his brother Broger.
- It's cultural associations with the ancestors of contemporary Aboriginal people who identify with the lower Shoalhaven River district.
- The potential for burials to occur within the area.
- It's potential to contain archaeological evidence of potentially continuous Aboriginal occupation from prior to European contact, into the mid and later nineteenth century.
- It's potential to contain archaeological evidence of the interaction between the European and Aboriginal communities and economies throughout the period of occupation.

It is not known if nineteenth century Aboriginal camping occurred, upstream of Boongaree, within the area of the project and of recording G2B A39. It is surmised that this was likely, given the presence of the 'Broughton Creek' European village on the adjacent spurline, and the discovery of a gorget bearing the legend 'Neddy Noora Shoal Haven 1834' in the bed of Broughton Mill Creek opposite the *Mananga* homestead in 1925 (refer section 4.4.3). If archaeological evidence of this phase of camping was demonstrated within this area, then it could potentially have high archaeological significance, and the place have high Aboriginal cultural significance, both within a regional context.

The later twentieth century phase of Aboriginal camping on the creek flats, now associated with the Berry Bowling Club, is historically well established. These camps remain part of living memory for many local Aboriginal people and relate to both their own experiences and to the lives of community and family members now deceased. As such, the location and any physical traces of the camps have strong cultural significance to Aboriginal people. They are evidence of a past way of life, and constitute a place associated with their ancestors. The location and any physical traces also have historical and social significance to the local community in general, as evidence of the role of Aboriginal people in the Berry township and economy. Physical traces, if identifiable, could potentially have archaeological value.

'Dicky Wood's Meadow' Aboriginal battle ground (G2B A13)

This recording is based on an account provided by a local Aboriginal person Buthring in 1900. The place has high significance for Aboriginal people as it relates to traditional lore and practice, and is associated with the potential for burials. To date, no archaeological evidence from the general area of the reported battle ground, indicates Aboriginal occupation which is different in type or character from similar valley floor contexts adjacent to a major streamline. Despite the absence of specific archaeological evidence for a battle ground, such evidence may still be present. The test excavations conducted to date have been limited in scope and extent relative to the potential battle ground area. The current archaeological evidence remains compatible with the reported battle ground function and does not limit its Aboriginal cultural value.

Toolijooa Ridge Aboriginal cultural landscape (TRACL)

The Toolijooa Ridge has Aboriginal cultural significance due to its stated role as a traditional access route and pathway between the uplands of the Illawarra range and the coastal fringe. Archaeological test excavations conducted for this program and previous investigations for the Eastern Gas Pipeline confirm that discontinuous subsurface artefact distributions occur along the ridge crest and some of its prominent spurs. There are also unconfirmed and no-specific reports of ceremonial grounds on the ridgeline.

A further significant aspect of the ridgeline is its dominant visual role in the landscape, and its presumed importance as a wildlife corridor. These values relate to a sense of belonging and custodianship to the land and the health of its plants and animals.

Large and mature fig trees

Many of the Aboriginal stakeholders who have participated in the consultation program have stated or concurred with a view that large and old growth fig trees within the Illawarra region are of high Aboriginal cultural value (refer to Section 4.4 for additional detail regarding Aboriginal cultural values of fig trees). These are values which may be irrespective of a European planted, or pre-European and/or natural origin for the tree. All trees which are large and mature, or which can be classed as old-growth are of stated cultural significance to at least some of the Aboriginal stakeholders in the Southern Illawarra.

It is probable that high cultural significance would be unanimously accepted amongst the project Aboriginal stakeholders for the pre-European high canopy forest remnant fig tree (MFT22) identified on the banks of Bundewallah Creek. This would be based, not only on the traditional lore associated with large and mature fig trees, but also for the education, representative and rarity value of this tree. Its size, height and form are evocative of a forest structure now vanished from the Coastal Plain, and as a consequence, a traditional lifestyle which also disappeared with that forest.

9 Statutory and policy context[2]

The project will be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

9.1 *Environmental Planning and Assessment Act 1979*

The EP&A Act and its regulations, schedules and associated guidelines require that environmental impacts are considered in land use planning and decision making. Environmental impacts include cultural heritage assessment. The Act was reformed by the *Environmental Planning and Assessment Amendment (Infrastructure and other Planning Reform) Act 2005*.

The Minister for Planning declared by Order dated 10th September 2010 and published in NSW Government Gazette No. 114, that the Princes Highway upgrade between Toolijooa Road and Schofields Lane, known as the Foxground and Berry bypass, was a project to which Part 3A of the EP&A Act applied.

Part 3A of the Act was an amendment which established a separate streamlined and integrated development assessment and approvals regime for major State government infrastructure projects, development that was previously classified as State Significant development, and other projects, plans or programs declared by the Minister for Planning.

Part 3A (Section 75U) removed the stop-the-clock provisions and the need for single-issue approvals under eight other Acts, including the *National Parks and Wildlife Act 1974* (NP&W Act) and the *Heritage Act 1977*. In addition, environmental planning instruments such as the heritage provisions within Regional Environmental Plans (REPs) and Local Environmental Plans (LEPs), (other than State environmental planning policies) did not apply to projects approved under Part 3A (Section 75R, paragraph 3).

This section established an exemption to the application of the NP&W Act regarding Aboriginal Heritage Impact Permits. It stated that a Permit was not required for an approved project subject to the provisions of Part 3A of the EP&A Act. Section 75U also extended this exemption to include 'any investigative or other activities that are required to be carried out for the purpose of complying with any environmental assessment requirements under this Part in connection with an application for approval to carry out the project or of a concept plan for the project' (s75(U)4.

Some provisions of the NP&W Act remained relevant to Part 3A investigations, notably the requirement to notify the Director-General of the location of Aboriginal objects within a reasonable time of their detection (now section 89A).

Since the Minister's declaration, Part 3A of the Act has been repealed (EP&A Amendment Act 2011). The amendment Act commenced on October 2 2011. The savings provisions in the amended EP&A Act mean that the project is a transitional Part 3A project. This means that Part 3A continues to apply to the project.

An application for project approval was made under Part 3A of the EP&A Act on 22 December 2010.

Environmental assessment requirements (DGRs) were issued for the project on 11 February 2011.

[2] The following information is provided as a guide only. Readers are advised to seek qualified legal advice relative to legislative matters.

9.2 Implications for the project

This project is being assessed under Part 3A of the EP&A Act .

Permits normally required under the NP&W Act for disturbing Aboriginal objects were not required for the conduct of the test excavations conducted in this assessment. There remains, however, requirements to report any findings to the OEH.

As part of the environmental assessment for the project as required under the EP&A Act, and specified in the DGRs (refer section 1.3), the potential impact of the project on Aboriginal heritage must be assessed and effective impact mitigation and conservation management proposed. Specifically, this assessment must consider artefacts, potential archaeological deposits and landscape cultural values, and be consistent with the draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, July 2005), specifically.

It is recommended that the strategies for impact minimisation, mitigation and the management of heritage values drafted in this assessment be included in the Statement of Commitments for the project.

10 Impact assessment

10.1 Representative and worst case impact

The general requirements included in the DGRs for the project specify that the environmental assessment must include:

> An assessment of the key issues, including an assessment of the worst case and representative impact for each issue for all aspects of the project (general requirement no.3).

For this assessment, representative impact is defined as that impact which has been anticipated in this analysis and to which the proposed management and impact mitigation strategies are directed. It is representative of the expected scenario, based on an analysis of the best information available and on a reasonable or normative level of prediction.

Worst case impact is defined as an extreme scenario where the highest conceivable degree of impact is anticipated due to unexpected occurrences which are extraordinary and outside of a reasonable level of prediction.

The worst case scenario with regard to Aboriginal heritage would consist of an unexpected encounter of an Aboriginal object or objects which, due to an exceptional level of assessed significance warrants *in situ* conservation and a consequential change in the Project alignment. This would conceivably be due to the discovery of a previously undetected or unpredicted item.

Worst case scenario discoveries fall into two broad categories:

- An archaeological deposit or feature with exceptional Aboriginal cultural value.
- A previously unassessed place of exceptional Aboriginal cultural value which may, or may not be associated with archaeological material.

The following hypothetical discoveries are examples which may constitute a worst case scenario, depending on the Aboriginal cultural and scientific values associated with the find and it's *in situ* conservation:

- Unique or rare site types.
- Evidence of mid to early Holocene and/or Pleistocene occupation (i.e. older than 5000 years before present).
- A burial ground (or grouping of burials), or a single burial with high significance grave goods.
- An archaeological deposit containing rare and well preserved organic items due to water logged and anaerobic conditions, such as may be found within a swamp or peat deposit.

It is considered that the potential for a worst case scenario has been minimised by the application in this assessment of a robust analysis which included:

- The participation of registered Aboriginal stakeholders and the exchange of information and discussion of issues at Aboriginal focus group meetings.
- A review of ethno-historical sources.
- Reference to oral tradition and information provided by local community sources.
- The use of predictive archaeological modelling.
- Archaeological survey and interpretation.
- Review of aerial photography.

An unexpected finds procedure has been developed by the RMS which defines a protocol to be followed in the event that an unexpected find is made during the process of construction (refer **Appendix M**). The adoption of this procedure provides both a safeguard and management process in the event of a worst case scenario.

10.2 Categories of potential impact

The potential impacts of the project on Aboriginal heritage consist of:

- A complete or majority degree of direct impact and disturbance to Aboriginal objects present within the direct construction footprint of the development. This can be expected to involve up to 100 per cent of the planned highway easement, with some limited potential for site remnants to survive in undeveloped areas of the easement (if any).
- A complete or majority degree of direct impact and disturbance to Aboriginal objects present within proposed construction and storage depots and other ancillary areas situated outside of the post-construction highway easement.
- Complete or varying degrees of direct impact/disturbance to items with Aboriginal cultural significance which do not fall into the category of an Aboriginal object, such as mature fig trees.
- Indirect impact to Aboriginal objects, or non-Aboriginal objects with Aboriginal cultural value, such as from development related changes to the landscape or scenic context of a site or item.

10.3 Recordings subject to impact

Of the 42 Aboriginal heritage recordings, (two surface artefact occurrences, 23 subsurface artefact occurrences (archaeological deposits), one PAD, twelve fig trees, and four ethno-historical recordings), sixteen would not be impacted by the project, eighteen would be partially impacted, and eight fully impacted. Of those fully impacted, all consist of archaeological deposits, with the exception of one fig tree. Three of the four ethno-historical recordings would be partially impacted. In the cases of G2B A13 and G2B A14), impact is measured relative to the broadly defined areas within which those places may have been located. Only one of the twelve fig trees would be impacted by the project.

Table 10-1: Summary of anticipated construction related impacts to Aboriginal heritage recordings, the ID of recordings subject to impact are bolded

Site ID	Recording type	Direct impact	Degree of impact	Comments
G2B A3	Aboriginal artefact occurrence	no		Known site exposure is outside of construction footprint (CF),
G2B A13	Ethno-historic place (Dicky Wood's Meadow Battle ground)	yes	partial	The actual size and location of the battle ground remains unknown, however 1.7 km of the CF passes through an area within which the battle ground is likely to have been situated. The battle ground is associated with the potential for burials
G2B A14	Ethno-historic place (Brookside Aboriginal historic encampment)	yes	partial	The actual size and location of the encampment is unknown, however 0.4 km of the CF passes through an area within which the encampment is likely to have been situated. The encampment is associated with the potential for archaeological occupation deposits
G2B A15	Archaeological deposit	yes	full	Deposit exists within the CF
G2B A16	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
G2B A17	Archaeological deposit	yes	partial	Deposit extends to either side of the CF
G2B A18	Archaeological deposit	no	partial	Deposit would be impacted by creek diversion trench, but extends to either side of proposed trench
G2B A19	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the project
G2B A20	Archaeological deposit	no		Deposit is to the north of the project
G2B A21	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the project
G2B A22	Archaeological deposit	yes	full	Most of the site focus is likely to be present within the CF
G2B A23	Archaeological deposit	yes	full	Most of the site focus is likely to be present within the CF
G2B A24	Archaeological deposit	yes	full	Most of the site focus is likely to be present within the CF
G2B A25	Archaeological deposit	yes	partial	Deposit exists within and likely to extend downslope and to the south of the CF.
G2B A26	Archaeological deposit	yes	full	Deposit exists within the CF
G2B A27	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
G2B A28	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
G2B A29	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
G2B A30	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF

Site ID	Recording type	Direct impact	Degree of impact	Comments
G2B A31	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
G2B A32	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
G2B A33	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
G2B A34	Archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
G2B A35	Archaeological deposit	yes	full	Deposit likely to extend to either side of the CF. However most of the focus of the site occurs within the CF
G2B A36	Archaeological deposit	yes	full	Most of the likely archaeological deposit on this spurline shoulder would be impacted
G2B A37	Archaeological deposit	no		Deposit is to the west of the project
G2B A38	Aboriginal artefact occurrence and associated PAD	no		Site and associated PAD is located within proposed ancillary area. Direct impact can be avoided by excluding this area from ancillary use.
G2B A39	Ethno-historic place (Aboriginal historical encampments at Berry)	no		Proposed roundabout within area of G2B A39 recording can be constructed within existing road disturbance corridor and thus avoid any potential for direct impact to recording area.
G2B PAD1	Potential archaeological deposit	yes	partial	Deposit likely to extend to either side of the CF
TRACL	Aboriginal Cultural Landscape (Toolijooa Ridge) an ethno-historic place	yes	partial	Approximately 1.4 km of the project would traverse the higher slopes of the Toolijooa Ridge and its associated side spurs. Impacts would include the carriageway formation, deep cuttings, and visually obtrusive embankments
MFT12	Fig tree	yes	full	Tree is situated within CF
MFT13	Fig tree	no		Tree is situated outside of CF
MFT14	Fig tree	no		Tree is situated outside of CF
MFT15	Fig tree	no		Tree is situated outside of CF
MFT16	Fig tree	no		Tree is situated outside of CF
MFT17	Fig tree	no		Tree is situated outside of CF
MFT18	Fig tree	no		Tree is situated outside of CF
MFT19	Fig tree	no		Tree is to the north of the project
MFT20	Fig tree	no		Tree is situated outside of CF
MFT21	Fig tree	no		Tree is situated outside of CF
MFT22	Fig tree	no		Tree is to the north of the project
MFT23	Fig tree	no		Tree is to the north of the project

10.4 Impact to cultural landscape values

10.4.1 General values

Generalised landscape features considered to have cultural significance and values by Aboriginal stakeholders can be summarised by the following:

- Large and old/mature growth fig trees.
- Remanent and regenerating native vegetation.
- Plants and animals with significance in past and contemporary Aboriginal cultural practice.
- Landforms which remain unchanged by European land use or strongly manifest the pre-European landscape (examples include prominent ridgelines, escarpments, hills former swamp basins and river and creek corridors).
- The sustainable presence of natural ecological systems associated with features such as creeks and rivers, forests and swamps.

The project would have varying degrees of impact to these generalised values, these can be summarised by the following:

- Loss of one large fig tree.
- Loss of some areas of native vegetation which may include plants known to have traditional uses.
- Substantial modification of natural landforms within the project area, through the construction of road platforms and cuttings.

10.4.2 The Toolijooa Ridge Aboriginal cultural landscape

The physical, visual and potential habitat changes across Toolijooa Ridge resulting from the project would amount to a substantial impact to the Aboriginal cultural values of the ridgeline.

Approximately 1.4 km of the project would traverse the higher slopes of the Toolijooa Ridge and its associated side spurs. Impacts would include the carriageway formation, deep cuttings, and visually obtrusive embankments. The cutting through Toolijooa Ridge is to be 900 metres in length, a maximum of 130 metres wide and a maximum of 25.5m deep.

These impacts will affect the Aboriginal cultural values of the landscape. The cutting through the ridge will result in significant alteration to the profile from various viewing angles. The visual continuity of the crest of the ridge will also be impacted. The presence of the project corridor would prevent vehicle and pedestrian through-travel along the ridge crest. This constraint is significant given the value of the ridge as a former pathway.

The vegetation clearance required for the project will reduce the current extent of vegetation cover. Aboriginal stakeholders have expressed concern that this may also impact habitat values.

10.5 Potential impact within ancillary areas

The location of heritage sites and items relative to the indicative location of ancillary areas is shown in Section C.3 of **Appendix C**. There are thirteen areas in which ancillary facilities may be placed. Eleven areas relate to proposed temporary or permanent stockpiles and compounds, including in some cases, potential backup and site offices. There are also five specific potential locations for offices or compounds. All but two of these are included wholly or partially within the eleven stockpile areas.

The impact associated with compounds includes a range of works and actions which would result in a complete or majority degree of direct impact and disturbance to any Aboriginal objects present. These include:

- Erection of fencing and bunded fuel and chemical storage areas.
- Construction of offices and sheds.
- Installation of sewerage and other services, as required.
- Sediment and erosion control works.
- Clearing and levelling.
- Construction of hard stand areas for plant and equipment.

The impact associated with temporary or permanent stockpile areas includes a range of works and actions which could result in a complete or partial degree of direct impact and disturbance to any Aboriginal objects present. There is some potential to avoid direct impact by fencing and excluding certain areas from use, or by temporarily covering deposits with hard stand gravels and rehabilitating the area upon completion. These works and actions include:

- Temporary storage of construction materials or material generated from within the construction site.
- A permanent area for the interim storage of materials for highway maintenance
- Erection of fencing.
- Sediment and erosion control works.

The exact location, configuration and scope of the impacts within these ancillary developments is impossible to anticipate at the current stage of project planning. This is because of the variables which would only be clarified at the detailed design stage of the project, and are dependent on the operational preferences and logistical constraints brought to the project by successful contractors. This uncertainty has implications for the effective management of potential impacts to heritage values. One option would be the conduct of a full scale test excavation program to define archaeological sensitivity across all possible ancillary areas. This, however, would result in considerable unnecessary testing impact to sites given that not all of the proposed ancillary sites would be impacted. An alternative would be to avoid impact to areas of potential were feasible, and where necessary, conduct a delayed and focused pre-construction testing program (where and if necessary), once areas of planned and unavoidable impact have been defined (refer discussion in section 11.1.3).

The following is an outline of Aboriginal heritage items and areas of potential which could potentially be directly impacted for impact at each indicative location. The areas of predicted archaeological potential are based on the predictive model used in this analysis and consideration of the test and salvage excavation results achieved to date on the Gerringong upgrade and Foxground and Berry bypass projects.

Southwest of intersection of Toolijooa Road and Princes Highway

This area has been the subject of recent archaeological surface survey (NOHC 2012). One known Aboriginal archaeological site has been identified, together with an associated area of predicted archaeological potential (refer Section 6.2).

The higher ground on the spurline in the northwestern portion of the area falls within the approximately defined boundary of the Aboriginal cultural landscape of the Toolijooa Ridge. A confirmed sub-surface Aboriginal archaeological deposit (G2BA12, NOHC 2011a), is located outside of the proposed ancillary area, on the crest of the spurline extending to the east of the intersection of the Toolijooa Road and Princes Highway. This deposit is interpreted as the eastern remaining portion of a site which was focused on the saddle in which the road intersection and highway is now situated (NOHC 2011a). Given the high degree of direct impact which has occurred in this area as the result of road and house construction, it is considered unlikely that the deposit now extends into the ancillary area.

An area of predicted archaeological potential is identified within the ancillary area (refer mapping in **Appendix C**). This area consists of valley-side basal slopes associated with an unnamed third order tributary creekline.

Toolijooa Ridge, on either side of the bypass alignment

This area occurs within the Aboriginal cultural landscape of the Toolijooa Ridge. There is one confirmed sub-surface Aboriginal archaeological deposit within the northern area, G2BA 35. This deposit is likely to extend to the north of the limit of archaeological testing, along the crest of the ridge, including the proposed vehicle access to the northern area. A further area of predicted archaeological potential is situated on the crest of a ridgeline knoll in the southern area. Although archaeological test pits within PASA28, indicated an absence of artefacts in proximity to this knoll, the knoll crest was not tested, and the low gradient surface of this feature is indicative of archaeological potential. The predictive model would anticipate a low incidence of subsurface artefacts.

A large fig tree (MFT12) is situated at the eastern end of the northern area, and may be subject to direct impact from construction, independent of any preparation or function of the ancillary area. This tree is relatively young compared to the remaining fig trees noted in or near the project.

East of Broughton Creek (SE of existing highway bridge)

There are no known Aboriginal sites within this area. Based on the recovery of artefacts from archaeological test pits just to the north (G2B A33 and 34), it is probable that archaeological deposits are also present within the proposed ancillary area. The area of predicted archaeological potential covers approximately two thirds of the proposed ancillary area (refer mapping in **Appendix C**) and comprises locally elevated micro-topographic landforms and valley-side basal slopes associated with an unnamed third order tributary creekline. The predictive model would anticipate a low or moderate incidence of subsurface artefacts to be present.

West of Broughton Creek (SW of existing highway bridge)

There are no confirmed Aboriginal sites or archaeological deposits within this area, however the whole of the area is classed as having archaeological potential for the following multiple considerations (refer mapping in **Appendix C**):

- A confirmed archaeological deposit is situated on the slopes and crest of a low spur, just north of the area (G2BA32). This indicates that archaeological deposit will be present on the same landform, where it extends into the northern portion of the proposed ancillary area. The predictive model would anticipate a low incidence of subsurface artefacts to be present.

- A confirmed archaeological deposit situated adjacent to the north bank of Broughton Creek, just west of the area the (G2BA31), indicates that archaeological deposit will be present along the southern margin of the proposed ancillary area, where it occurs within at least 200 metres of the river bank. The predictive model would anticipate a low or moderate incidence of subsurface artefacts to be present.
- The southern two thirds of this area falls within former portion 181, which is a potential location of Dicky Woods' Meadow. An ethno-historical source identifies this former meadow as the location of a traditional Aboriginal battle ground which is associated with the potential for burials (refer sections 4.4.2 and 6.2.3). If a margin of up to 200 metres from the meadow is allowed for the potential location of associated burials, the whole of the proposed ancillary area falls within this outlined area of potential.

Greystanes Lodge

This area includes a mature fig tree (MFT16) which was probably planted in association with a former Berry Estate tenant farmhouse at this location.

In addition, this area is situated on the edge of a potential location of Dicky Woods' Meadow. As mentioned above, this former meadow is associated with the potential for burials (refer sections 4.4.2 and 6.2.3). If a margin of up to 200 metres from the meadow is allowed for the potential location of associated burials, the whole of this proposed ancillary office or compound falls within this outlined area of potential.

Southeast of intersection of Austral Park Road and Princes Highway

There are no known Aboriginal sites within this area.

There is one area of predicted archaeological potential on a small spurline shoulder situated immediately east and southeast of the existing building complex.

Southwest of intersection of Austral Park Road and Princes Highway

There are no known Aboriginal sites within this area.

There are two areas of predicted archaeological potential:

- A spurline shoulder on the western margin of the proposed ancillary area.
- Basal slopes and elevated microtopography associated with an unnamed second order tributary creekline, flowing along the northern edge of the Broughton Creek valley floor. This area of potential occurs within the southeastern portion of the proposed ancillary area.

West of Intersection of Tindalls Lane and Princes Highway

A confirmed archaeological deposit (G2BA24) is situated on the elevated slopes of a prominent ridgeline knoll, immediately adjacent to the boundary of this proposed ancillary area. It is not considered likely that this deposit extends further downslope and into the proposed ancillary area.

A large fig tree (MFT19) is situated in the base of a gully on the western boundary of this area.

An area of predicted archaeological potential occurs along the spurline crest and low knoll in the northern portion of the proposed ancillary area. The predictive model would anticipate a low incidence of subsurface artefacts to be present.

There are a number of mature native trees within the area which have not been inspected for the possible occurrence of Aboriginal scars.

Oakleigh farmhouse and area, West side of Woodhill Mountain Road

There are no known Aboriginal sites or areas of predicted archaeological potential within this area.

A large fig tree (MFT23) occurs within the middle of the proposed ancillary area, and was probably planted in association with the early history of the present farmhouse, or a former homestead at this location.

Western end, and South of North Street, Berry

There are no known Aboriginal sites within this area. However a confirmed subsurface archaeological deposit (G2BA16) is situated immediately to the east, on the basal slopes of a spurline, adjacent to creek flats. This indicates that archaeological deposit will be present on the same landform, where it extends into the southern, upslope portion of the proposed ancillary area. The predictive model would anticipate a low incidence of subsurface artefacts to be present.

Southwest of Princes Highway, south of Graham Park

The majority of this area has not been the subject of archaeological survey. Survey of the proposed Princes Highway upgrade, along the eastern margin of this area, resulted in the identification of a potential archaeologically sensitive area (PASA 11) in association with an unnamed second order creekline. This PASA falls within the future assessment area of the Berry to Bomaderry Upgrade and has not been the subject of test excavation. A suite of micro-topographic landforms with predicted archaeological potential are associated with this creek line, and cover approximately half of this proposed ancillary area, within an east-west band across the middle of the area. These landforms include locally elevated landforms and valley-side basal slopes adjacent to the creekline, and the crest of a narrow spurline between the creek and a tributary. The predictive model would anticipate a low to moderate incidence of subsurface artefacts to be discontinuously present.

There are a number of mature native trees within the area which have not been inspected for the possible occurrence of Aboriginal scars.

10.6 Impact from realigned services and utilities

The project would include, as necessary, the realignment of some services and utilities. These works would occur during the pre-construction stage of the project and would be in accordance with the design and construction methods approved by the relevant service authorities.

Alterations to the alignment of major utilities are anticipated for the Shoalhaven Water sewer main along Kangaroo Valley Road, and about 800 meters of the Optus fibre optic cable east of Tindalls Lane. In other cases, existing service crossings would be reinforced, encased, or ducted on new overbridges.

Where sections of the existing highway would be upgraded, any existing minor utilities would be relocated as required to suit the new alignment. Temporary utility diversions may also be undertaken should the new permanent alignment be located within the active construction footprint.

In most of these cases, the works involved would occur within the assessed footprint of the project and the associated easement. These impacts are included within the project assessment presented in this report. There remains some potential for the realignment of services outside of the proposed project easement, such as in the two major utility examples referenced above. Where such a possibility is anticipated, an appropriate heritage assessment and impact mitigation process would be required to be completed prior to any disturbance.

10.7 Cumulative impact

The cumulative impacts of the project can best be understood by dividing the assessment area into broad landscape suites. This allows a comparison of similar known or predicted archaeological resources according to the premise that the distribution of, and variability in, Aboriginal sites tends to be related to landscape types and associations. The incidence of six broad landscape suites, or topographies, has been mapped in **Figure 10-1** across the project area and the two adjacent section of the Princes Highway upgrade – the Gerringong upgrade (GU) and the Berry to Bomaderry upgrade (BBU).

The six landscape suites are:

- *Low relief, locally elevated, undulating bedrock slopes adjacent to the Shoalhaven River gorge.* This topography occurs within the southern end of the BBU, but is widespread on either side of the Shoalhaven river gorge upstream from Nowra.
- *Basal slopes, spurs and interfluves fringing the coastal flats (which were former estuary basins).* This topography dominates the BBU and GU projects and forms a margin of descending spurlines and drainage lines around the edge of the coastal plain. The plain, now relatively well drained, was formerly dominated by swamp basins, and before that, by estuarine embayments. This topography consists of the terminal slopes of the south-eastern fall of the Illawarra Range.
- *Ridges, spurs and interfluves fringing major alluvial valley floors*. This topography dominates the (FBB) project area and is characterised by the spurlines, slopes and drainage gullies which border the major alluvial valleys that drain onto, and later merge with, the coastal plain. Those portions occurring within the G2B project areas form part of the Broughton Creek and Broughton Mill / Bundewallah Creek valleys.
- Major alluvial valley floors (excluding former estuary basins). Despite numerous drainage lines crossing the G2B project areas, only two major valley floors are traversed which are situated away from former estuarine basins of the coastal plain. These are the valleys of Broughton Creek and Broughton Mill / Bundewallah Creeks. Both are traversed in the (FBB) project area.
- *Higher ridges and spurs.* This topography consists of the higher ground within the G2B project areas and occurs across Toolijooa Ridge and Mount Pleasant. This topography dominates the lower-middle portion of the southeastern fall of the Illawarra Range.
- Wetland basin (drained), former estuary basin. This topography dominates the coastal plain of the Southern Illawarra, situated between the coastal sand bodies and the bedrock slopes. The G2B alignment largely avoids this flood prone topography, except for Omega flat in the GU project area.

All of these topographies extend to a majority degree, to either side of the project areas for the three sections of the Princes Highway upgrade between Gerringong and Bomaderry. None of these categories are rare across the Southern Illawarra and the proportion subject to impact from the upgrade projects is very small relative to their total distribution.

Table 10-2 presents the incidence of heritage recordings relative to topography and project areas. It should be noted that the data for the BBU does not yet include subsurface testing results, and may consequently be a substantial underestimate of actual site numbers.

The greatest net impact of all three sections of the Princes Highway upgrade between Gerringong and Bomaderry occurs across the alternating spurs and valleys of the coastal plain margin, with 55 per cent of the projects traversing this topography. Only 7 per cent of this net impacted area however occurs within the FBB project. This is 10 per cent of the FBB project but accounts for only 4 per cent of all confirmed BBU Aboriginal recordings (ie excluding tested PASAs with no detected archaeological material).

The FBB project is dominated by the spurlines, slopes and gullies which fringe the valleys of the Broughton and Broughton / Bundewallah Creek valley floors. This topography accounts for 44 per cent of the FBB project and 36 per cent of all confirmed FBB Aboriginal recordings. The next largest landscape within the FBB consists of major alluvial valley floors, again belonging to the Broughton and Broughton / Bundewallah Creek valleys. These comprise 31 per cent of the project and account for 50 per cent of all confirmed FBB Aboriginal recordings.

The remaining topography is of the higher ridges and spurs. This comprises 14 per cent of the FBB project and accounts for 4 per cent of all confirmed FBB Aboriginal recordings. Fifteen per cent of the GU project area also includes higher ridges and spurs, and includes 22 per cent of the confirmed GU Aboriginal recordings.

Although these figures demonstrate that most of the topographies traversed by the three sections of the Princes Highway upgrade between Gerringong and Bomaderry have a relatively high site incidence, 1.14 sites per GU kilometre and 2.48 sites per FBB kilometre, they do not in themselves provide a basis for broad concern about the cumulative impact of the FBB project or the G2B development context. In all cases, the topographies are not rare within the Southern Illawarra, and all extend up and downslope, and/or up and downstream of the highway easement. The archaeological resource encountered within the three sections of the Princes Highway upgrade between Gerringong and Bomaderry can be expected to similarly occur in adjacent areas. Given the linear nature of the highway project, the potential for substantial impact to a full suite of related landforms is low.

Apart from the limited urban expansion occurring around the region's towns, such as Berry, Bomaderry and Gerringong, and localised impacts from rural residential home construction the topographies traversed by the three sections of the Princes Highway upgrade between Gerringong and Bomaderry are not subject to significant development re is not a significant cumulative impact.

At a more localised scale, it can be noted that the FBB valley floor traverses pose the greatest increase in cumulative impacts. This is partly due to the fact that each diverge from the existing highway easement, and therefore will create new disturbance corridors. The other factors are the bypass alignments through the former location of Dicky Woods Meadow (G2B A13), and around the northern margin of Berry. The high Aboriginal cultural significance of the former Meadow cannot be compared, or weighed against, an equivalent or expected archaeological resource elsewhere within the same topographic zone. This ethnographically recorded traditional battle ground is a rare site type and would be hard to predict elsewhere using archaeological and landscape criteria. The construction of the bypass through the potential area of the former Meadow represents a substantial cumulative impact to the remaining area of that site – approximately 7 per cent of the total potential area (**refer section 6.2.3**).

The township of Berry is situated in the lower catchment of Broughton Mill Creek. Its continuing urban development has substantially impacted a suite of low spurs, basal slopes and creek flats at a point where the catchment merges with the coastal plain and the former estuary. Although this transitional zone, from bedrock basal slopes to the flat coastal plain, is extensive and continues southwest to Bomaderry, Berry remains the only section intersected by a major alluvial valley. As such, the impact of the FBB project along the northern margin of the town poses a further cumulative impact to this particular topographic nexus.

It can be concluded that the two FBB traverses across major alluvial valley floors, Broughton Creek, and the Broughton Mill / Bundewallah Creeks, pose localised cumulative impacts. These are to the Dicky Woods Meadow site, and to the transitional topography of the Broughton Mill Creek catchment onto the coastal plain. This underlines the need to effectively mitigate the impacts of the project within these two areas. On the northern margin of Berry, this can be realised through archaeological salvage and the return of recovered materials and information to the local Aboriginal community. At the potential location of Dicky Woods Meadow, mitigation must address both visual, archaeological and Aboriginal cultural issues.

Table 10-2: The incidence of PASAs, PADs and Aboriginal sites/recordings, relative to topography, across the three sections of the Princes Highway upgrade between Gerringong and Bomaderry (excluding ancillary area data)

		Broad scale landscape suite						
Project	**Variable**	**Low relief, locally elevated, undulating bedrock slopes adjacent to the Shoalhaven River gorge**	**Basal slopes, spurs and interfluves fringing the coastal flats (which were former estuary basins)**	**Ridges, spurs and interfluves fringing major alluvial valley floors**	**Major alluvial valley floors (excluding former estuary basins)**	**Higher ridges and spurs**	**Wetland basin (drained), former estuary basin**	**Totals**
GU	Approx. GU length (km)	-	5.32	-	-	1.17	1.38	7.87
	No. of PASA/PADs	-	7	-	-	2	0	9
	No of confirmed archaeological sites	-	7	-	-	2	0	9
	No of other recordings	-	0	-	-	0	0	
	Total no. confirmed Aboriginal recordings	-	7	-	-	2	0	9
FBB	Approx. FBB length (km)	-	1.17	5.00	3.51	1.59	-	11.27
	No. of PASA/PADs	-	1	11	10	3	-	25
	No. of confirmed archaeological sites	-	1	10	11	2	-	24
	No. of other recordings	-	0	0	3	1	-	4
	Total no. confirmed Aboriginal recordings	-	1	10	14	3	-	28
BBU	Approx. BBU length (km)	0.96	10.11	-	-	-	-	11.07
	No. of PASA/PADs	1*	13*	-	-	-	-	14*
	No. of confirmed archaeological sites	1*	1*	-	-	-	-	2*
	No. of other recordings	0	0	-	-	-	-	0
	Total no. confirmed Aboriginal recordings	1*	1*				-	2*
G2B	Approx. total G2B length (km)	0.96	16.60	5.00	3.51	2.76	1.38	30.21
	Proportion of total G2B length (%)	3.0	55.0	16.5	12.0	9.0	4.5	100
	Total no. of PASA/PADs	1	21	11	10	5	0	48
	Proportion of total PASA/PADs (%)	2.0	44.0	23.0	21.0	10.0	0	100
	Total no. confirmed Aboriginal recordings	1	9	10	14	5	0	39
	Proportion of total confirmed recordings (%)	2.0	23.0	26.0	36.0	13.0	0.0	100

** - These values are based only on surface survey results and do not include test excavation results*

BBU	FBB	GU	Broad scale landform suite
			Low relief, locally elevated, undulating bedrock slopes adjacent to the Shoalhaven River gorge
			Basal slopes, spurs and interfluves fringing the coastal flats (which were former estuary basins)
			Ridges, spurs and interfluves fringing major alluvial valley floors
			Major alluvial valley floors (excluding former estuary basins)
			Higher ridges and spurs
			Wetland basin (drained), former estuary basin.

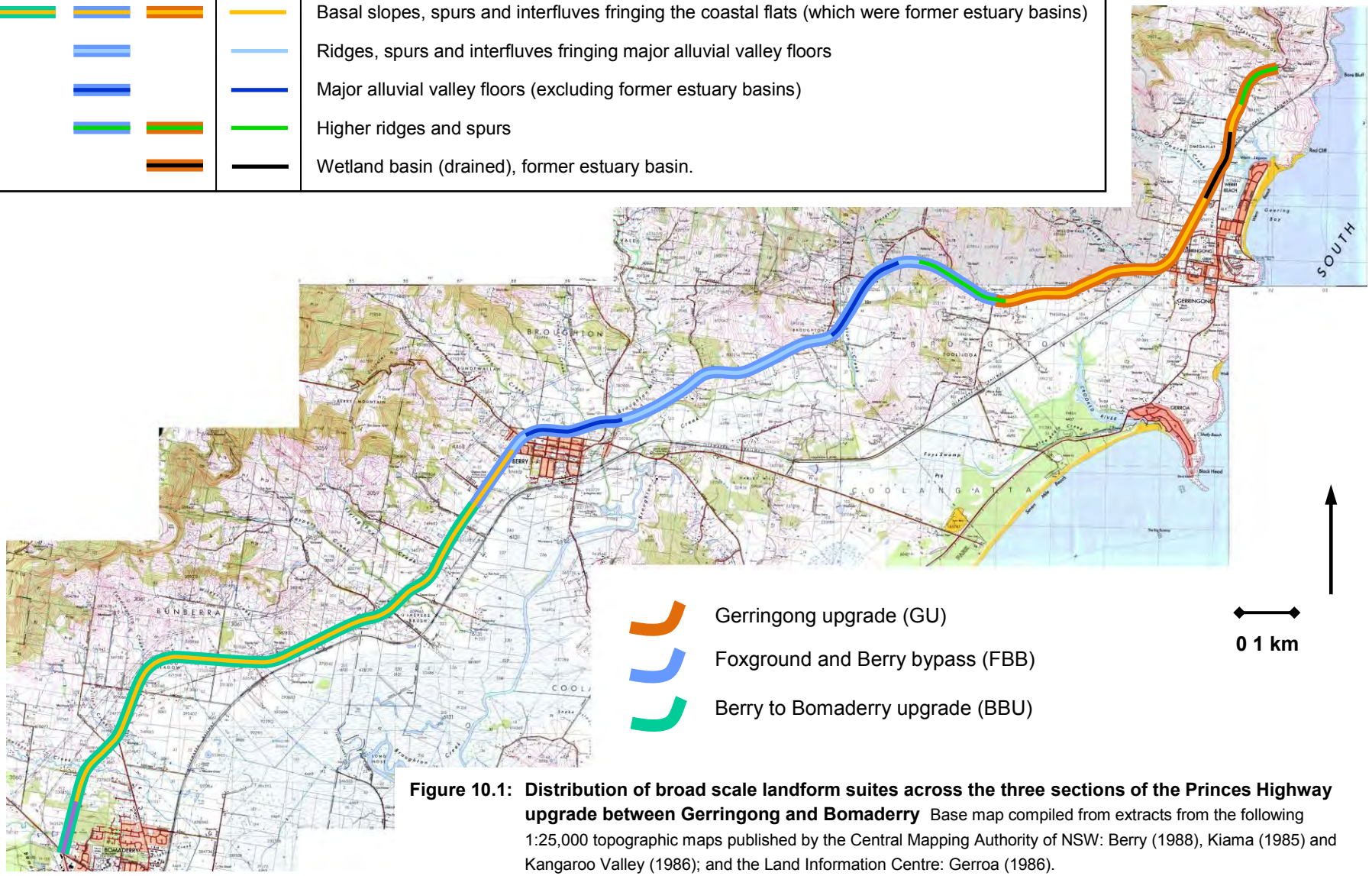

Figure 10.1: Distribution of broad scale landform suites across the three sections of the Princes Highway upgrade between Gerringong and Bomaderry Base map compiled from extracts from the following 1:25,000 topographic maps published by the Central Mapping Authority of NSW: Berry (1988), Kiama (1985) and Kangaroo Valley (1986); and the Land Information Centre: Gerroa (1986).

11 Recommended management and mitigation strategies

11.1 Management and mitigation measures

11.1.1 Archaeological values

Archaeological recordings G2B A15, G2B A17, G2BA19, G2B A20, G2B A21, G2B A23, G2B A25, G2B A27, G2B A34, G2B A35 and G2B A37 are relatively common, low density and discontinuous archaeological deposits with limited research potential. Impacts associated with the project are anticipated at all of these sites except G2B A20 and G2B A37. Given the low archaeological significance of these sites, no further archaeological investigations are warranted to commencement of construction impacts.

Archaeological recordings G2BA16, G2B A18, G2B A22, G2B A24, G2B A26, G2B A28, G2B A32, G2B A33, and G2B A36 have been assessed to be of moderate archaeological significance due to their research potential. These sites are generally characterised by a higher incidence of artefacts and/or a higher than average assemblage richness. These sites can also be grouped according to landform: G2B A16 and G2B A32 both correspond to the crest and slopes of a low spurline adjacent to a drainage line; G2B A22 and 24 both correspond to the crest and slopes of a prominent spurline knoll; G2B A26 and 33 both correspond to locally elevated features in a valley floor context; G2B A18, 28 and 36 correspond to an alluvial terrace, moderately graded spur crest and a prominent spurline shoulder, respectively.

Impacts associated with the project are anticipated at all of these sites. G2B A18 would be impacted by the trench diversion of Town Creek onto Bundewallah Creek.

Further archaeological investigation, in the form of salvage excavation, is warranted at a sample of these sites in order to assist with characterisation and the refinement of the model of Aboriginal occupation for the local region. The selection of an appropriate sample of sites for salvage can be based on the inclusion of sites that display higher levels of integrity, artefact diversity, or artefact incidence for any given landscape setting.

For example, G2B A32 displays a higher artefact incidence and richer assemblage than other low spurline sites adjacent to drainage lines, and as such it is a logical choice for salvage excavation. The identification of a possible glass artefact at Site G2B A16 warrants further excavation as part of a salvage program. Site G2B A24 is a less disturbed and higher density example of a site similar to that encountered at G2B A22, and G2B A33 displays a richer assemblage than G2B A26. G2B A36 and G2B A28, while not directly comparable in terms of landscape, are broadly similar as examples of spur crests and slopes of prominent ridgelines. In this instance, G2BA36 is associated with Toolijooa Ridge, a place of ethno-historical significance, and it displays a richer artefact assemblage, thus making it a potentially more significant site and hence worthier of salvage excavation. G2B A18 on the other hand is relatively unique in terms of landscape context as the only locally elevated alluvial terrace with a well defined higher incidence of artefacts. There is therefore a good argument for the conduct of salvage excavation at this site.

Based on this analysis, an appropriate sample of the sites with assessed moderate archaeological significance, for the conduct of salvage excavations is G2B A16, G2B A18, G2B A24, G2B A32, G2B A33 and G2B A36. Sites G2BA22, G2B A26 and G2B A28 have not been selected.

The archaeological deposits at G2BA29, G2B A30 and G2B A31 have all been assessed as being of moderate to high archaeological significance; they are potentially associated with the ethno-historically significant Brookside Aboriginal encampment and "Ðicky Wood's Meadow" battle ground. Because of the significance of these sites, further archaeological investigation in the form of salvage excavation is considered to be prudent at all of these sites prior to commencement of construction impacts at these sites.

The potential archaeological deposit identified following the finalisation of the excavation program (G2B PAD1), has predicted moderate or high archaeological potential, within a local context. As such it warrants the conduct of a salvage excavation program prior to the commencement of construction impact.

In the event that project related disturbance is anticipated to occur outside of the project area as defined in this assessment, then an appropriate heritage assessment and impact mitigation process should be completed prior to any disturbance. This requirement would include impact mitigation actions such as land rehabilitation and revegetation programs.

11.1.2 Aboriginal cultural values

The following points provide a summary of the stated Aboriginal values and associated issues within the project, as defined in the last and previous AFG discussions and stakeholder responses.

- All Aboriginal archaeological sites have Aboriginal cultural values. These may differ to the archaeological evaluations.
- It is acknowledged that all archaeological assessment is based on sampling, and that there is always potential for test excavation programs to miss items or sites which fall outside of the predictive theory upon which the sampling is based.
- The potential for burial sites to occur within a given area cannot be fully excluded based on test excavation results alone. There is always the possibility that an isolated burial is situated between the test pits.
- The conduct of archaeological salvage at those sites where test excavations have indicated research value, has been supported by stakeholders. Archaeological salvage excavation provides a means of managing both archaeological and cultural values. Information recovered by archaeological salvage actions can have value for the traditional Aboriginal interpretation of these sites, and understanding the past life of ancestors.
- However, the conduct of archaeological salvage, where it is justified by demonstrated research value, cannot effectively manage all of the Aboriginal cultural values present. This is because all Aboriginal artefacts have cultural value and many artefacts remain within the construction areas after archaeological salvage is completed, and at sites where salvage is not deemed to be warranted.
- Stakeholders have expressed a strong opinion that the cultural values inherent in artefacts which remain on-site, (after the completion of any required archaeological salvage excavations), and which would be directly impacted by construction, should still be effectively managed. The stakeholders have consistently proposed that this be achieved by the monitoring of construction works by qualified Aboriginal sites officers.
- The potential for encountering and disturbing Aboriginal burials, or their remains, is a major concern for all stakeholders, especially within the area of Dicky Wood's Meadow Battle Ground (G2B A13). Where there is a substantial potential risk for encountering burials, stakeholders have suggested monitoring of construction works by qualified Aboriginal sites officers and an archaeologist.
- Large and mature fig trees have high cultural value and should be conserved wherever possible.

- It is acknowledged that the local Aboriginal community is the custodial group for all of the Aboriginal artefacts recovered from the project area. The storage and/or return of all Aboriginal artefacts recovered from the project area should be determined according to an agreement decided upon by the stakeholders, the RMS, and the OEH.

At the AFG held on 21 November 2011 two key resolutions were made in relation to Aboriginal heritage and cultural values:

- That as little damage as possible be incurred at Toolijooa Ridge and Dicky Wood's Meadow, [these places] should be protected at all costs.
- It was strongly recommended that RMS reconsider its monitoring policy [in favour of] requiring monitors on-site during activities resulting in ground disturbance.

In the only written response to the draft report, the Jerrinja LALC reiterates the call for involvement of Aboriginal sites officers in the monitoring of construction works. The Land Council specifies that sites officers should be present during the removal of the first 500 millimetres - 1000 millimetres of topsoil.

In response to these values and issues, the RMS makes the following acknowledgements and undertakings:

- RMS has undertaken an archaeological assessment of the project area and undertaken community consultation to identify areas with heritage significance. Based on this, RMS proposes to undertake a strategic salvage program across all areas with moderate to high heritage significance that would be impacted by the project. RMS acknowledges that Aboriginal objects may occur anywhere across the landscape; however it also acknowledges that it is not feasible to attempt to identify and/or collect all objects through monitoring. Given that a salvage program would be employed prior to construction, the request to undertake monitoring during construction is not supported by RMS.
- Managing Aboriginal cultural values would be the subject of further consultation with Aboriginal stakeholders, and a Heritage Interpretation Plan (HIP) would be developed with the aim of identifying options for promoting local cultural values (refer recommendation no. 8).
- The management and curation of recovered Aboriginal artefacts would, where possible, be determined by a consensus or majority view of the Aboriginal stakeholders, and subject to approval by OEH, as necessary (refer recommendation 9). All such actions must be consistent with OEH policy, comply with any necessary permit or agreement conditions, and satisfy documentation standards.
- In order to minimise and mitigate impacts to cultural landscape values, the following strategies would be conducted where feasible (refer recommendation No.10):
  - Reduce the visual impact of the project through the planting and regeneration of vegetation.
  - Minimise and mitigate impact to ecological values.
  - The re-establishment of native vegetation to be a priority in areas requiring revegetation.
  - The use of native plant species with Aboriginal cultural values to be encouraged in revegetation programs. Appropriate species can be identified through liaison with Aboriginal stakeholders.
  - Incorporate or allow for the interpretation of cultural values, through the erection of signage, the adoption of Aboriginal nomenclature, or the inclusion of appropriately commissioned Aboriginal art or motifs.
  - Provide opportunities and access for the conduct of Aboriginal ceremony.

- RMS acknowledges the cultural significance of Dicky Wood's Meadow (G2B A13) and the Toolijooa Ridge Aboriginal cultural landscape to the Aboriginal community. RMS make the following commitments:
  - Provide an opportunity for the Aboriginal stakeholders to conduct ceremonial activities, where required, within the project area of G2B A13 and the Toolijooa Ridge Aboriginal Cultural Landscape prior to construction works. (refer recommendation no.11).
  - Minimise disturbance to the natural soil profile of G2B A13 within the construction footprint. This would generally be achieved by constructing the proposed carriageway on embankment, and thus reducing the need to cut into the natural soil profile (refer recommendation no.12). This strategy would also be deployed to minimise impact to G2B A14 (recommendation no.14).
  - Archaeological salvage excavation would be conducted in all areas of G2B A13 where the natural soil profile would be impacted, including pier, abutment and swale construction (refer recommendation no.13).
- Impact to large and mature fig trees would be avoided wherever feasible, and where unavoidable, impacts would be managed in consultation with Aboriginal stakeholders (refer recommendations 18, 19 and 20).

The construction of embankment in preference to impacting the natural soil profile within those portions of the construction footprint which include sites of Aboriginal cultural significance, is a strategy with two aims:

1. To minimise impact to Aboriginal cultural values by preventing the disturbance and exposure of remains as a consequence of ground excavations. In other words, to maximise the potential for archaeological deposits to lay undisturbed, albeit with a new construction and earth mass overlying them.
2. To provide the potential for the long term continuity of undisturbed archaeological deposits underneath the constructed mass of the bypass.

Neither aim is fully realised in this context as it is acknowledged that an undetermined degree of compaction must occur under the bypass mass. Despite this, the potential of this strategy to retain some cultural and archaeological values within the permanent impact zone of the construction footprint is a major advantage and justification for its use. The ability to ensure that potentially present, but undetected, burials would remain undisturbed (apart from compaction) and in their original context and country, is also a major justification for the use of this strategy, as a compromise position, advocated by the Aboriginal community.

In relation to the conduct of rehabilitation and revegetation, where it serves as a strategy for the reinforcement and mitigation of impacts to Aboriginal cultural values, it is noted that such actions have the potential to impact upon archaeological values. If and where such programs are anticipated outside of the area of the current assessment, then potential impacts to heritage values should be considered in a separate impact assessment (refer recommendation 25).

With regard to the effective archaeological management of construction impacts to the four areas with significant Aboriginal cultural landscape values the OEH has requested that the RMS consider the use of non-invasive and remote sensing techniques, such as ground penetrating radar (GPR) or electro-resistivity. The areas referred to by the OEH are the Toolijooa Ridge Aboriginal cultural landscape (TRACL), the Brookside encampment (G2B A14), Dicky Woods Meadow battle ground (G2B A13), and the Berry encampments (G2B A39), In the case of G2B A39, such action should not be necessary as construction impacts would be limited to areas of past road construction and disturbance (refer **Appendix I**).

The remaining recordings cover large areas, and the deployment of remote sensing would need to be further focused using other criteria in order to be cost-effective. Greatest archaeological potential within the affected portions of the TRACL consist of the ridge and spur crests, however these have been substantially impacted by agricultural development. The G2B A13 and G2B A14 areas have similar landuse histories. There are difficulties in conducting remote sensing techniques in disturbed agricultural lands because signals or anomalies can be generated by the detection of past disturbance traces with no archaeological value, such as from stump removal, erosion gullying, animal burrows, ripped rabbit warrens, and the disposal of stock animal remains. All such signals require ground truthing.

A possible exception would be the conduct of GPR within some portions of the G2B A13 area (Dicky Woods meadow). This technique could assist in the pre-salvage excavation assessment of theorised burial locations, based either on archaeological or Aboriginal cultural parameters. The potential burials that would be the subject of remote detection across this area could date as late as the nineteenth century and therefore have a distinct GPR signal, as opposed to the poor differentiation of much older burial pits due to greater degrees of compaction and mineralisation.

It is recommended that consideration be given to the use of remote sensing techniques as part of the impact mitigation program across G2B A13 (recommendation no. 13).

Please refer to section 11.2 below for a detailed outline of all recommendations.

11.1.3 Ancillary areas

The location of proposed ancillary areas relative to archaeological recordings is shown in **Appendix C.3**.

Two Aboriginal archaeological sites (G2B A35 and G2B A38) occur within proposed ancillary areas, one west of Toolijooa Road, and another on Toolijooa Ridge. Both of these proposed ancillary areas also include areas of predicted archaeological potential associated with the confirmed archaeological finds. No further archaeological or impact mitigation action is recommended at site G2B A35. Avoidance of impact is recommended at G2BA38 and its associated potential archaeological deposit.

Three ancillary areas would be situated partially or wholly within the Toolijooa Ridge Aboriginal cultural landscape. The recommended strategies for minimising impact to this landscape (Recommendation no. 12) would apply also to these ancillary areas.

Three mature fig trees occur within ancillary areas (MFT12, 13 and 23). The three recommended strategies for avoiding or mitigating impact to these trees would apply to the use of these ancillary areas (Recommendations 16, 17 and 18).

Ten of the ancillary areas include areas of predicted archaeological potential. In five of these instances, these predicted areas are based on the nearby presence of confirmed archaeological deposits where a program of salvage excavation would be recommended prior to direct impact (G2B A16, G2B A24, G2B A31, G2B A32 and 33). At the two ancillary areas west of Broughton Creek, predicted archaeological potential is also associated with the potential for burials around the location of Dicky Woods' Meadow (G2B A31). The proposed inter-project ancillary area south of Graham Park includes an untested PASA and an extensive area of associated predicted archaeological potential.

The management of potential heritage impacts within ancillary areas must address two particular characteristics of ancillary developments:

- There is a degree of flexibility in the placement of ancillary infrastructure and storage, due to the size of the properties available, and the fact that they are not constrained by a need for permanence.
- The exact location, scope and configuration of ancillary developments cannot be accurately defined until the detailed design stage of the project, when the specific preferences and operating requirements of contractors can be detailed.

One consequence of these is that, where necessary, any program of test excavation is better conducted at the detailed design stage, so that test areas can be limited to anticipated development footprints and testing impact can be kept to a minimum. Although ground truthing is delayed by this contingency, the action is predicted on predictive mapping of archaeological sensitivity, which itself is based on the now well established site location model, that has been developed and revised according to test results gained from the adjacent bypass corridor.

In response to these characteristics and the consequential testing constraints, a number of criteria for the selection of ancillary development areas have been proposed with respect to minimising impact to heritage values (refer also to section 4.4.7 of the environmental assessment). These are:

- Ancillary facilities to be located on sites that have a low likelihood of having Aboriginal or non-Aboriginal heritage significance and/or potential.
- Sites or areas of moderate to high Aboriginal and/or non-Aboriginal heritage significance and/or potential, including known sites, potential archaeologically sensitive areas and areas of Aboriginal cultural significance, are not to be used for ancillary facilities except where the impact is authorised and managed by a relevant approval or an approved Heritage Management Plan.

In addition, to these criteria, the following management strategies are proposed:

- In all cases, direct impact to areas of predicted archaeological potential should be avoided where feasible. This could be achieved by either:
  - Fencing off and excluding these areas from ancillary functions and use.
  - Avoiding direct disturbance to the natural soil profile, by overlaying the area with a temporary protective treatment and barrier (such as a geotextile), followed by a layer of hard stand gravels, all of which can be removed after construction and during rehabilitation.
- Where direct impact to areas of predicted archaeological potential cannot be avoided, it is recommended that:
  - Those areas of potential which consist of an extension of a landform on which a confirmed archaeological deposits is situated, and which has been recommended for salvage excavation, should be the subject of a program of salvage excavation prior to impact. This applies to the proposed ancillary areas: east of Broughton Creek, the two areas west of Broughton Creek, the area southwest of Tindalls Lane, and on the south side of North Street.
  - Those areas of potential which are unrelated to adjacent confirmed archaeological deposits should be subject to a program of test excavation (where and if necessary) prior to direct impact, and any management strategies developed as a consequence of the results of the test program. This applies to the proposed ancillary areas: southwest of Toolijooa Road, the ridgeline knoll in the southern area on Toolijooa Ridge, southwest of Austral Park Road, and south of Graham Park.

The use and effectiveness of temporary ground barriers as a means to protect overlain archaeological deposits is a technique subject to on-going review and improvement. Recent deployment of this technique by the RMS on the Woomarmaga bypass revealed limitations and potential areas for refinement. Following the removal of hard stand gravels and an underlying geotextile, varying degrees of compaction of the underlying sediments was observed, including some breakage of stone artefacts. Retarded rates of revegetation were also noted, resulting in greater susceptibility to erosion (pers. comm. Julian Watson, RMS 24/10/12). These observations should be taken into consideration when formulating a barrier design and protocol for use, within the project area. Possible refinements and local characteristics which should be considered include:

- High local re-growth and revegetation rates.
- The characteristic absence of stone artefacts on the surface and at least the upper 10 centimetres of the natural soil profile.
- In most senarios, temporary hard stand surfaces would be deployed over areas of lower (predicted or tested) significance (refer selection criteria above).
- The potential for compaction could be reduced by better and more even structural distribution of the weight of any structures or objects placed on the hard stand.
- The placement of a non-recoverable sand layer between the natural land surface and the geotextile could be trialled with a view to reducing compaction impact, and mechanical disturbance when removing the textile and overlying gravels.
- Any deployment of barriers and temporary had stands should be coupled with a program to test and review the effectiveness of the strategy.

11.2 Recommendations

The following recommendations have been prepared with input from the RMS and in certain instances are limited by RMS policy which excludes monitoring strategies.

These recommendations would be incorporated into the Statement of Commitments and included, as appropriate, within a project specific Construction Environmental Management Plan or relevant Heritage Sub Plan or equivalent.

<u>With regard to stakeholder consultation it is recommended that:</u>

1. Aboriginal stakeholders should continue to have the opportunity to actively participate in an on-going consultation program regarding the management of Aboriginal cultural heritage within the project area.

<u>With regard to archaeological sites it is recommended that:</u>

2. Avoid unnecessary impact to sites G2B A3, 20 and 37. All of these sites are outside of the project area.

3. Avoid impact to site G2B A38, and the associated area of potential archaeological deposit. This site is situated within a proposed ancillary area (refer also recommendation 23b).

4. No further archaeological investigation is necessary at G2B A15, G2B A17, G2B A19, G2B 20, G2B 21, G2B A22, G2B A23, G2B 25, G2B 26, G2B 27, G2B 28, G2B 34, G2B A35 or G2B 37.

5. A program of salvage archaeological excavation should be completed at G2BA16, G2B A18, G2B A24, G2B A29, G2B A30, G2B A31, G2B A32, G2B A33, G2B 36 and G2B PAD1 prior to the conduct of construction related ground disturbance within the area of those sites. The aim of this program would be to realise the information potential of the deposits through the recovery and analysis of a larger sample of artefacts from each site.

6. Where an Aboriginal site, or portion thereof, is situated adjacent to, but outside of the zone of construction activity, temporary fencing should be erected between the zone of construction activity and the adjacent site area and/or archaeological deposit, with the aim of defining a 'no–go' area for vehicles, material storage or other actions likely to result in ground disturbance. This function may be realised by temporary and purpose specific fencing, or by standard fencing which may be erected to define the road easement and works area, regardless of heritage requirements. Temporary fencing should be removed at the cessation of construction activities. This recommendation is relevant to the following known Aboriginal sites: G2B A2, G2B A3, G2B A15, G2B A16, G2B 17, G2B A18, G2B A19, G2B A21, G2B A23, G2B 24, G2B 25, G2B A26, G2B A27, G2B A28, G2B A29, G2B A30, G2B A31, G2B 32, G2B A33, G2B A34, G2B A35, G2B A36 and G2B A38.

7. The protocols provided in **Appendix M** of this report should be adopted and followed in the event that construction related disturbance involves the unanticipated discovery of Aboriginal objects or suspected human remains.

<u>With regard to Aboriginal cultural values and Ethno-historical recordings, it is recommended that:</u>

8. A Heritage Interpretation Plan (HIP) should be developed, with the aim of identifying options for the promotion of the cultural values of the project area for current and future generations. The HIP should be drafted with the involvement of Aboriginal stakeholders, landowners and local Councils. Options may include interpretive signage, educational materials, and supporting local museum displays. In particular, the HIP should address the acknowledgement and promotion of Aboriginal cultural values associated with the Toolijooa Ridge Aboriginal cultural landscape, and the Dicky Wood's Meadow traditional battleground (G2B A13).

9. The RMS continue to liaise with Aboriginal stakeholders regarding the management and curation of all Aboriginal artefacts (Aboriginal objects) recovered or salvaged from the project, following the completion of any required description and analysis. Where possible a consensus or majority view should be determined. If and as necessary, an application for a Care Agreement may need to be approved by OEH where artefacts are to be held in the care of an individual or organisation. Alternatively, recovered artefacts may be re-buried on-site or deposited with the Australian Museum (Sydney) pursuant to section 88 of the *National Parks and Wildlife Act 1974*.

   The location of all reburied Aboriginal objects must be recorded on an OEH Aboriginal site recording form and submitted to the OEH.

10. In order to minimise and mitigate impacts to cultural landscape values, the following strategies should be conducted where feasible:

    a. Reduce the visual impact of the project through the planting and regeneration of vegetation.

    b. Minimise and mitigate impact to ecological values.

    c. The re-establishment of native vegetation should be a priority in areas requiring revegetation.

    d. The use of native plant species with Aboriginal cultural values should be encouraged in revegetation programs. Appropriate species can be identified through liaison with Aboriginal stakeholders.

    e. Incorporate or allow for the interpretation of cultural values, through the erection of signage, the adoption of Aboriginal nomenclature, or the inclusion of appropriately commissioned Aboriginal art or motifs.

    f. Provide opportunities and access for the conduct of Aboriginal ceremony.

11. The RMS provide an opportunity for the Aboriginal stakeholders to conduct ceremonial activities, where required, within the project area sections of Toolijooa Ridge Aboriginal cultural landscape, and Dicky Wood's Meadow traditional battleground (G2B A13) prior to construction works.

G2B A13 "Little Mountain" or "Dicky Wood's Meadow" battle ground

12. Where feasible, minimise disturbance to the natural soil profile of G2B A13 within the construction footprint. This would generally be achieved by constructing the proposed carriageway on embankment, thus reducing the need to cut into the natural soil profile.

13. Prior to the conduct of construction works within G2B A13, archaeological salvage excavation should be conducted in all areas where it is anticipated that the natural soil profile would be impacted, such as from pier, abutment and swale construction. Consideration should be given to the use of remote sensing techniques as an initial stage of the salvage excavation program. This could assist in the selection of areas warranting detailed salvage methodologies.

G2B A14 Brookside (Broughton Village) Aboriginal encampment

14. Where feasible, adopt a carriageway elevation and a construction methodology which minimises disturbance to the natural soil profile within the construction footprint, and which requires the construction of an embankment across the valley floor rather than the excavation and removal of the natural soil profile.

G2B A39 Historical Aboriginal encampments at Berry (G2B A39)

15. The proposed roundabout at the intersection of Woodhill Mountain Road and the current Princes Highway, should be designed and constructed in such a way that direct impact is limited to the area of the existing disturbance corridor around the intersection. This corridor is illustrated in **Appendix I**.

16. Temporary fencing should be erected between the zone of construction activity and the adjacent areas of G2B A39, with the aim of defining a 'no–go' area for vehicles, material storage or other actions likely to result in ground disturbance. This function may be realised by temporary and purpose specific fencing, or by standard fencing which may be erected to define the road easement and works area, regardless of heritage requirements. Temporary fencing should be removed at the cessation of construction activities.

Toolijooa Ridge Aboriginal cultural landscape (TRACL)

17. Where feasible, construct and finish the embankment and cutting faces in such a way as to minimise adverse visual impacts, and re-establish vegetation to reduce visual impacts and minimise disruption to wildlife corridor values.

<u>With regard to the management of potential impact to mature fig trees it is recommended that:</u>

18. Wherever feasible, direct impact to mature fig trees is avoided and the continued and sustainable health of near or adjacent trees is considered in the detailed design of the bypass.

19. In cases where direct impact to mature fig trees is unavoidable:

    a. Then, wherever practicable, trees with reduced health, condition or vigour are impacted in preference to examples displaying good condition, health and vigour.

    b. Establish a management and impact mitigation program in consultation with the AFG.

20. Consultation with Aboriginal stakeholder groups should be conducted with regard to all incidences of anticipated impact to mature fig trees. The objective of this consultation is to propose strategies for the management of the Aboriginal cultural values which may be effected by the impact. Some impact mitigation strategies previously suggested by Aboriginal stakeholders for consideration by the RMS include:

    a. Conducting a program of propagation (such as via semi-hardwood cuttings) for replanting within and outside of the development.

    b. Make available established cuttings to members of the local Aboriginal and non-Aboriginal community for use in private gardens and landholdings.

    c. Removal and transplantation of high or exceptional value trees, to a new secure location and providing necessary aftercare.

<u>With regard to potential impact within ancillary areas it is recommended that:</u>

21. The following selection criteria for the location of ancillary facilities should be adopted:

    a. Ancillary facilities to be located on sites that have a low likelihood of having Aboriginal heritage significance.

    b. Sites or areas of moderate to high Aboriginal heritage significance, including known sites, potential archaeologically sensitive areas and areas of Aboriginal cultural significance, are not to be used for ancillary facilities except where the impact is authorised and managed by a relevant approval or an approved Heritage Management Plan.

22. In all cases, direct impact to areas of predicted archaeological potential should be avoided where feasible. This could be achieved by:

    a. Fencing off and excluding these areas from ancillary functions and use.

    b. Avoiding disturbance to the natural soil profile, by overlaying the area with a temporary protective treatment and barrier (such as a geotextile), followed by a layer of hard stand gravels, all of which would be removed after construction and during rehabilitation.

       The design and deployment of this strategy should seek to address recently identified limitations of the technique in other RMS projects, and take into account the characteristics and possible refinements outlined in section 11.1.3.

23. Where direct impact to areas of predicted archaeological potential cannot be avoided, it is recommended that:

    a. Those areas of potential which consist of an extension of a landform on which a confirmed archaeological deposits is situated, and which has been recommended for salvage excavation, should be the subject of a program of salvage excavation prior to impact. This applies to the proposed ancillary areas: east of Broughton Creek, the two areas west of Broughton Creek, the area southwest of Tindalls Lane, and on the south side of North Street.

    b. Those areas of greater than low predicted archaeological potential which are unrelated to adjacent confirmed archaeological deposits should be subject to a program of test excavation prior to direct impact, and any management strategies developed as a consequence of the results of the test program. This applies to the proposed ancillary areas: just southwest of Toolijooa Road (including site G2B A38), the ridgeline knoll in the southern area on Toolijooa Ridge, southwest and southeast of Austral Park Road, and south of Graham Park.

    c. Any required test excavation program should be conducted and completed as part of the detailed design stage of the project, and prior to construction. This would allow for a focused approach, in which testing can be limited to defined facility locations, and necessary revisions or mitigation actions can be proposed and enacted.

<u>With regard to the management of unexpected finds it is recommended that:</u>

24. Conduct of the following strategies is recommended to address the potential for encountering unexpected finds, including human remains:

    a. Basic recognition skills for Aboriginal artefacts and human remains should be included in all construction fieldwork induction programs.

    b. Adopt and conduct, when and as necessary, the protocols outlined in the RMS policy - Unexpected Finds Procedure, provided in **Appendix M** of this report.

<u>With regard to on-site staff training it is recommended that:</u>

25. An appropriate representative of the registered Aboriginal parties and a project archaeologist be invited to give a tool box talk to construction teams prior to construction. The purpose would be to make the construction teams aware of the cultural significance of Dicky Wood's meadow, Brookside and Toolijooa Ridge. In particular, to be aware that if any bones are identified during construction, works must cease until they can be dealt with in accordance with the RMS' *Unexpected archaeological finds procedure*.

26. With regard to any anticipated works (including mitigation actions such as revegetation and land rehabilitation) to be conducted outside of the currently defined project area, proposed easement boundaries, or ancillary areas, it is recommended that:

    a. An appropriate heritage assessment and impact mitigation process should be completed prior to any disturbance occurring. This process should be outlined within any Construction Environmental Management Plan or relevant Heritage Sub Plan or equivalent.

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Appendix A

Aboriginal stakeholder consultation

Registered Aboriginal stakeholders

As of 7 October 2011

Title	First name	Last name	Organisation
Mr	Tony	Acton	
Mr	Shane	Acton	
Mr	Richard	Archibald	Wollongong Northern District Aboriginal Corp
Mr	Keith	Ball	Wadi Wadi Coomaditchie Aboriginal Corp
Mr & Mrs	Keith and Heather	Ball	Wadi Wadi Coomaditchie Aboriginal Corp
Ms	Natalie	Beckett	Nowra LALC, Yuin Traditional Owner
Mr	Dean	Bell	Yurwang Gundna Consultant
Mr	Don	Bell	
Mrs	Ruth	Bell	Buru Ngunnwal Traditional Elders Group
Mr	Tyronne	Bell	
Ms	Veronica	Bird	Aboriginal Liaison Officer Shellharbour city council
Mr	Cohen	Blair	
Ms	Djarkin	Blair	
Mr	Leeroy	Boota	
Ms	Taminya	Boota	
Mr	Aaron	Broad	
Mr	Bart	Brown	KEJ Aboriginal Corp
Ms	Lorraine	Brown	Coomaditchie United Aboriginal Corp
Mr	Reuben	Brown	KEJ Aboriginal Corp
Mr	Richard	Campbell	
Mr	Paul	Charles	Killila Site Consultants
Mr	Greg	Coe	
Mr	Graham	Connolly	Jerrinja Traditional Owners
Mr	Bob	Davis	
Mr	Greg	Davis	
Mr	James	Davis	Illawarra Elders Wodi Wodi Corp.
Ms	Karon	Davis	Illawarra Elders Wodi Wodi Corp.
Ms	Lisa	Davis	
Mr	Lyle	Davis	
Mr	Richard	Davis	Illawarra ITEC
Mrs	Sheryl	Davis	
Mr	Jason	Davison	
Mr	Stewart	Davison	

Title	First name	Last name	Organisation
Ms	Sally	Dellitson	
Mrs	Joyce	Donovan	
Mrs	Mavis	Errington	
Ms	Charmain	Evans	
Mr	Mick	Farrett	
Mr	Rodney	Freeman	
Ms	Pam	Glover	
Mr	Shannon	Glover	
Mr	Andrew	Harvey	CEO Jerrinja LALC
Mr	Robert	Harvey	
Mr	Steve	Henry	
Mr	William	Henry	
Ms	Holly	Herring	Yurwang Gundana Consultant
Mr	Bronson	Ireland	
Mrs	Judith	Ireland	
Ms	Nicole	Ireland-Vuaceva	
Mrs	Gwenda	Jarrett	Yunimyna Industries & Logistics
Mr	Kelvin	Jarrett	
Mr	Kristian	Jarrett	
Mr	Mick	Jarrett	
Mr	Stan	Jarrett	CEO, Nowra LALC
Ms	Wendy	Kelley	
Mr	Roy	Kennedy	Chairman Illawarra LALC
Ms	Julie	Luland	
Mr	Ali	Maher	
Mr	Geoff	Maher	
Mrs	Maria	Maher	
Mr	Damien	Maher-Pagett	
Mr	Steven	Marsden	
Mr	Bob	Maynard	CEO Jerrinja LALC
Ms	Elizabeth	Miller	
Mr	Robert	Miller	
Mr	Lionel	Mongta	NPW Elder
Mrs	Mary	Mongta	Traditional Owner
Ms	Margaret	Mongta	

Title	First name	Last name	Organisation
Mr	Anthony	Moore	
Mr	Chris	Moran	
Mr	Donald	Moran	
Mr	Edward	Moran	
Ms	Irene	Moran	
Mr	Kim	Moran	
Mr	Robert	Moylan	Coomaditchie United Aboriginal Corp
Mr	Mattew	Naylor	
Mr	Robert	Naylor	
Mr	Glenn	Pagett	
Mr	John	Pagett	
Mr	Johnathan	Pagett	
Mr	Rick	Pagett	
Mr	Shayne	Pegett	
Ms	Sheree	Rankmore	Illawarra Aboriginal Corp
Ms	Angelia	Reid	
Ms	Sharrallyn	Robinson	CEO Illawarra LALC
Ms	Jenny	Sajkovic	Wollongong NIAC
Ms	Phoebe	Sajkovic	Wollongong NIAC
Mr	Sonny	Simms	Nowra LALC
Mr	C	Smith	
Mr	Mah	Spanda	
Mr	Clayton	Stewart	
Mr	Elliott	Stewart	
Ms	Gwendoline	Stewart	
Mr	Jodie	Stewart	
Ms	Keira	Stewart	Illawarra Local Aboriginal Land Council
Ms	Lila	Stewart	
Ms	Marie	Stewart	Nowra LALC, Yuin Traditional Owner
Mr	Paul	Stewart	Nowra LALC, Yuin Traditional Owner
Mr	Roy	Stewart	
Ms	Kristy	Thomas	Coomaditchie United Aboriginal Corp
Mr	David	Thulin	
Ms	Leanne	Tungai	
Mr	Noel	Webster	
Mr	Dennis	Wellington	Jerrinja Land Council

Title	First name	Last name	Organisation
Mr	Gordon	Wellington	Shoalhaven Elders Corp. Chair.
Mr	Noel	Wellington	Jerrinja LALC
Mr	Kone	Willams	

MEETING MINUTES

Name of meeting: Aboriginal Focus Group (AFG) for the Foxground and Berry Bypass

Location of meeting: Berry Agricultural Pavilion

Meeting facilitator: Ron de Rooy

Date: 10/11/11 **Time:** 10:00 am – 1:00 pm

Attendees	
John Pagett	Site Officer
Paul Charles	Killila Housing and Welfare
Ali Maher,	National Koorie Site
Geoff Maher,	Killila Housing and Welfare
Troy Tungai	Lands Council Wollongong – Site officer
Lyle J Davis	Yuin Nation
Clint Andy	Yuin Nation
Johnathon Pagett	Site officer
Kelly Ingram	
Rick Pagett	IAC/ILALC
Noel Wellington	Jerringa LALC
Andrew Harvey	Jerringa LALC
Alfred Wellington	Jerringa LALC
Anthony Moore	Illawarra Bush Tucker Man / site officer
Leanne Tungar	Illawarra
Daniel Percival (RMS)	RMS Environment Officer (Heritage)
Denis Gojak (RMS)	RMS Senior Environmental Officer (Heritage)
Julian Watson (RMS)	RMS Senior Environmental Officer
Mark Kheireddine (RMS)	RMS Project Engineer
Rebecca Parkes	NOHS
Kelvin Officer	NOHS – Navin Officer
Ron de Rooy (RMS)	RMS Project Manager
Jason Davison	Dungarn
Pam Glover	Illawarra Local Lands Council
Lorraine Brown	Coomaditchie United Aboriginal Corp
Agnes Donovan	RMS Cultural and Heritage Advisor – Southern Region
Apologies	
Maria Maher	
Veronica Bird	
David Thulin	

Agenda

1. Welcome to Country

2. Introduction – Agnes Donovan – Aboriginal Cultural Heritage Advisor

3. Project background and update – Ron de Rooy – Project Manager
   - Julian Watson – Senior Environmental Officer

4. Navin Officer – Findings of the Foxground and Berry Bypass Aboriginal Cultural Heritage Assessment investigations - Draft Cultural Heritage Assessment Report for Foxground and Berry Bypass

5. Comments on the Draft Cultural Heritage Assessment Report for Foxground and Berry Bypass

6. What's the next step, where to from here

Acronyms

GU – Gerringong upgrade

FBB – Foxground and Berry bypass

BBU – Berry to Bomaderry upgrade

EA – Environmental assessment

OEH – Office of Environment and Heritage

PASAs - Potential Archaeological Sensitive Areas

Agenda item	Record of discussion
Welcome to Country	Welcome to Country by Rick Pagett.
Introduction **Agnes Donovan** **RMS Aboriginal Cultural Heritage Advisor, Southern**	Agnes welcomed all attendees and asked all those present to state their name, organisation they represent and reason they are attending the meeting.
Project Background and Update	Ron - described project update and background for each of the three projects – GU, FBB and BBU Lyle – Simms Road was a trading track – Gerringong to mountains and beyond (Aunty Mary Simms. Need to consider in accordance of relevant legislation. Ron – FBB discussion in general. Dates for display/approval/salvage etc. John Paget – why not continue work for the remainder of projects –Denis noted we do not have approval. Continuity of work issue and possibility of third project. Ron – BBU discussion. Nick Boyd is current project manager. Julian – Reform of Aboriginal Heritage Legislation was noted for the benefit of the AFG who may not be aware. For any extra information please contact OEH or Agnes. Denis – Aboriginal Community should speak up and give their perspective. Community member – RMS should do their bit too and reconciliate with the Aboriginal community. Kelvin – Participation in reform/hand our flyers/phone line to call.
Cultural Heritage Assessment Report for Foxground and Berry Bypass **Navin Officer** **Heritage Consultants**	Kelvin – presents findings of Cultural Heritage Assessment Report for FBB. This now gives an expanded understanding of the area from an archaeological perspective. Previous large investigation was for the Eastern Star Gasline. The testing undertaken for RMS has enabled this understanding to take place. A number of artefacts have been found across the PASAs identified and tested. All PASAs (Potential Archaeological Sensitive Areas) have been tested. Wider area investigated in North Berry due to PM request to investigate an alignment further away from North St. 21 PASAs and 298 test pits. Community member – Tubular clay material found near Broughton Creek? Where did it come from and was it tested? Kelvin – not tested. There is clay under all of the profiles we tested but the column we found is most likely from geotechnical investigations where a hole was drilled and filled back up. Not Aboriginal material. 236 Artefacts were found from pits. 71 per cent chert. There may be a chert source in this area. 19 PASAs where artefacts were found mainly near major spur lines, slopes, ridges. Not many found in low lying areas maybe because these

Agenda item	Record of discussion
	areas were previously dense rainforest. Historic description of area details massive areas of brush – thick rainforests and large swamps. Test North of Berry – elevated area near Bundewellah Creek was a good site for artefacts. Toolijooa Ridge – most artefacts were found lower down near flats. 23 archaeological deposits, 12 fig trees, one of which is to be removed. A 1953 aerial image of the fig tree to be removed shows it to be a relatively young tree. 3 recorded historic sites. Lyle – These are not battegrounds, but are massacre sites. Ted Thomas as a 12 year old walked to Hawkesbury River and witnessed massacre sites. Kelvin – Battleground was referenced from a 19th century Aboriginal Man. Dickie Wood's Meadow – last AFG meeting we did not know where it was located. We have now narrowed it to Broughton Creek Valley. Alignment to go through section of Dickie Wood's Meadow. Community member – will it be monitored? Kelvin – RMS policy states no monitoring will be undertaken. 8-9 locations identified for salvage works to recover much larger samples of artefacts. John Paget – It seems like European heritage is more important than Aboriginal heritage Kelvin - Not true, some European heritage will be destroyed and not salvaged. A wide range of various investigations to be undertaken for heritage purposes. Julian – Discussion about Cultural Heritage Office John Paget – elders are reluctant to give information to RMS. Daniel Percival – is there a way to make it more comfortable for the elders to divulge the information? Community – no. Ron – Road may be built anyway but with respect to Aboriginal Heritage Community member – is compensation an option? Ron – this is a broader issue therefore we will make a note and discuss with the appropriate people. Kelvin – Discuss recommendations Continue consultation Avoid/protect sites that do not need to be impacted Further salvage for some sites John Paget – what was that piece of glass we found?

Agenda item	Record of discussion
	Kelvin – all material was looked at by stone artefact specialists Training for work crews to identify PAD's RMS does not approve of monitoring. Community member – Why does RMS not employ a monitoring program? Ron – Pursue consultative process for change in legislation. Denis – Add other conditions if disagree with RMS approach. Give us a better solution. Community member – put a monitoring officer on. Committee requests a monitoring officer. Ron – Comments need to be put in. Kelvin – everyone should write in and state they want a site officer Ron – there are two forms for response – Respond to this report and respond to the reform. Lyle – Archaeologists study only rocks. Anthropology is more relevant to the cultural associations we have here. John Paget – what happened with the photos of Green and Golden Bell Frog Ron – we will pursue the photo. Kelvin – Impact on Fig trees – 1 young fig tree impacted, will plant new fig trees. We need your assessment of the sites. Comments on report. Will be submitted to DP&I (Department of Planning and Infrastructure). Community member – battleground sites should be protected, not only aboriginal history but Australian history. All sites should be protected. People respect sites overseas and therefore should respect Aboriginal Sites. Ron – Comments also go to Department of Planning and Infrastructure and they can stop the project from getting approval. Julian – need your feedback in writing/recommendation for monitoring – specific sites will help us to respond in detail if you are more specific. Consultation open till 21st Nov 2011. Lyall – Europeans took land off us with weapons and made it their own place. **Resolution – As little damage as possible to Toolijooa Ridge, Dickie Wood's Meadow, protect at all costs.** **Community Resolution adopted by community members – strongly recommend RMS reconsider monitoring policy to acquire monitors on-site.** Kelvin – my recommendations are constrained by RMS.

Agenda item	Record of discussion
	Ron – Next steps, if you need help getting response in, contact myself or Agnes. **<u>Community resolution – fair and equitable distribution of workers across project.</u>**
Where to from here	Ron - Site officer application – BBU work to commence early next year. No more work on FBB until after project approval. Good progress was made during this meeting. The RMS would like to thank all attendees for their commitment and input. Meeting closed.

Appendix B

Site recording parameters

Site recording parameters

Aboriginal Sites, PADs and PASAs

The archaeological survey aimed at identifying material evidence of Aboriginal occupation as revealed by surface artefacts and areas of archaeological potential unassociated with surface artefacts. Recordings fall into three broad categories: sites, potential archaeological deposits, and potential archaeologically sensitive areas (PASAs).

Sites

A site is defined as any material evidence of past Aboriginal activity that remains within a context or place which can be reliably related to that activity.

Most Aboriginal sites are identified by the presence of three main categories of artefacts: stone or shell artefacts situated on or in a sedimentary matrix, marks located on or in rock surfaces, and scars on trees.

Frequently encountered site types within south eastern Australia include stone artefact occurrences - including isolated finds and open artefact scatters, coastal and freshwater middens, rock shelter sites - including occupation deposit and/or rock art, grinding groove sites and scarred trees. For the purposes of this section, only the methodologies used in basic site identification are outlined, together with those for the recording types encountered by this investigation.

Stone artefact occurrences

Stone artefact occurrences are the most commonly recorded site type in Australia. They may consist of single artefacts - described as isolated finds; or as a distribution of more than one artefact – often described as an artefact scatter or ‘open camp site’ when recording surface artefacts, or as a subsurface artefact distribution when dealing with an archaeological deposit.

Where artefact incidence is very low, either in terms of areal distribution (artefacts per square metre) or density (artefacts per cubic metre), the differentiation of the recording from background artefacts counts or background scatter may be an issue.

Isolated finds

An isolated find is a single stone artefact, not located within a rock shelter, and which occurs without any associated evidence of Aboriginal occupation within a radius of 60 metres. Isolated finds may be indicative of random loss or deliberate discard of a single artefact; the remnant of a now dispersed and disturbed artefact scatter; and/or an otherwise obscured or subsurface artefact scatter.

Except in the case of the latter, isolated finds may be considered to be constituent components of the background scatter present within any particular landform.

The distance used to define an isolated artefact varies according to the survey objectives, the incidence of ground surface exposure, the extent of ground surface disturbance, and estimates of background scatter or background discard densities. In the absence of baseline information relating to background scatter densities, the defining distance for an isolated find must be based on methodological and visibility considerations.

Given the varied incidence of ground surface exposure and deposit disturbance within the project area, and the lack of background baseline data, the specification of 60 metres is considered to be an effective parameter for surface survey methodologies. This distance provides a balance between detecting fine scale patterns of Aboriginal occupation and avoiding environmental biases caused by ground disturbance or high ground surface exposure rates. The 60 metre parameter has provided an effective separation of low density artefact occurrences in similar southeast Australian topographies outside of semi-arid landscapes.

Background scatter

Background scatter is a term used generally by archaeologists to refer to artefacts which cannot be usefully related to a place or focus of past activity (except for the net accumulation of single artefact losses).

There is no single concept for background discard or 'scatter', and therefore no agreed definition. The definitions in current use are based on the postulated nature of prehistoric activity, and often they are phrased in general terms and do not include quantitative criteria. Commonly agreed is that background discard occurs in the absence of 'focused' activity involving the production or discard of stone artefacts in a particular location. An example of unfocused activity is occasional isolated discard of artefacts during travel along a route or pathway. Examples of 'focused activity' are camping, knapping and heat-treating stone, cooking in a hearth, and processing food with stone tools. In practical terms, over a period of thousands of years an accumulation of 'unfocused' discard may result in an archaeological concentration that may be identified as a 'site'. Definitions of background discard comprising only qualitative criteria do not specify the numbers (numerical flux) or 'density' of artefacts required to discriminate site areas from background discard.

Artefact distribution

Artefacts situated within an open context are classed as an open artefact distribution, also known as artefact scatter (or ‘open camp site’) when two or more occur no more than 60 metres away from any other constituent artefact. The 60 metre specification relates back to the definition of an isolated find (Refer above). The use of the term scatter is intended only to be descriptive of the current archaeological evidence and does not infer the original human behaviour which formed the site. The term open camp site has been used extensively in the past to describe open artefact scatters. This was based on ethnographic modelling suggesting that most artefact occurrences resulted from activities at camp sites. However, in order to separate the description from the interpretation of field evidence, the terms artefact scatter, artefact distribution or artefact occurrence are now more extensively used. The latter two options can also be used to categorise artefacts occurring in sub-surface contexts.

Rock shelter sites

In a rock shelter, a site is defined as one or more artefacts occurring within or immediately adjacent to the sheltered space. Unlike a single artefact in an open context, a rock shelter provides a probable occupational focus to the interpretation of a single artefact and can therefore be considered to be indicative of a site rather than a background occurrence. An exception would be a single artefact which may have been deposited in the shelter through natural processes.

Rock art

Any location containing one or more marks of Aboriginal origin on rock surfaces is classed as a site. Marks typically consist of grinding features such as grinding grooves for hatchet heads, and rock art such as engravings, drawings or paintings. The boundaries of these sites are defined according to the spatial extent of the marks, or the extent of the overhang, depending on which is most applicable to the spatial and temporal integrity of the site.

Scarred trees

Trees with scars of Aboriginal origin form the other major type of artefactual evidence. Each tree is normally considered to be a separate site. The identification of a scar as Aboriginal in origin is dependent on a set of inter-related interpretive criteria. The credibility of alternative causal explanations such as natural traumas and other types of human scarring must be tested for each scar.

A range of diagnostic criteria has been developed to assist in the identification of Aboriginal scarred trees. The following criteria are based on archaeological work conducted by Simmons (1977) and Beesley (1989), and the field manual for Aboriginal scarred trees developed by Long (2005):

1. The scar does not normally run to ground level: (scars resulting from fire, fungal attack or lightning nearly always reach ground level). However, ground termination does not necessarily discount an Aboriginal origin (some ethno-historical examples of canoe scars reach the ground).

1(a). If a scar extends to the ground, the sides of the original scar must be relatively parallel: (natural scars tend to be triangular in shape.

2. The scar is either approximately parallel sided or concave, and symmetrical: (few natural scars are likely to have these properties except fire scars which may be symmetrical but are wider at the base than their apex. Surveyors marks are typically triangular, and often adzed).

3. The scar should be reasonably regular in outline and regrowth: scars of natural origin tend to have irregular outlines and may have uneven regrowth.

4. The ends of the scar should be 'shaped', either squared off, or pointed (often as a result of regrowth): (a 'keyhole' profile with a 'tail' is suggestive of branch loss).

5. A scar which contains adze or axe marks on the original scar surface is likely to be the result of human scarring. Their morphology and distribution may lend support to an interpretation of an Aboriginal origin: (marks produced after the scarring event may need to be discounted).

6. The scar must date to the time of Aboriginal bark exploitation within its region: The traditional Aboriginal exploitation of bark probably ceased in most regions between 100 and 150 years ago. However, in some locations associated with Aboriginal settlement, the Aboriginal removal of bark may have continued to the present day, or restarted as part of new cultural movements.

7. The tree must be endemic to the region: (and thus exclude historic plantings).

Field based identification of Aboriginal scars, is based on surface evidence only and will not necessarily provide a definitive classification. In many cases the possibility of a natural origin cannot be ruled out, despite the presence of several diagnostic criteria or the balance of interpretation leaning toward an Aboriginal origin. For this reason interpretations of an Aboriginal origin are qualified by the recorder's degree of certainty. The following categories were used:

- Aboriginal scar - This is a scar where an Aboriginal origin is considered the most likely. The scar conforms to all of the criteria and a natural origin is considered unlikely and improbable.
- Probable Aboriginal scar - This is a scar that conforms to all of the criteria and where an Aboriginal origin is considered to be the most likely. Despite this, a natural origin cannot be ruled out.

- Possible Aboriginal scar - This is a scar which conforms to all or most of the criteria and where an Aboriginal origin cannot be reliably considered as more likely than alternative natural causes. The characteristics of this scar will also be consistent with a natural cause.

Potential archaeological deposits

A potential archaeological deposit, or PAD, is defined as any location where the potential for subsurface archaeological material is considered to be moderate or high, relative to the surrounding project area landscape. The potential for subsurface material to be present is assessed using criteria developed from the results of previous surveys and excavations relevant to the region. Where necessary, PADs can be given an indicative rating of their 'archaeological potential' based on a combined assessment of their potential to contain artefacts, and the potential archaeological value of the deposit.

Table A2.1 illustrates the matrix on which this assessment is based. Locations with low potential for artefacts fall below the threshold of classification. In such cases the potential incidence of artefactual material is considered to be the same as, or close to that for background scatter. Where there is moderate potential for artefacts, the predicted archaeological potential parallels the potential significance of the deposit. For deposits with high potential for artefacts, the assessed archaeological potential is weighted positively.

The boundaries of PADs are generally defined by the extent of particular micro-landforms known to have high correlations with archaeological material. A PAD may or may not be associated with surface artefacts. In the absence of artefacts, a location with potential will be recorded as a PAD. Where one or more surface artefacts occur on a sedimentary deposit, a PAD may also be identified where there is insufficient evidence to assess the nature and content of the underlying deposit. This situation is due mostly to poor ground surface visibility.

Table A2.1 Matrix showing the basis for assessing the archaeological potential (shown in bolded black text) of a potential archaeological deposit

		Potential to contain Aboriginal objects		
		Low	***Moderate***	***High***
Potential archaeological significance	***Low***	---	**low**	**moderate**
	Moderate	---	**moderate**	**high**
	High	---	**high**	**high**

Potential archaeologically sensitive areas

Where a predictive model has been substantially tested and refined against a corpus of subsurface archaeological results, the resulting degree of certainty associated with areas of predicted potential allows the use of a term such as Potential Archaeological Potential (PAD), (refer above). In contrast, where a model remains largely untested, as is the case for the Southern Illawarra coastal hinterland, it must necessarily be inclusive and general in its use of criteria. There is therefore a consequential level of uncertainty in the model's predictions. On-going refinement of the model following the application of test results may well establish a more discriminatory and exclusive subset of archaeological predictions.

It is the intention of the assessment program to progressively test and revise the predictive model through successive stages of archaeological test pitting. Through the refinement of the model, locations that were identified using an early version, may no longer qualify after model refinement. In view of both the higher level of uncertainty associated with the current Southern Illawarra model, and the related risk of identifying areas as PADs in contexts which may subsequently be considered to have lesser or no potential, an alternative terminology has been adopted for this assessment.

Those areas which are consistent with the current predictive criteria have been termed Potential Archaeologically Sensitive Areas (PASAs). This term is intended to denote that the archaeological sensitivity of the identified area remains subject to confirmation and model refinement. The use of this term is deliberately distinct from potential archaeological deposit (PAD). In the context of the present investigation, the identification of a PASA is more tentative, and based on a less tested regional model, than for a PAD.

At present some PASAs include known site locations. This is not a contradiction. Despite the presence of one or more surface artefacts, a reliable prediction regarding the nature of any associated subsurface artefact distribution cannot yet be made for Southern Illawarra coastal plain sites. Elsewhere across NSW, a low incidence of surface artefacts is often associated with a higher subsurface incidence. However, within the Southern Illawarra, and especially within areas of former rainforest vegetation, low numbers of surface artefacts may yet be a reliable reflection of the below-ground resource. Given the regional uncertainty regarding the nature and incidence of archaeological deposits, a PASA identification in association with surface artefacts (a site) should not be inferred to correspond to a PAD for that site.

The identification of PASAs within the project area was based on the following:

- The predictive model criteria developed in the route options assessment stage of the project.
- Ethno-historical information.
- A review of landscape characteristics relative to known archaeological site patterning and landscape disturbance.
- Locations suggested by local Aboriginal community representatives.

Appendix C

Location of Aboriginal cultural heritage recordings

[Mapping not included in this report version]

Appendix D

Test pit locations and transects

[Mapping not included in this report version]

Appendix E

Pit data and soil profile descriptions

Pit data and soil profile descriptions

[Map grid references for each test pit location not included in this report version]

G2B - Foxground and Berry bypass (PASA 12)

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	Rich dark brown sandy clayey loam, grass roots + tree roots, some rounded gravels + cobbles in base of spit.
	2	10-20	Continuing with increasing clay, tree roots continuing.
	3	20-30	Increasing clays onto a layer of river cobbles in base of spit.
	4	30-40	Grading onto large orange/brown sandy clays.
	5	40-45	Massive compact orange/brown clays.
3			
	1	0-10	De-turfed - Dark brown sandy clayey loam, grass roots. Lots of glass + ceramics. Cobbles (sub-rounded) appearing 25 cm.
	2	10-20	Continuing with increasing clays. Nodules of red + orange clay. Historic artefacts continuing into base of spit. Sub-rounded cobbles (<80 mm) continuing.
	3	20-30	Continuing increasing clays + compaction. Small brick fragment, otherwise decreasing historical artefacts.
	4	30-40	Increasing red/brown sandy clays, fine grained.
	5	40-50	Layer of river cobbles 45cm. Grades onto compact brown clays.
4			
	1	0-10	De-turfed – Dark brown sandy clayey loam, increasing orange/brown sandy clays in base of spit. Some sub-rounded cobbles <100mm.
	2	10-20	Increasing orange/brown sandy clays. Decreasing cobbles, 300mm sub-rounded rock embedded in base of spit.
	3	20-30	Grades onto massive orange brown clays.
5			
	1	0-10	De-turfed – Thin layer of dark brown sandy clayey loam, compact layer of nodules + rounded river cobbles < 50mm, consistent through spit.
	2	10-20	Continuing with cobble size + density decreasing.
	3	20-30	Continuing some large cobbles (<450mm), grey/brown clays increasing.
	4	30-40	Cobbles decreasing in size. Increasing grey clays.
	5	40-50	Continuing orange/brown sandy clays in base.
	6	50-60	Grading onto orange/brown clayey sands. Cobbles decreasing.
	7	60-70	Continuing with appearance of cobbles.
	8	70-80	Increasing clays + moisture. Increasing cobbles.

Pit number	Spit number	Depth (cm)	Description
	9	80-90	Continuing.
	10	90-100	Clays increasing as above.
	11	100-110	Continuing.
	12	110-120	Sand grain size increasing.
	13	120-130	Coarse sand, cobbles decreasing.
	14	130-140	Dense layer of river cobbles in coarse clayey sandy matrix.
6			
	1	0-10	De-turfed – Rich dark brown sandy clayey loam with patches of brown/orange gritty sands in base of spit. A few sub-rounded cobbles <50mm.
	2	10-20	Continuing increasing cobbles, some sub-angular.
	3	20-30	Increasing large brown clays, sand patches decreasing. Some patches of decaying roots.
	4	30-40	Grades onto massive fine-grained orange/brown clays.
7			
	1	0-10	De-turfed – Dark brown sandy clayey loam, patches of orange/brown silty sandy. Some sub-rounded cobbles in base of spit (100mm).
	2	10-20	Continuing with increasing clays. Some sub-rounded cobbles continuing.
	3	20-30	Increasing brown clays. Decreasing cobbles.
	4	30-40	As above, increasing density.
	5	40-45	Grading onto large brown clays.
8			
	1	0-10	De-turfed – Rich dark brown sandy clayey loam, tree roots continuing into base of spit.
	2	10-20	Increasing brown sandy clays + compaction, tree roots continuing. Flecks of decaying roots.
	3	20-30	Increasing clay density, roots continuing.
	4	30-40	Continuing decaying roots present.
	5	40-50	Grading to orange/brown sandy clays, medium compaction, fine grained. Decaying roots continuing into base of spit.
	6	50-60	Continuing, increasing compaction.
	7	60-70	Grading onto rounded cobbles (<150mm) in base of spit.
	8	70-80	Cobbles continuing in base, clays increasing. Patch of sandy dusky red clay in base.
	9	80-90	Grading onto brown large clays in eastern side of pit, cobbles in western side.
	10	90-100	Increasing coarse sands in western side of pit.
	11	100-110	Onto gravels, cobbles, orange/brown coarse sand.

Pit number	Spit number	Depth (cm)	Description

Pit number	Spit number	Depth (cm)	Description
9			
	1	0-10	De-turfed – Thin layer of dark brown sandy clayey silt. Turf string, large (<200mm) angular cobbles + gravels. Grading to brown/orange sandy clays with embedded angular + sub-rounded cobbles. Grass + tree roots (fine) disturbed.
	2	10-20	Mottled orange/orange-brown sandy clays continuing, cobbles continuing, decreasing in size.
	3	20-30	Continuing, large lumpy clays, brown bottle glass. Some gravels continuing. Cicada holes.
	4	30-40	Increasing clay density. Rounded cobbles (<150mm) continuing, absence of angular rock.
	5	40-50	Clays increasing, cobbles decreasing. Some patches of gravelly, coarse orange brown sand.
	6	50-60	Onto orange-brown coarse sands, cobbles (<150mm) and gravels sub-rounded.
	7	60-70	As above - onto sands (orange-brown) cobbles decreasing.
	8	70-80	Coarse orange brown sands+ cobbles (<200mm)
10			
	1	0-10	Silty clay loam – De-turfed, grey/brown with yellow inclusions.
	2	10-20	Silty clay loam – grey/brown with yellow inclusions
	3	20-25	Clay loam – grey/brown with yellow inclusions, some rocks.
	4	25-40	Clay loam, grey/brown with some rocks.
	5	40-43	Clay loam, some rocks – grey/brown.
	6	43-57	Clay loam – grey/brown some rocks.
	7	57-70	Clay loam – grey/brown some rocks.
	8	70-80	Clay loam, grey/brown some rocks and charcoal.
	9	80-90	Compacted clay loam – grey/brown and charcoal.
	10	90-100	Compacted clay loam – grey/brown and charcoal
	11	100-110	Grey/brown clay loam with some charcoal
	12	110-120	Grey/brown clay loam with some charcoal
11 to 19	Numbers not allocated		
20			
	1	0-10	De-turfed – Dark brown sandy clayey loam grass roots.
	2	10-20	Continuing with increasing clays + compaction.
	3	20-30	Increasing orange – brown sandy clays.
	4	30-40	Continuing rounded boulder (<400mm) in base of spit.
	5	40-50	Grading onto cobble (sub-rounded) layer in sandy clayey matrix.

Pit number	Spit number	Depth (cm)	Description
	6	50-60	Cobbles + decomposing rock continuing.
	7	60-70	Continuing, increasing brown clay.
	8	70-80	Onto orange brown sandy clays.
21			
	1	0-10	Thick grass onto brown clayey loam damp.
	2	10-20	As above.
	3	20-30	As above, less damp and more compact with depth.
	4	30-40	As above.
	5	40-50	Grades to more clayey brown and lighter orange/brown clayey sand.
	6	50-60	Grades to orange/brown sandy clay.
22			
	1	0-10	De-turfed – Rich dark orange/brown sandy clayey silt. Grass roots.
	2	10-20	Continuing with increasing clays.
	3	20-30	As above, patches of orange – brown compact clays, decaying roots.
	4	30-40	Onto compact orange/brown sandy clays.
	5	30-40	Continuing.
23			
	1	0-10	Thick grass onto brown loam, damp.
	2	10-20	As above, more clay with depth, tree roots.
	3	20-30	As above.
	4	30-40	Grading to brown & orange/brown clayey sand, some charcoal.
	5	40-50	As above.
	6	50-60	Grades to orange/brown sandy clay.
24			
	1	0-10	De-turfed. Rich dark brown sandy clayey silt. Grass and tree roots.
	2	10-20	Increasing clays, roots continuing.
	3	20-30	Continuing increasing clays.
	4	30-40	Grading to compact orange/brown sandy clays.
	5	40-50	Increasing compaction.
25			
	1	0-10	Thick grass onto brown sandy loam grades to brown clayey sand.
	2	10-20	As above, patch of pebbles and cobbles, rounded, unsorted, tree roots, some charcoal.
	3	20-30	Brown clayey sand, pebbles/cobbles end.
	4	30-40	More sandy with depth, some cobbles.
	5	40-50	As above, tree roots.
	6	50-60	Grades onto cobles and sandy clay tree roots.

Pit number	Spit number	Depth (cm)	Description
	7	60-70	Cobble layer decreased onto brown clayey sand.
	8	70-80	As above, tree roots.
	9	80-90	As above, layers of cobble, tree roots continued.
	10	90-100	Grades to mixture of cobbles and brown sand.
26			
	1	0-10	Thick grass onto brown loam, sandy and clayey.
	2	10-20	As above, more sand and clay with depth.
	3	20-30	Grades to brown sandy loam with orange/brown sandy clay, some charcoal.
	4	30-40	Orange/brown sandy clay.
27			
	1	0-10	Thick grass onto brown loam.
	2	10-20	As above, some charcoal and ironstone.
	3	20-30	As above, sandier with depth, some small gravels, more clay.
	4	30-40	Grades quickly onto brown clayey sand with rounded, unsorted pebbles and cobbles.
	5	40-50	Sand, pebbles and cobbles continued. Linear charcoal and burning feature at end of pit – charcoal sample taken.
	6	50-60	As above.
	7	60-70	As above.
	8	70-80	As above.
28			
	1	0-10	Thick grass onto brown loam.
	2	10-20	As above.
	3	20-30	As above, more clay and orange colour with depth.
	4	30-40	Grades to clayey sand, some cobbles.
	5	40-50	Grades to orange/brown sandy clay, some cobbles.
29			
	1	0-10	Grass onto brown loam and some cobbles sandy loam.
	2	10-20	As above, gravel and cobbles continued.
	3	20-30	Grades to clayey sand with some gravels and cobbles.
	4	30-40	Grades to sandy clay with some cobbles and gravels.
	5	40-50	Orange/brown sandy clay, cobble and pebble inclusions.
30			
	1	0-10	Thick grass onto brown loam with large cobbles and pebbles.
	2	10-20	As above, including large cobbles.

Pit number	Spit number	Depth (cm)	Description
	3	20-30	As above
	4	30-40	As above
	5	40-70	Grades onto cobbles with sandy clay orange/brown.
31			
	1	0-10	Thick grass onto orange/brown clayey loam, worms.
	2	10-20	As above
	3	20-30	More clay with depth.
	4	30-40	As above
	5	40-50	Grades to sandy clay, orange/brown.
	6	50-60	Orange/brown sandy clay
32			
	1	0-10	De-turfed – Rich dark brown clayey silt few specks of decaying orange rock. Grass roots. 1 rounded cobble (<200mm).
	2	10-20	Continuing increasing clays, some sub-rounded cobbles.
	3	20-30	Increasing clays + compaction. Increasing cobble size (<400mm).
	4	30-40	Onto cobble layer with nodules of decaying rock, some orange- brown sandy clays in base of spit.
	5	40-50	Cobbles decreasing in size, orange-brown gravelly clays.
	6	50-60	Onto orange gravelly clays some embedded rounded cobbles.
33			
	1	0-10	Grass onto brown loam and worms.
	2	10-20	As above, more clay with depth.
	3	20-30	Silty clayey loam.
	4	30-40	Grades to mix of brown silty loam and orange/brown sandy clay, more clay with depth.
	5	40-50m	As above, more clay with depth.
	6	50-60	Orange/brown sandy clay.
34			
	1	0-10	Thick grass onto brown sandy loam, damp more clay with depth.
	2	10-20	As above, more clay with depth, some charcoal.
	3	20-30	Grades to clayey sandy silt, some charcoal.
	4	30-40	Grading to clayey sand, more clay with depth.
	5	40-50	More orange with depth more clay.
	6	50-60	Orange/brown sandy clay.
35			
	1	0-10	De-turfed – Dark orange/brown sandy clayey fine-grained silt grass roots.

Pit number	Spit number	Depth (cm)	Description
	2	10-20	Increasing clays. Grades onto cobble (sub-rounded <100mm) layer in base of spit.
	3	20-30	Continuing with increasing orange/brown sandy clays. Small cobbles continuing.
	4	30-40	Continuing cobbles decreasing.
	5	40-50	Onto compact orange/brown sandy clays.
36			
	1	0-10	De-turfed – Dark orange/brown sandy clayey silt, grass roots.
	2	10-20	Increasing orange clays, sub-rounded cobbles (<150mm).
	3	20-30	Increasing rounded gravels, increasing cobble size (<250mm).
	4	30-40	Cobble size decreasing, gravels + clays continuing.
	5	40-50	Continuing clays + gravels, some small cobbles (<50mm).
	6	50-60	Onto orange gravelly clayey sands.
37			
	1	0-10	Thick grass onto brown clayey silty sand.
	2	10-20	Grades to brown slightly clayey sand, some charcoal.
	3	20-30	As above
	4	30-40	As above, some cobble noted in base.
	5	40-50	As above, grades quickly onto sand, cobbles and pebbles.
	6	50-60	As above, cobbles and pebbles continued.
	7	60-70	As above
	8	70-80	Cobbles diminish onto brown sand some gravel.
	9	80-90	Grades quickly onto dense cobbles and gravels.
38			
	1	0-10	Rich dark brown clayey silts. Grass roots.
	2	10-20	Continuing increasing clays flecks of decomposing roots + decomposing red rock.
	3	20-30	Onto orange sandy clays medium compaction.
	4	30-40	Compact yellow orange clays.
39			
	1	0-10	Thick grass onto brown loam, more orange colour and clay with depth.
	2	10-20	As above, orange/brown clayey silty sand.
	3	20-30	Grades to orange/brown sandy clay artefact from base.
	4	30-40	More clay and orange colour lighter.
	5	40-50	Orange sandy clay.

Pit number	Spit number	Depth (cm)	Description
40			
	1	0-10	Rich dark brown sandy clayey silt with grass roots.
	2	10-20	Increasing orange/brown sandy clays.
	3	20-30	Onto red/brown sandy clays, medium compaction.
	4	30-40	Increasing red clays, some sand.
	5	40-50	Onto large red clays.
41			
	1	0-10	Thick grass onto brown loam, grades quickly to red/orange brown silty gravelly clay, some cobbles and angular stones.
	2	10-20	Onto orange/red brown silty clay.
42			
	1	0-10	Thick grass onto brown loam some list material in end pit, cobble with opposite end early 20th.
	2	10-20	As above, some burnt wood and charcoal in and (same end as list artefacts)
	3	20-30	Lighter more yellow colour, more sandy with depth, some cobbles and pebbles, more clay with depth.
	4	30-40	Grades to yellow/brown clayey silty sand some pebbles.
	5	40-50	Yellow/brown compact silty clay.
	6	50-105	Clay continued onto sandy clay.
43			
	1	0-10	Dark orange brown sandy clayey silt, grass + tree roots.
	2	10-20	Increasing orange/brown sandy clays + compaction, gravels at base of spit.
	3	20-30	Increasing clay density, increasing compaction, decomposing roots.
	4	30-40	As above, gravel size increasing.
	5	40-50	Cobbles decreasing. Dark/orange brown sandy silty clay.
	6	50-60	As above, yellow/brown clayey sands grading in at base of spit.
	7	60-70	Continuing
	8	70-80	Increasing orange sandy clays + compaction.
	9	80-90	Compact orange/brown sandy clay.
44			
	1	0-10	De-turfed – grass, brown sandy clay loam.
	2	10-20	Lighter brown sandy clay loam.
	3	20-28	Lighter brown sandy clay loam, can see orange coming through.
	4	28-35	Clay loam orange/brown/orange clay.

Pit number	Spit number	Depth (cm)	Description
45			
	1	0-10	De-turfed – Dark orange brown clayey silt with grass roots
	2	10-20	Increasing red/brown clays, some gravels, charcoal flakes.
	3	20-30	Continuing larger patches of charcoal.
	4	30-40	As above, gravels decreasing.
	5	40-50	Onto compact red/brown clays.
46			
	1	0-10	De-turfed – Dark brown clayey silt, grass roots.
	2	10-20	Increasing clays, some gravels appearing, speck of orange decomposing rock.
	3	20-30	Grading onto red/brown silty clay, specks of charcoal + burnt clay. Few sub-rounded cobbles (<350mm).
	4	30-40	Increasing clays, specks of burnt clay continuing.
	5	40-50	Onto large red compact clays.
47			
	1	0-10	De-turfed - sandy clay loam brown, quite orange
	2	10-20	Sandy clay loam brown, getting more orange.
	3	20-30	Clay loam (orange/brown) coming down onto orange clay.
48			
	1	0-15	De-turfed grass – Dark brown clay loam.
	2	15-30	Brown orange clay loam.
	3	30-37	Orange/brown clay loam.
	4	37-40	Orange clay, piece of brick.
49			
	1	0-10	De-turfed – Dark brown clayey silt, grass roots.
	2	10-20	Increasing brown clays + compaction.
	3	20-30	Continuing small patch of charcoal.
	4	30-40	Increasing brown clays + compaction.
	5	40-50	As above
	6	50-60	As above
	7	60-70	Increasing compaction, 1 sub-rounded cobble (<400mm) in base of spit.
	8	70-80	Continuing
	9	80-90	Onto large brown clays.
50			
	1	0-10	Grey/brown clay loam devegetated.

Pit number	Spit number	Depth (cm)	Description
	2	10-20	Clay grey/brown loam, getting more compact, some charcoal inclusions.
	3	20-30	Clay grey/brown loam getting more compact.
	4	30-38	Sandy clay grey/brown getting more compact, charcoal inclusions.
	5	38-40	Sandy clay grey/brown charcoal inclusions getting more compact
	6	40-50	Sandy clay grey/brown getting more compact, yellow clay inclusion, charcoal inclusions.
	7	50-60	Clay grey/brown, charcoal inclusions, some yellow inclusions.
51			
	1	0-10	Orange grey/brown clayey silt, some small river gravels, earthenware fragment and grass roots.
	2	10-20	Grading to orange/brown clayey gravelly sand, small rounded + sub-rounded rock nodules (<60mm).
	3	20-30	Continuing increasing rock size including sub-rounded boulders <300mm, increasing compaction.
	4	30-40	Continuing rock size decreasing, rock density increasing.
	5	40-50	As above.
	6	50-60	Increasing clays, cobbles + boulders continuing.
	7	60-70	Continuing.
	8	70-80	Onto solid cobble/gravels.
52			
	1	0-10	Sandy clay loam light grey/brown.
	2	10-20	Sandy clay loam light grey/brown, some cobbles.
	3	20-30	Sandy clay loam, light grey/brown and more cobbles.
	4	30-40	As above.
	5	40-50	As above.
	6	50-60	As above
	7	60-70	As above.
	8	70-80	As above.
53			
	1	0-10	De-turfed – Dark orange/brown clayey sand silt, fine grained grass roots.
	2	10-20	Continuing gradual increase of orange sandy clays.
	3	20-30	Increasing clays and compaction.
	4	30-40	As above
	5	40-50	As above
	6	50-60	Onto layer of rounded rock nodules + cobbles (<250mm)
	7	60-70	Onto gravelly sandy clays, rock size decreasing.

Pit number	Spit number	Depth (cm)	Description
	8	70-80	Continuing.
	9	80-90	Sands cobbles decreasing.
54			
	1	0-10	De-turfed – Rich dark orange/brown sandy clayey silt, fine grained. Grass roots.
	2	10-20	Continuing increasing orange/brown clayey sands, 1 sub-rounded boulder <300mm.
	3	20-30	Continuing some sub-rounded cobbles (<100mm) in base of spit.
	4	30-40	Compaction increasing, cobble size increasing (<200mm).
	5	40-50	Onto cobble + gravel layer, sand coarseness increasing.
	6	50-60	Dense cobble layer in coarse sandy matrix.
55			
	1	0-10	De-turfed – Dark orange/brown clayey silt, fine-grained grass roots.
	2	10-20	Continuing, increasing orange clayey sands.
	3	20-30	Continuing, increasing compaction.
	4	30-40	Continuing.
	5	40-50	Onto cobbles + boulders <600mm boulder embedded in spit.
	6	50-60	Onto gravelly coarse

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	(No grass continuing) very compact dark brown clay loam, grey clay patch on south end pit.
	2	10-20	As above. One patch circular grey clay like substance continuing (20 diameter).
	3	20-30	As above, cylinder of grey clay substance continued through entire pit.
	4	30-40	Grading to orange/brown mottled silty clay loam, cylinder of clay continued.
	5	40-50	As above increased clay commence.
	6	50-60	Grading to orange clay at base.
2			
	1	0-10	Patchy grass (not De-turfed) humic rich brown silty clay loam. Increasing clay + compaction towards base.
	2	10-20	Grading to dark brown silty clay increased compaction towards base.
	3	20-30	Grading to orange/brown silty clay loam, occasional orange clay nodules at base.
	4	30-40	As above increased clays.
	5	40-50	Grading to orange sandy clay.
	6	50-60	As above, increased compact + clay.
3			
	1	0-10	Patchy grass over humic, rich brown silty clay loam. Increased clay + compaction towards base.
	2	10-20	Grading to dark brown silty clay humic compact towards base.
	3	20-30	Grading to orange/brown mottled silty clay.
	4	30-40	Increased clay, otherwise as above.
	5	40-50	Grading to orange clay.
4			
	1	0-10	Silty clay loam, grey/brown, would have been disturbed by pastoral activity.
	2	10-20	As above, with darker grey areas.
	3	20-30	As above.
	4	30-35	Silty clay slightly darker and more compact with some roots in spit.
	5	35-40	Silty clay slightly darker and more compact.
	6	40-50	Silty clay more compacted, can see the orange natural clay appearing.
	7	50-55	Silty clay more compacted, more orange clay appearing.
	8	55-60	Silty clay as above.
	9	60-65	Silty clay more of the orange/grey clay.
	10	65-70	Silty clay (grey/brown) cut into natural orange/grey clay.
5			
	1	0-10	Light grey/brown silty clay.
	2	10-20	Light grey/brown silty clay with more compacted.
	3	20-30	Charcoal inclusions grey/brown silty clay.
	4	30-40	Grey/brown silty clay.

Pit number	Spit number	Depth (cm)	Description
	5	40-50	As above.
	6	50-55	As above.
	7	55-60	As above.
	8	60-70	As above.
	9	70-75	Silty clay grey/brown/orange/grey clay.
	10	75-80	Orange/grey clay.
6			
	1	0-20	De-turfed – grass, some rocks, sandy clay loam medium brown.
	2	20-30	Brown sandy clay loam.
	3	30-40	As above.
	4	40-50	As above.
	5	50-55	As above.
	6	55-60	Brown sandy clay loam, charcoal.
	7	60-70	Brown sandy clay loam.
	8	70-80	Brown sandy clay loam, charcoal.
	9	80-90	Brown sandy clay more compact loam, charcoal.
	10	90-100	Brown sandy clay loam.
	11	100-110	As above.
	12	110-120	More compacted clay loam.
	13	120-130	More compacted lighter brown clay.
7			
	1	0-10	Grass/turf onto brown sandy loam, some charcoal noted.
	2	10-20	As above, tree roots.
	3	20-30	As above, tree roots continued.
	4	30-40	More clay with depth, more compact.
	5	40-50	As above.
	6	50-60	Grades to brown loamy silty clay.
	7	60-70	Brown sandy clay with some orange/brown mottles, tree roots continued.
8			
	1	0-10	Turf removed onto brown clayey loam, some orange mottles, and worms.
	2	10-20	Grades to mottled orange/brown and brown loamy clay.
	3	20-30	Grades to orange/brown silty clay.
9			
	1	0-10	Turf removed, onto brown clayey loam.
	2	10-20	Grades to mottled brown and some orange/brown clayey silty loam.
	3	20-30	Grades to silty clay, brown and orange/brown.
	4	30-40	Orange/brown sandy clay.
10			
	1	0-10	No turf, bare ground onto dark brown clayey loam.
	2	10-20	As above, slightly lighter with depth.
	3	20-30	As above, brown silty clay, black irrigation pipe.
	4	30-40	Grades to brown silty clay.

Pit number	Spit number	Depth (cm)	Description
11			
	1	0-10	Sparse turf onto brown loam, some gravel, more clay with depth
	2	10-20	Grades to orange/brown sandy clay.
12			
	1	0-10	Sparse turf onto brown loam, some gravel inclusions grades quickly to mottled loam and orange/brown silty clay.
	2	10-20	Grades to orange/brown silty clay.
13			
	1	0-10	Silty clay loam, large amount of rocks black/brown.
	2	10-20	Silty clay loam, dark black/brown with yellow inclusions, large amount of rocks.
	3	20-30	Silty clay loam, dark black/brown large amount of rocks.
	4	30-40	Silty clay loam, dark black/brown with some yellow inclusions, large amount of rock fill.
	5	40-50	Silty clay loam, dark black large amount of rock fill.
	6	50-60	Silty clay loam, dark black/brown large amount of rock fill.
	7	60-70	Silty clay loam, dark black/brown fill, lots of charcoal and large amount of rock.
	8	70-80	Silty clay loam, dark black/brown fill, wood, large amount of rock.
	9	80-90	Old star picket, fill becomes different, silty clay loam, dark black/brown large amount of rock, more organic material, lots of charcoal. Voids underneath – looks fairly modern, could be the result of the construction of the sports field.
14			
	1	0-10	Turf removed onto mixed loam and clay, some charcoal.
	2	10-20	Mixed loam, clay, some charcoal, some red soft stone (?) = fill ??, wood.
	3	20-30	Fill continued.
	4	30-40	As above.
	5	40-50	As above.
	6	50-60	Onto clayey fill, more clay, mixed some cobbles.
	7	60-85	Excavated to 85 – fill to base onto orange/brown sandy clay.
15			
	1	0-10	Cut turf onto brown clayey loam.
	2	10-20	As above, some worms.
	3	20-30	More clay with depth.
	4	30-40	As above, more orange colour with depth.
	5	40-50	As above.
	6	50-60	As above.
	7	60-70	Grades to orange/brown sandy clay with some brown mottling.
	8	70-80	Orange/brown sandy clay.

Pit number	Spit number	Depth (cm)	Description
16			
	1	0-10	Cut turf onto brown loam, some clay mixed some angular stones, some fill.
	2	10-20	Grades to more orange/brown clayey sand.
	3	20-30	As above, clayey sand orange/brown.
	4	30-40	As above.
	5	40-50	As above.
	6	50-60	Grades to sandy clay, orange/brown.
17			
	1	0-10	Turfed removed, onto brown loam.
	2	10-20	As above, more compact clayey loam.
	3	20-30	As above, some charcoal.
	4	30-40	Gradual change to orange/brown clayey sand, more clay with depth, more compact with depth.
	5	40-50	Orange/brown sandy clay.
18			
	1	0-10	De-turfed – Dark brown sandy clayey silt, grass roots.
	2	10-20	Continuing with increasing brown clays.
	3	20-30	Grading to orange/brown silty clay.
	4	30-40	Continuing, increasing orange/brown clay concentration + compaction.
	5	40-50	As above.
	6	50-60	Onto massive orange/brown sandy clays.
19			
	0	0-55/60	Fill removed, fill includes brick, rock, charcoal, clay etc.
	1	60-70	Yellow/brown sand, well sorted.
	2	70-80	As above.
	3	80-90	As above, some clay with depth, grades of clayey sand.
	4	90-100	As above, more clay with depth, some charcoal uneven over pit. Less clay in east side.
	5	100-110	Grades to sandy clay.
	6	110-120	Orange/brown sandy clay.
20			
	1	45-55	Top 45 is fill, including charcoal layer, Dark orange/brown clayey sand, a few sub-rounded gravel inclusions.
	2	55-65	Continuing.
	3	65-75	Continuing with slight increase in clay density.

Pit number	Spit number	Depth (cm)	Description
	4	75-85	Orange clayey sands continuing, layer of rounded cobbles appearing in base of spit (<150mm).
	5	85-95	Grading onto coarse orange sands, gravels + cobbles (<200mm).
	6	95-105	Gravels decreasing, grading back to a sandy orange clay.
21			
	1	0-10	Disturbed bank edge, some weeds/grass onto orange/brown clayey sand.
	2	10-20	As above, clay increases with depth some charcoal.
	3	20-30	As above.
	4	30-40	As above, more clay with depth to orange/brown sandy clay.
	5	40-50	Grades to damp sandy clay.
22			
	1	0-10	Sandy loam, brown, De-turfed.
	2	10-20	Sandy loam, slightly lighter brown.
	3	20-30	As above.
	4	30-40	As above
	5	40-50	As above
	6	50-60	As above
	7	60-70	As above
	8	70-80	As above
	9	80-100	Sandy brown loam
	10	100-110	As above.
	11	110-120	As above.
	12	120-220	No samples taken same as above.
	13	220-240	Pebbly – grey/brown sand, looks as though in line with river.
23			
	1	0-10	Brown De-turfed, sandy loam compacted.
	2	10-15	Brown sandy loam, some charcoal.
	3	15-20	Brown sandy loam.
	4	20-30	As above.
	5	30-40	As above.
	6	40-50	As above.
	7	50-300	NO SAMPLES.
	8	310-320	Brown sandy clay and more clay.
24			
	1	0-10	Brown sandy clay loam, De-turfed – some orange clay inclusions.

Pit number	Spit number	Depth (cm)	Description
	2	10-15	Brown sandy clay loam, coming down into grey/brown clay with orange clay inclusions.
	3	15-20	Grey brown clay with orange/yellow inclusions.
	4	20-25	Grey/brown clay.
25			
	1	0-10	De-turfed. Orange brown sandy clayey silt. Some small angular gravels.
	2	10-20	Onto massive orange/brown clays.
26			
	1	0-10	De-turfed – Thin layer of orange/brown sandy clayey silt. Quickly grading to a large silty sandy clay. Some grass roots.
	2	10-15	Onto compact orange/brown clay.
27			
	1	0-10	Turf onto brown loam with some fill mixed in.
	2	10-20	Clayey fill material, mottled brown/oranges and gravels.
	3	20-40	Excavated to check fill/mixing depth, mixed fill until solid clay at 35 cm.
28			
	1	0-10	De-turfed – Dark brown silty sandy clay, grass roots.
	2	10-20	Onto massive orange/brown clays.

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	Black/brown compacted clay loam de-turfed with red and yellow clay inclusions
	2	10-25	Black brown clay with yellow red clay inclusions
	3	25-39	Light yellow orange clay with few red inclusions
2			
	1	0-20	De-turfed, black brown clayey loam with red/yellow clay inclusions, some grass roots
	2	20-30	Black/brown clay with red/yellow clay inclusions
	3	30-40	Lighter black/brown clay more yellow/red clay inclusions
	4	40-50	Yellow/orange clay inclusions with some grey inclusions changed to a much sandier clay
	5	50-60	Yellow clay inclusions some charcoal inclusions
	6	60-70	Yellow clay
	7	70-80	Sandy yellow clay
3			
	1	0-20	De-turfed, a lot of gravel, maybe from road work, rich dark brown sandy clay loam
	2	20-30	Yellow bedrock
	3	30-40	Yellow clay
4			
	1	0-20	Rich dark brown clay loam, yellow and red clay inclusions
	2	20-30	Dark brown clay loam yellow clay appearing some red clay inclusions
	3	30-40	Yellow clay with some orange inclusions
5			
	1	0-10	Sandy clay loam de-turfed, base coming down onto yellow grey clay
	2	10-20	Clay yellow orange
6			
	1	0-10	Dark brown clay loam, pebbly inclusions.
	2	10-20	Dark brown clay loam, more yellow red clay, rocky inclusions.
	3	20-30	Clay yellow/grey.
7			
	1	0-10	Rich dark black/brown sandy clay loam (similar to first spits of PASA 14, pit 7) Coming onto yellow/orange clay.
	2	10-20	Rich dark black/brown sandy clay loam (as above) base coming onto yellow/orange clay.

Pit number	Spit number	Depth (cm)	Description
	3	20-30	Black/brown clay with a lot of yellow/grey clay.
	4	30-50	Yellow/grey clay.
8			
	1	0-10	Rich dark brown sandy clay loam, De-turfed, some grass roots.
	2	10-15	Rich dark brown, sandy clay loam.
	3	15-20	Dark brown, coming down onto yellow clay layer, red clay inclusions.
	4	20-30	Yellow/orange clay.
9			
	1	0-10	De-turfed, dark black/brown soil (clay sandy loam).
	2	10-15	Dark black/brown soil, starting to see yellow/orange clay inclusions.
	3	15-20	Yellow/orange clay, few red clay inclusions.
	4	20-30	Yellow/orange clay.
10			
	1	0-10	Very rich dark brown/black/brown sandy clay loam.
	2	10-20	Very rich dark brown/black sandy clay loam, some red clay inclusions.
	3	20-30	Rich dark brown black sandy clay loam, base of yellow and grey clay with some red inclusions.
	4	30-40	Yellow/red clay base.
11			
	1	0-10	Dark black/brown clay sandy loam.
	2	10-20	Dark black/brown clay coming onto red/yellow/orange clay.
	3	20-30	Dark black/brown
	4	30-40	Yellow orange clay.

G2B - Foxground and Berry bypass (PASA 15)

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	De-turfed, rich dark brown sandy clay loam. Grass roots. Increasing brown clays with depth. Patches of burnt clay.
	2	10-20	Lump of red brick, patches of charcoal. Grading onto brown sandy clays. Roots continuing.
	3	20-30	Continuing with increasing reddy brown clays. Large patches of orange decaying bedrock
	4	30-40	Continuing, increasing compaction
	5	40-50	Grading onto massive red clays, decomposing bedrock
	6	50-60	Thick orange/red clays with patches of decomposing bedrock
2			
	1	0-10	De-turfed, rich dark brown sandy clayey loam, grass roots, some red and orange clay nodules
	2	10-20	Continuing with increasing orange/brown sandy clays. Nodules of red and orange clay continuing
	3	20-30	Grading to large brown/orange clays with patches of orange decomposing bedrock
	4	30-40	Grades onto orange/brown massive clays with decomposing bedrock
3			
	1	0-10	De-turfed dark brown sandy clayey loam. Grass roots, increasing clays with depth, gravels in base of spit.
	2	10-20	Continuing with increasing orange/brown sandy clays. Nodules of decaying orange bedrock in base
	3	20-30	Increasing orange/brown clays and compaction
	4	30-35	Grades onto compacted fine-grained orange/brown clays with nodules of decomposing bedrock
4			
	1	0-10	De-turfed, dark brown sandy loam, large tree roots. Flecks of decomposing bedrock in base.
	2	10-20	Continuing with some orange/brown clays appearing ~15cm.
	3	20-30	Grading onto large orange/brown mottled clay with flecks of decomposing bedrock.
	4	30-40	Grading onto massive orange/brown clays with red/white/orange decomposing bedrock.
5			
	1	0-10	De-turfed – Dark brown clayey sandy loam. Grass + tree roots.
	2	10-20	Continuing with increasing orange/brown clays, flecks of decomposing bedrock.

Pit number	Spit number	Depth (cm)	Description
	3	20-30	Grading onto orange/brown compacted clays with flecks of decomposing orange bedrock.
6			
	1	0-10	De-turfed – Dark brown sandy clayey loam with grass roots.
	2	10-20	Continuing with increasing clay content + appearance of gravels (rounded + sub-rounded). Some disturbance – 195? Brown glass bottle base. Flecks of decomposing bedrock.
	3	20-30	Continuing with increasing clays + bedrock, burnt wood.
	4	30-40	Mottled sediments, brown clays, orange sand – disturbed. Bottle, thick melted bottle glass, red brick.
	5	40-50	Grades onto yellow sandy clay.
7			
	1	0-10	De-turfed – Rich dark brown humic sandy clayey loam with grass roots. Some gravels + decomposing orange bedrock in base of spit. Tree roots.
	2	10-20	Grading to a brown sandy clay with increasing patches of decomposing bedrock. Roots continuing.
	3	20-30	Grading onto largely massive orange/brown clays + decomposing bedrock, patches of less compact orange clayey sand.
	4	30-40	Grades onto compact orange/brown clays decomposing bedrock.

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	De-turfed – (Thick green grass) Dark brown sandy clayey loam, nodules of red/orange clay; increasing clays at base of spit. Some fine roots.
	2	10-20	Increasing tree roots, increasing orange/brown heavily compacted clays with patches of decomposing orange bedrock. Roots disappearing ~18cm. Some angular gravels appearing ~25cm.
	3	20-25	Grading onto massive heavy gravelly clays.
2			
	1	0-10	De-turfed – Dark brown sandy clayey loam, grass roots and some tree roots. Red/orange clay nodules + decaying bedrock. Grading to orange/brown sandy gravelly clay ~8cm.
	2	10-20	Grading onto large brown/orange sandy gravelly clay, tree roots decreasing.
	3	20-25	Grades onto compacted massive gravelly orange clays.
3			
	1	0-10	Dark brown sandy clayey loam with grass roots + tree roots. Increasing orange/brown clays with depth. Some sub angular cobbles (<100mm) appearing in base of spit, nodules of orange clay + burnt roots.
	2	10-20	Increasing brown/orange clays with nodules of decomposing bedrock. Tree roots continuing.
	3	20-30	Grading onto compacted gravely bedrock/clay. Some tree roots in base of spit.
	4	30-40	Tree roots at ~32cm compacted clays + decomposing bedrock.
4			
	1	0-10	Rich dark brown sandy clayey loam with grass roots, sub angular cobbles in base of spit.
	2	10-20	Increasing orange/brown clays + gravels. Some tree roots. Nodules of decaying orange/bedrock.
	3	20-30	Large amounts of decaying bedrock, in orange/brown sandy clays.
	4	30-40	Continuing with increasing decaying bedrock.
	5	40-45	Grading to a compact sandy clay + bedrock.
5			
	1	0-10	Dark brown sandy gravelly clayey loam. Patches of orange/brown clay in base of spit. Nodules of red clay.
	2	10-20	Increasing orange/brown clays compacted sandy orange/brown clay in base of spit.
	3	20-30	Grading onto massive sandy orange/clays with red/yellow decaying bedrock.

Pit number	Spit number	Depth (cm)	Description
6			
	1	0-10	De-turfed – Rich dark brown sandy clayey loam, grass roots. Sparse nodules of orange clay. Moist.
	2	10-20	Increasing orange/brown sandy clays, some small gravels.
	3	20-30	Grades onto compacted orange clays with decomposing bedrock (red/orange/yellow) burnt roots.

G2B - Foxground and Berry bypass (PASA 18)

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	Patchy grass covering grey brown silty clay loam, grass roots
	2	10-20	As above, increasing compaction, occasional red clay nodules
	3	20-28	Grading to very light grey brown sandy clay loam occasional charcoal flecking
	4	28-34	As above increasing compaction, small roots persist
	5	34-42	Large tree roots, grading to heavy yellow clay
	6	42-50	As above
2			
	1	0-10	Grass over grey brown silty clay loam, grass roots
	2	10-20	As above, increasing compaction, gravels and cobbles, sub-angular, appears towards base
	3	20-30	Light grey brown silty clay loam with gravels and cobbles
	4	30-38	As above grading yellow clay at base
	5	38-45	Heavy yellow clay
3			
	1	0-10	Patchy grass over grey/brown silty clay loam, grass roots throughout.
	2	10-20	Grading to light grey/brown silty clay loam, occasional charcoal, occasional sub-angular gravels.
	3	20-28	As above, increase compact towards base, occasional roots.
	4	28-36	Increase clay + increase lighter yellow towards base. Increase charcoal flecks.
	5	36-44	Grading to yellow clay towards base occasional charcoal flecks.
	6	44-50	Heavy yellow clay.
4			
	1	0-10	Thick grass over grey/brown silty clay loam, occasional charcoal flecks + sub angular gravels at base grass roots.
	2	10-20	As above, increase compact towards base.
	3	20-30	As above, increase compact grading to light grey/brown silty clay loam, increase clay towards base.
	4	30-40	As above, increase clay + increase compact towards base.
	5	40-47	As above, grading to yellow clay towards base.
	6	47-52	Heavy yellow clay.
5			
	1	0-20	De-turfed, grey sandy clay.

Pit number	Spit number	Depth (cm)	Description
	2	20-30	Grey sandy clay loam, coming down onto yellow/grey clay, large red clay inclusions.
6			
	1	0-10	De-turfed – Medium grey/brown sandy clay loam base of yellow/grey clay.
	2	20-30	Medium grey/brown sandy clay loam base of yellow/grey clay.
	3	30-40	Yellow/grey clay.
7			
	1	0-10	De-turfed – Grey/brown sandy clay loam.
	2	10-20	Grey/brown sandy clay loam.
	3	20-30	Grey/brown sandy clay loam, coming down onto yellow clay base.
8			
	1	0-10	De-turfed – grass, leaves, lots of vegetation, grey/brown. Some grass roots, sandy clay loam.
	2	10-20	Grey/brown sandy clay loam coming down onto yellow/grey clay.
	3	20-30	Grey/brown clay loam with a lot of yellow clay.

G2B - Foxground and Berry bypass (PASA 20)

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-12	Thick grass covering over red/brown silty loam gravels, cobbles <15cm increase towards base.
	2	12-20	As above gravels, cobbles <16cm increase in density occasional charcoal flecks.
	3	20-30	As above, occasional charcoal <20cm.
	4	30-40	Increasing clay, increase compact grading to orange/brown sandy clay with gravels + cobbles (high density).
	5	40-45	As above.
2			
	1	0-10	Thick grass covering over red/brown silty sandy loam gravels cobbles <10cm increasing towards base.
	2	10-18	As above, gravels cobles increasing in density + size. Clay content increase towards base <16cm.
	3	18-26	As above, grades to orange/brown sandy clay with gravels + cobbles <15cm.
	4	26-31	As above, increase clay, cobbles increase in density (high).
	5	31-36	As above – very compact.
3			
	1	0-12	Thick grass covering red/brown silty clay loam. Increasing clay towards base. Occasional cobbles (decaying bedrock at base) <12cm fine grass roots throughout.
	2	10-12	Increase clay charcoal pieces <1.5cm, increase at base. Cobbles increase in density, gravels towards base, grass roots + occasional small tree roots.
	3	20-28	Grades red/brown sandy clay, increase gravels, decreasing cobbles, occasional charcoal fleck – decrease in size + density.
	4	28-35	As above, grading to red clay.
	5	35-40	As above, heavy red clay occasional tar + orange nodules.
4			
	1	0-10	Thick grass over dark brown silty clay loam, fine grass roots.
	2	10-18	As above, cobbles and gravels <10cm at base. Occasional charcoal flecks increase towards base, increase clay.
	3	18-28	As above, increase clay. Few red clay orange + orange sandy clay nodules at base. Decreasing charcoal flecks.
	4	28-40	As above, grading to mottled red/brown sandy clay at base.
	5	40-50	As above, grading quickly to heavy red clay. Occasional gravels (decaying bedrock at base.

Pit number	Spit number	Depth (cm)	Description
5			
	1	0-10	Thick grass onto dark red/brown silty clay loam. Fine grass roots throughout. Clay increase towards base.
	2	10-20	Grading to red/brown clay loam, occasional charcoal flecks, clay increase towards base. Gravels + cobbles <6cm. At base.
	3	20-30	As above, increase clay, occasional charcoal flecks, gravel continued (occasional) – Decreasing towards base occasional red clay nodules at base.
	4	30-40	Grading to heavy red clay.
6			
	1	0-10	Thick grass onto dark brown silty clay loam. Grading into red brown/brown silty clay loam. Increase clay towards base.
	2	10-20	As above, increase clay increase density occasional charcoal flecks + cobbles (<6cm – probably decaying bedrock) towards base.
	3	20-30	Quickly grading to heavy red clay – increase compact, decreased charcoal.
	4	30-40	As above, increase compact.
7			
	1	0-8	Thick grass (De-turfed) onto dark brown silty clay loam. Clay increase to bottom half. Fine grass roots 0-5cm depth.
	2	8-20	Grading to red/brown clay loam, occasional charcoal, gravels appearing + increased towards base.
	3	20-30	As above, increase clay, gravels + cobble <7cm.
	4	30-38	As above, increased clay, increased gravels + increased density.
8			
	1	0-10	Dark brown silty clay loam under thick grass covering.
	2	10-18	Grading to red/brown clay loam.
	3	18-28	As above, gravels increase clay.
	4	28-35	Grades to heavy red clay cobbles <10cm at base.
9			
	1	0-10	Thick grass over dark brown silty clay loam, cobbles appear at base <15cm.
	2	10-20	As above – grading to red/brown silty clay loam. Gravels + cobbles increase towards base <16cm charcoal <2cm at base.
	3	20-28	As above, clay increase.
	4	28-36	Grading to heavy red clay gravels + cobbles increase in density.
10			
	1	0-10	Thick grass (decayed) over dark red/brown silty clay loam, cobbles + gravels at base <12cm.

Pit number	Spit number	Depth (cm)	Description
	2	10-20	As above, increase clay cobbles, gravels increase density.
	3	20-30	Grading to red/brown sandy clay gravels.
	4	30-40	Quickly grading to red clay increase compact.
11			
	1	0-10	Thick grass over dark brown silty clay loam cobbles + gravels appearing at base (sub-angular <15cm).
	2	10-20	As above, increase compact.
	3	20-28	As above, gravels + cobbles at high density.
	4	28-36	As above.
	5	36-44	Quickly.
12			
	1	0-10	Dark brown silty clay loam. Occasional charcoal bits + gravels appearing at base.
	2	10-20	As above, gravels + cobbles (sub angular) appearing halfway + increasing south end. Uneven surface.
	3	20-30	Clay still unevenly distant.
	4	30-36	Clay across whole pit, increased density towards base.
13			
	1	0-12	Dark brown silty clay loam under thick grass. Sub-angular gravels appearance towards base, grading to sandy clay loam (dark brown).
	2	12-24	As above, sudden transition to orange clay at base (uneven across pit – sloping surface) Gravels/cobbles cease quickly approx. 20cm depth.
	3	24-34	Heavy orange clay.
14			
	1	0-10	Dark brown silty clay loam, increase compact and gravels (sub-angular) + charcoal flecks appear towards base.
	2	10-20	Transition – grading to sandy clay loam (dark brown).
	3	20-30	Orange sandy clay appears suddenly at base.
	4	30-40	Heavy orange.
15			
	1	0-10	Thick grass onto dark red brown silty clay loam, increase clay. Gravels + cobbles at base.
	2	10-20	As above, orange sandy clay appearing at base(still mottled brown).
	3	20-30	Mottled orange + brown sandy clay, high density gravels (sub-angular)
	4	30-45	As above, increase compact decaying bedrock at base.
16			
	1	0-10	De-turfed some roots. Silty clay loam, rich dark brown.

Pit number	Spit number	Depth (cm)	Description
	2	10-20	Yellow grey clay with orange clay inclusions motley.
	3	30-40	Light cream clay.
17			
	1	0-12	Red/brown clay loam under thick grass roots through first half.
	2	12-22	Occasional charcoal flecks appearing towards base. Otherwise as above – increasing clay towards base.
	3	22-32	As above.
	4	32-40	As above, increasing clay + increased compact.
	5	40-50	As above.
	6	50-56	As above increased compact.
	7	56-62	As above increased clay increased compact.
	8	62-70	Gradual slight colour change towards base (lighter)
	9	70-78	As above, increased compact – gradual transition to orange/brown clay.
	10	78-84	As above, very compact.
18			
	1	0-10	Rich dark brown silty clay loam, de-turfing.
	2	10-20	Rich dark brown silty clay loam.
	3	20-30	Rich dark brown silty clay loam – more compacted.
	4	30-40	Rich dark brown silty clay loam.
	5	40-55	Rich dark brown.
	6	55-70	Rich dark brown silty clay loam.
	7	70-80	Compacted brown clay (lighter and redder).
19			
	1	0-10	Thick grass (De-turfed) over red/brown silt loam.
	2	10-18	Grading to red/brown sandy loam increase compact.
	3	18-28	As above, occasional charcoal flecks, small tree roots.
	4	28-38	As above.
	5	38-44	As above.
	6	44-52	As above, increased compact.
	7	52-60	Gradual colour change – lighter increased clay – light red/brown sandy clay loam, increasingly compact towards base.
	8	60-68	Snake hole east wall in the spit, as above increased compact.
	9	68-78	As above.
	10	78-90	Grading to lighter orange sandy gravels + cobbles <8cm sub-rounded cobbles increase in density.
	11	90-100	As above, gravels + cobbles increase in density.

Pit number	Spit number	Depth (cm)	Description
	12	100-110	As above, gravels + cobbles <10cm sub angular – sub-rounded.
	13	110-120	As above, gravels cobbles boulders <26cm sub-rounded.
	14	120-130	As above, gravels cobbles boulders sub-rounded increase density.
	15	130-140	As above.
20			
	1	0-10	Dark grey/brown sandy clay loam under thick grass covering. Fine grass roots throughout (decreasing).
	2	10-22	Gravels appear towards base, clay increase towards base. Quickly appearing orange/brown mottled sandy clay loam.
	3	22-30	Continuing as above, increase clay, high density gravels, increase density.
	4	30-35	Increase clay – orange, increase density, cobbled decaying bedrock at base.
21			
	1	0-10	De-turfed, rich dark brown loam (sandy) some grass roots.
	2	10-20	Rich dark brown sandy loam.
	3	20-30	Rich dark brown sandy loam (more clayey)
	4	30-40	Dark brown sandy clay loam.
	5	40-50	Lighter brown sandy clay.
	6	50-60	Lighter brown sandy clay rubble.
	7	60-70	Red brown clay.
22			
	1	0-10	De-turfed, rich dark brown sandy loam, some roots.
	2	10-20	Rich dark brown sandy loam.
	3	20-30	Rich dark brown sandy loam.
	4	30-40	Lighter brown sandy clay loam.
	5	40-50	Rich dark brown sandy clay (still quite sandy, but getting more compact)
	6	50-60	Lighter brown/yellow clay.
23			
	1	0-10	De-turfed, rich dark brown sandy loam, some roots.
	2	10-20	Rich dark brown sandy loam.
	3	20-30	Rich dark brown sandy loam.
	4	30-40	Rich dark brown sandy loam, getting lighter in colour pebbles.
	5	40-50	Lighter dark brown-compacted clay.

G2B - Foxground and Berry bypass (PASA 23)(incorporates PASA 21 and 22)

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	De-turfed rich red brown sandy clayey humic 10cm with grass roots + tree roots.
	2	10-20	Continuing with increased sands + clays (decreased humics) tree roots continuing.
	3	20-30	Continuing increasing orange/brown clays, nodules of orange clay in base of spit.
	4	30-40	As above
	5	40-50	As above
	6	50-60	Increasing clays, increasing compaction.
	7	60-70	As above
	8	28-36	Grades onto compact smooth rich brown sandy clay.
2			
	1	0-10	Grass onto brown loam.
	2	10-20	As above, some clay with depth some charcoal noted.
	3	20-30	Grades to lighter yellow/brown loamy clayey sand.
	4	30-40	Grades to yellow/brown clayey sand.
	5	40-50	As above.
3			
	1	0-10	De-turfed rich dark brown humic sandy clayey loam grass.
	2	10-20	Increasing red brown sandy clay content with depth.
	3	20-30	Increasing orange brown clays, increasing compaction
	4	30-40	Compacted orange/brown sandy clay appearing in base of spit.
	5	40-45	Grading onto compact orange/brown sandy clay.
4			
	1	0-10	Grass onto brown loam.
	2	10-20	As above, grades to lighter yellow/brown clayey sandy loam.
	3	20-28	Grades to yellow/brown clayey sand, some charcoal noted.
	4	28-36	Clay increase in clay with depth to sandy clay.
5			
	1	0-10	De-turfed dark brown humic sandy clayey loam with grass.
	2	10-20	Increasing red orange brown sandy content + compaction.
	3	20-30	Grading to a compact orange/brown sandy loam.
6			
	1	0-10	Grass onto brown sandy loam lighter with depth.

Pit number	Spit number	Depth (cm)	Description
	2	10-20	Grades onto yellow/brown clayey sand some charcoal.
	3	20-30	Grades to yellow/brown sandy clay
7			
	1	0-10	De-turfed rich brown sandy clayey loam, grass roots, sparse orange clay nodules.
	2	10-20	Continuing with increasing clays, no clay nodules present.
	3	20-30	Grading onto compact orange/brown clays.
8			
	1	0-10	Grass onto brown loam.
	2	10-20	As above, more sandy with depth.
	3	20-30	Grades to yellow/brown sandy clay some charcoal & pieces degrading wood.
9			
	1	0-10	De-turfed rich dark brown sandy clayey loam with grass roots.
	2	10-20	Increasing orange brown clays + compactness.
	3	20-22	Grading onto compact orange brown sandy clay.
10			
	1	0-10	Thick grass onto brown clayey loam charcoal flecks & some ironstone gravel.
	2	10-20	Grades to yellow/brown sandy clay with ironstone gravel inclusions
11			
	1	0-10	De-turfed rich brown loamy sandy clay, slightly moist some fine grass roots.
	2	10-20	Continuing increasing yellow brown sandy clay with depth some fine gravels.
	3	20-27	Grading onto compact yellow/brown gravelly sandy clay.
12			
	1	0-10	Grass onto light brown sandy loam.
	2	10-20	Grades to yellow/brown sandy clay with ironstone gravel inclusions.
13			
	1	0-10	Rich dark brown sandy clayey loam, grass roots, nodules of burnt clay, burnt roots.
	2	10-20	Increasing clay with depth small gravels appearing, continuing to base of spit. Increasing yellow brown clay content & density gravels include ironstone.
	3	20-28	Grading onto large yellow brown gravelly sandy clays.
14			
	1	0-20	Grass onto brown sandy loam

Pit number	Spit number	Depth (cm)	Description
	2	20-40	Grades quickly to yellow/brown sandy clay some ironstone gravels
15			
	1	0-10	De-turfed – dark brown sandy clayey loam with grass roots.
	2	10-20	Continuing with increasing yellow/brown clay, some small gravels.
	3	20-25	Grading onto compact yellow/brown clays.
16			
	1	0-10	Thick grass onto brown sandy loam.
	2	10-20	As above.
	3	20-30	Grades to yellow/brown sandy clay.
17			
	1	0-10	De-turfed – dark brown humic sandy clays, grass roots.
	2	10-20	Increasing orange/brown clays and some small gravels increasing compaction.
	3	20-30	Grades onto solid orange/brown gravelly sandy compacted clays.
	4	30-40	
18			
	1	0-10	Grass onto brown loam.
	2	10-20	Grades to lighter brown clayey sandy loam.
	3	20-30	Grades to yellow/brown sandy clay.
19			
	1	0-10	De-turfed, rich dark brown humic sandy clayey loam, some fine grass roots.
	2	10-20	Continuing with increasing sandy clay.
	3	20-30	As above, increasing compaction.
	4	30-40	As above.
	5	40-50	Grading to dense massive orange/brown clay.
20			
	1	0-10	Grass onto brown loam.
	2	10-20	As above.
	3	20-30	As above, some charcoal noted.
	4	30-40	As above.
	5	40-50	As above.
	6	50-60	More sandy with depth, some clay and some charcoal noted.
	7	60-70	Grades to brown clayey sand, some charcoal.

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	De-turfed (thick green grass) rich dark brown clayey loam, grass roots moist.
	2	10-20	Continuing, mild clay increase with depth, grading to a dark brown silty sandy clay.
	3	20-30	Continuing increasing clays.
	4	30-40	Continuing.
	5	40-50	Continuing with some orange/grey clays appearing. Some small fine crystal fragments.
	6	50-55	Grading onto orange/brown compacted smooth massive clays.
2			
	1	0-10	De-turfed rich dark brown sandy clayey loam, grass roots.
	2	10-20	Continuing with increasing clay.
	3	20-30	Continuing sparse orange/clay nodules.
	4	30-40	Continuing clay nodules decreasing orange/brown clay content + compaction increasing.
	5	40-50	Grades onto smooth on compact orange/brown clay.
3			
	1	0-10	De-turfed (thick green grass) dark brown sandy clayey loam, fine grass roots, fine grained.
	2	10-20	Continuing with increasing orange-brown clay content.
	3	20-30	As above.
	4	30-40	Continuing slight orange/brown clay increase.
	5	40-50	As above.
	6	50-60	Grading onto compact orange/brown clay.
4			
	1	0-10	De-turfed – rich dark sandy clayey loam, grass roots.
	2	10-20	Continuing with increasing orange/brown clays.
	3	20-30	As above.
	4	30-40	As above increasing clays decreasing sand.
	5	40-50	Grading onto a compact smooth orange/brown clay.
5			
	1	0-10	De-turfed – dark brown sandy clayey loam, fine with grass roots.
	2	10-20	Continuing with increasing red brown clays.
	3	20-30	Continuing with increasing compaction.
	4	30-40	As above, tiny crystals in sandy clay.

Pit number	Spit number	Depth (cm)	Description
	5	40-45	Grading onto a compact orange/brown clay.
6			
	1	0-10	De-turfed – dark rich brown sandy clayey loam, grass roots.
	2	10-20	Continuing with increasing red brown clay content and compaction.
	3	20-30	As above.
	4	30-40	Grading onto compact orange/brown clays – hammerstone + flecked cobble found at ~33cm sitting on compacted clay.
7			
	1	0-10	De-turfed – dark brown sandy clayey humic loam with grass roots- (pit on slight gradient, deeper at south end).
	2	10-20	Continuing with increasing orange/brown clay content notably ~12cm increasing sand content.
	3	20-30	As above, increasing compaction + clay density decreasing sands.

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	Dark brown sandy clay loam grass roots (fine) De-turfed thick grass covering.
	2	10-18	Decreasing clay.
	3	18-28	Gravels occasional charcoal flecks grading to dark orange/brown clay loam.
	4	28-32	Occasional orange clay nodules towards base dark orange as above with increase clay.
	5	32-42	Grades to grey clay (compact) with gravels occasional charcoal flecks.
2			
	1	0-10	Silty dark brown clay loam, fine grass roots, under thick grass De-turfed.
	2	10-20	As above, increase clay, increase compaction.
	3	20-28	Increase charcoal <5cm thick compact at base. Orange clay nodules at base.
	4	28-36	Increase compaction, increase orange clay nodules.
	5	36-44	Grades to heavy orange/grey clay increase in compact towards base. Decreasing charcoal.
3			
	1	0-10	Dark brown silty clay loam under thick grass (De-turfed) fine grass roots to base.
	2	12-22	As above, increase clay increase compaction.
	3	22-30	Increase clay – grades to orange/brown silty clay, increase compaction.
	4	30-40	Increase compaction, increase clay grades to heavy orange clay.
4			
	1	0-10	Dark brown silty clay loam under thick grass (De-turfed) five grass roots throughout increase clay content at base.
	2	10-20	Increase clay + compaction sporadic fine grass roots continued. Charcoal. Flecks at base.
	3	20-28	Increase clay – graded to orange/brown silty clay.
	4	28-36	As above.
	5	36-44	As above – orange/brown silty clay appearing at base.
	6	44-54	Grades to orange clay mottle beginning of spit. Gravels appearing at base, decaying bedrock.
5			
	1	0-10	Thick grass onto brown silty clayey loam.
	2	10-20	As above, more clay & orange/brown with depth.

Pit number	Spit number	Depth (cm)	Description
	3	20-30	Grades to lighter orange/brown silty clayey loam, more clay with depth.
	4	30-40	As above, more clay with depth.
	5	40-50	Grades to orange/brown silty loamy clay some cobbles.
	6	50-60	Grades to silty clay.
6			
	1	0-10	Thick grass onto brown loam.
	2	10-20	As above, more orange/brown with depth more clay, some charcoal, lighter with depth.
	3	20-30	As above.
	4	30-40	As above, clay increases with depth to brown clay silt.
	5	40-50	More clay with depth to loamy silty clay artefacts in pit.
	6	50-60	Grades to orange/brown silty clay.
7			
	1	0-10	Grass onto brown silty clayey loam.
	2	10-20	Grades to orange/brown silty clayey loam.
	3	20-30	As above, more orange clay with depth.
	4	30-40	As above.
	5	40-50	As above, more clay with depth.
	6	50-60	Grades to brown red silty clay somewhat loose.
8			
	1	0-10	Thick grass onto brown clayey silty loam.
	2	10-20	Grades to orange/brown clayey loamy silt, less loamy with depth.
	3	20-30	As above.
	4	30-40	As above, more clay with depth to a silty loamy clay.
	5	40-50	Grades to loamy clay.
9			
	1	0-10	Thick grass (removed) onto brown friable loam.
	2	10-20	Grades to higher yellow/brown clayey loam.
	3	20-30	Grades to yellow/brown silty clay.

G2B – Foxground and Berry Bypass (PASA27 – incorporates PASA26)

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	Dark brown clay loam, grass roots throughout.
	2	10-20	As above, increased clay content, increased moisture grading to orange/brown clay loam.
	3	20-28	As above.
	4	28-35	As above, increase clay gravels < 1cm.
	5	35-40	As above.
	6	40-48	Grading to heavy clayey brown clay.
2			
	1	0-10	De-turfed (thick green grass) rich dark brown clayey loam, moist some fine roots.
	2	10-20	Continuing gradual clay increase, gradual moisture increase.
	3	20-30	Gradual change to orange/brown clayey loam continuing.
	4	30-40	Grading onto a smooth grey clay moist compact.
3			
	1	0-10	De-turfed rich dark black/brown clay loam, moist some fine roots.
	2	10-20	Continuing with slight orange/brown clay increase.
	3	20-30	Continuing with increasing clay, grading onto grey compacted clay.
4			
	1	0-10	Dark brown clay loam, fine grass roots throughout.
	2	10-20	As above, occasional charcoal flecks, increased clay, increased moisture, grading to orange/brown clayey loam.
	3	20-28	As above.
		28-38	Increased clay increased compact.
	4	38-48	Grades to heavy grey/brown clay.
5			
	1	0-10	Thick grass onto brown silty loam.
	2	10-20	As above, less loam with depth at <15cm grades quickly to lighter grey/brown gravels clayey silt.
	3	20-30	Grades to yellow/brown silty sandy clay, ironstone gravels.
6			
	1	0-10	Grass onto brown silty loam.
	2	10-20	As above, less loamy with depth some gravel to gravelly silt some charcoal.
	3	20-30	Grades to yellow/brown silty gravelly clay.
7			

Pit number	Spit number	Depth (cm)	Description
	1	0-10	Thick grass onto brown clayey loam.
	2	10-20	Grades quickly to yellow/brown sandy silty clay.
8			
	1	0-10	De-turfed, dark orange/brown clayey sandy loam, increasing clay content at base.
	2	10-20	Continuing increasing clays grading to solid smooth orange/grey clay.
9			
	1	0-10	Thick grass onto brown clayey silty loam.
	2	10-20	Grades quickly to yellow/brown silty sandy clay, some charcoal & gravel – no sample taken.
10			
	1	0-10	De-turfed, dark orange/brown sandy silty clayey loam, fine grained evenly sorted.
	2	10-20	Continuing with increasing clays compact.
11			
	1	0-10	Dark brown clay loam, fine grass roots.
	2	10-18	As above, decreasing clay gravels.
	3	20-30	Grading to heavy orange clay at base.
12			
	1	0-10	Grass onto brown loam with rubbish included with stone, brick and plastic.
	2	10-20	(Area may have been altered – creek dug and spoil put into bank) Artefact.
	3	20-30	Grades to yellow/brown sandy clay.
	4	30-40	As above, more clay with depth.
13			
	1	0-10	Thick grass onto brown loam.
	2	10-20cm	As above, lighter with depth.
	3	20-30cm	As above, some gravel noted.
	4	30-40cm	Grades to loamy silty clay, some gravels.
14			
	1	0-10cm	Thick grass onto brown loam.
	2	10-20	As above, slightly lighter colour, more clay with depth.
	3	20-30	As above.
	4	30-40	As above.
	5	40-50	Grades to yellow/brown loamy clay.
15			
	1	0-10	Thick grass onto brown loam.

Pit number	Spit number	Depth (cm)	Description
	2	10-20	As above, lighter clayey yellow/brown in base.
	3	20-30	Grades to yellow/brown sandy silty clay.

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	Grass onto dark brown clayey loam, cobbles, lots of worms.
	2	10-25	Grades to orange/brown loamy clayey sandy silt.
	3	25-35	As above, increase in clay with depth, cobbles continued.
	4	35-55	Grades to orange/brown clay.
2			
	1	0-15	Grass onto brown clayey loam, cobbles some gravel.
	2	15-30	More yellow with depth, cobbles continued.
	3	30-40	Grades onto orange/brown clay some cobbles.
3			
	1	0-10	Grass onto brown clayey loam large cobbles.
	2	10-20	Grades slowly to yellow/brown clayey loam to loamy clay. Uneven change, large cobbles continued.
	3	20-30	Grades onto orange/yellow/brown clay over whole pit.
4			
	1	0-10	Grass onto brown clayey loam cobbles of large stones.
	2	10-20	As above, lots of cobbles, charcoal uneven change to orange/brown clay over some of pit.
	3	20-30	Onto orange/brown clay, rocks and cobbles.
5			
	1	0-10	Thick grass onto brown damp clayey loam, large stones & cobbles.
	2	10-20	As above, many large angular cobbles.
	3	20-30	Onto yellow/grey/brown clay & large stones.
6			
	1	0-10	Thick grass onto brown clayey loam large angular cobbles.
	2	10-20	As above, large stone boulder in centre of pit some charcoal.
	3	20-30	Grades to brown & orange/brown clay.
7			
	1	0-10	Thick grass onto brown clayey loam.
	2	10-20	As above, friable, some gravel.
	3	20-28	Grades quickly onto yellow/brown sandy clay with orange & yellow inclusions.
8			
	1	0-10	Thick grass onto brown loam.
	2	10-20	As above, some gravel.

Pit number	Spit number	Depth (cm)	Description
	3	20-30	Grades quickly onto yellow/brown gravelly clay with orange & yellow inclusions degrading bedrock.
9			
	1	0-10	Thick turf onto brown clayey loam some gravel, friable.
	2	10-20	Tree roots, as above, gravels increases with depth.
	3	20-30	Grades to yellow/brown mottled gravelly clay, some charcoal.
10			
	1	0-10	Thick turf onto brown clayey loam some gravel.
	2	10-20	As above, gravel increases with depth ironstone type gravel.
	3	20-30	Grades quickly onto yellow/brown gravelly clay.
11			
	1	0-10	Thick turf onto brown gravelly loam.
	2	10-20	As above, more gravel with depth clay increases.
	3	20-30	Grades quickly onto yellow/brown gravelly clay.
12			
	1	0-10	Thick turf onto brown clayey loam, some gravel.
	2	10-20	As above.
	3	20-30	Grades quickly onto red/brown clay with degrading stones.
13			
	1	0-10	Thick grass onto brown loam.
	2	10-20	Grades quickly onto red/orange/brown clay.
14			
	1	0-10	Thick grass onto brown clayey loam.
	2	10-20	Grades at c.17cm onto orange/brown massive clay.
15			
	1	0-10	Thick grass onto damp brown clayey loam.
	2	10-20	Grades quickly at c17cm to orange/brown massive clay
16			
	1	0-10	Thick grass onto brown clayey loam.
	2	10-20	Grades quickly onto orange/brown clay.
17			
	1	0-10	Thick turf onto brown clayey loam.
	2	10-20	Grades onto yellow/brown clay some stones.

Pit number	Spit number	Depth (cm)	Description
1			
	1	0-10	Dark brown clayey loam, grass roots throughout.
	2	10-18	Continuation of same, sub-angular inclusions.
	3	18-22	Dark brown clayey loam decreasing clay content occasional red clay nodules. Assorted <5cm sub-angular gravels occasional charcoal flecks.
	4	22-35	Continuation of same, decreasing gravel, increasing sand content, increase red clay nodules, occasional charcoal flecks.
	5	35-44	Orange brown sandy clay (grades to)
	6	44-54	Increase clay content, occasional charcoal flecks.
	7	54-64	Orange clay, increase charcoal inclusions <5cm.
2			
	1	0-14	Dark brown clayey loam, orange clay nodules increase towards base. Grass roots throughout charcoal flecks.
	2	14-23	Mottled clay + Loam, sub-angular gravel (5cm or less) charcoal flecks present.
	3	23-31	Still mottled sandy clay, increase sub-angular gravels, increasingly compact (lighter orange/brown).
	4	31-40	Gravelly clay fill, dark brown clay loam at base occasional cobbles.
	5	41-50	Dark brown clay loam (friable) red clay nodules (occasional) + occasional flecks.
	6	50-58	Grading to orange brown towards base, increasing clay content, increase compact.
	7	58-64	As above.
	8	64-67	Grades to heavy orange clay.
3			
	1	0-12	Dark brown clay loam, grass roots throughout.
	2	12-30	As above.
	3	30-36	Decreasing clay increasing sand, occasional red clay nodules, charcoal flecks.
	4	36-45	Grading to orange/brown sandy clay at base, charcoal inclusions in size towards base <5 cm
	5	45-54	Large concentration charcoal on north wall, increase clay, sub-angular gravels <5cm occasional charcoal flecks.
	6	54-62	Gravelly sandy clay grading to decomposing bedrock at base.
4			
	1	0-10	Dark brown clay loam grass roots.
	2	10-21	Continuation occasional red clay nodules at base occasional fleck.

Pit number	Spit number	Depth (cm)	Description
	3	21-30	Decreasing clay content otherwise as above.
	4	30-41	Grading to orange/brown sandy clay at base.
	5	41-46	Orange/brown sandy clay, increase clay content increase compaction.
5			
	1	0-11	Dark brown clay loam, grass roots throughout, red clay nodules (occasional) at base.
	2	11-21	As above, with increase clay content towards base occasional flecks towards base.
	3	21-32	Increase sand + sub-angular gravel <5cm.
	4	32-43	Orange/brown sandy clay increase clay + compaction towards base.
6			
	1	0-10	Dark brown clay loam, sand increase at base, occasional sub-angular cobbles 5-15cm towards base.
	2	10-20	Dark brown clay loam grading to heavy orange/brown sandy clay. Occasional charcoal flecks increase compaction, decaying bedrock appearing in south wall at base.
7			
	1	0-10	Dark brown clay loam, grass roots throughout.
	2	10-21	As above, occasional + red clay nodules towards base, decreasing clay increase sand.
	3	21-31	Continued same, increase charcoal + red clay nodules.
	4	31-40	Orange/brown sandy clay, increase clay compaction.
8			
	1	0-10	Dark brown clay loam, gravels, cobbles, boulders (less than equal to 24cm sub-angular) grass roots throughout.
	2	10-24	As above, increase in density cobbles + boulders <26cm.
	3	24-27	As above, gravel cobbles boulders <68cm.
	4	27-35	Grading to orange/brown sandy clay (compact) occasional charcoal flecks.
9			
	1	0-10	Dark brown clay loam, grass roots throughout.
	2	10-20	As above, charcoal.
	3	20-28	Increase charcoal flecks + orange clay nodules.
	4	28-38	Increase sand + charcoal + compact towards base on south wall. Loamy clay still continues north half.
	5	38-43	Increase clay + increase sand towards base grading to orange/brown compact sandy clay at base throughout.
10			
	1	0-10	De-turfed dark brown clayey loam, grass roots nodules of orange clay.

Pit number	Spit number	Depth (cm)	Description
	2	10-20	Continuing with increasing clay content.
	3	20-30	Grading to a massive orange-brown/brown compacted clay.
11			
	1	0-10	De-turfed dark brown humic clayey loam, grass roots.
	2	10-20	Increasing clays, gravels, cobbles and boulders (450mm), decaying orange/white rocks.
	3	20-30	Grading onto a sandy gravelly orange clay, rock size decreasing, clay size increasing.
	4	30-35	Grades onto orange/brown compacted clay with decaying bedrock.
12			
	1	0-10	Location: De-turfed, rich dark brown humic clayey loam, sub-angular cobbles appearing in base of spit (<100mm).
	2	10-20	Continuing with increasing cobble and boulder size (250mm) increasing clays.
	3	20-30	Continuing patches of decaying orange/white bedrock decreasing rock size.
	4	30-40	Grading onto compact brown clays with embedded decaying bedrock.
13			
	1	0-10	De-turfed (thick green grass) dark brown humic clayey loam, grass roots. Patched of grey/black decomposing conglomerate rock.
	2	10-20	Continuing with increasing clay, decreasing loam. Increasing cobbles and boulders appearing (<150mm) decaying orange/white bedrock nodules in base of spit.
	3	20-28	Increasing clays (size+density) large streaks of decaying white/orange rock in base of spit.
14			
	1	0-10	De-turfed, dark rich brown clayey humic loam, grass roots, some sub-angular gravels + cobbles.
	2	10-20	Continuing with increasing clays + increasing cobbles + boulders (<250mm).
	3	20-30	Continuing with increasing clays + decreasing cobble size (<100mm). Patches of decaying bedrock and lumps of orange brown clay.
	4	30-40	Grading onto compacted orange/brown clay + decomposing bedrock.
15			
	1	0-10	De-turfed rich dark brown clayey loam with grass roots, sub angular gravels, nodules + cobbles up to 300mm25cm.
	2	10-20	Continuing with increasing cobbles and sub-rounded boulder (<450mm) decaying white/orange bedrock.
	3	20-28	Increasing rock content, decreasing rock size, grading onto decaying orange/white bedrock + clay.

Pit number	Spit number	Depth (cm)	Description
16			
	1	0-10	De-turfed dark brown humic clayey loam with grass roots specks of orange decaying rock in base of spit.
	2	10-20	Continuing with increasing clay content + size gravels + sub-angular cobbles appearing (<200mm), large patches of decaying orange bedrock.
	3	20-30	Continuing with increasing clays + bedrock.
	4	28-36	Continuing grading to massive brown clays with nodules of decaying bedrock.
17			
	1	0-10	De-turfed dark brown clayey humic loam, lots of fine grass roots.
	2	10-20	Continuing with increasing dark brown clay content, roots continuing clump of decaying orange bedrock pebbles <50mm.
	3	20-30	Grading onto a chunky orange brown clay.
18			
	1	0-10	De-turfed dark brown humic clayey loam with grass roots, specks of orange clay.
	2	10-20	Continuing with increasing sub-angular gravels, increasing orange/brown clay content and nodules of orange/red.
	3	20-30	Continuing with gravels, increasing clay content + size specks of orange + white decaying bedrock (<5mm).
	4	30-40	Grading onto compact red/brown massive clay.
19			
	1	0-10	De-turfed dark brown clayey humic loam, grass roots bits of charcoal.
	2	10-20	Continuing with increasing clay content, nodules of orange clay, some small gravels.
	3	20-30	Grading onto compact massive orange brown clay.
20			
	1	0-10	De-turfed dark brown clayey humic loam with grass roots.
	2	10-20	Continuing with increasing clay content.
	3	20-30	Continuing increasing orange/brown clay content + size some gravels, specks of red + orange clay.
	4	30-40	Decreasing gravels increasing orange/brown clays to massive clays with some fine roots.
21			
	1	0-10	De-turfed (thick green grass) dark brown humic clayey loam, grass roots, some orange clay nodules.
	2	10-20	Continuing fine roots, increasing clay content, some cobbles <200mm.
	3	20-30	Continuing with increasing orange clay content + clay size, small nodules of charcoal and burnt + red clay.
	4	30-35	Grades onto massive orange/brown clays.
22			
	1	0-10	De-turfed dark brown clayey loam, humic-rich slightly moist.

Pit number	Spit number	Depth (cm)	Description
	2	10-20	Continuing with increasing clay content, decreasing roots, some spots of burnt roots + burnt clay nodules, some orange/brown clay lumps appearing in base.
	3	20-30	Continuing with increasing orange/brown clay content, some sub-angular cobbles (<100mm) in base of spit nodules of red clay.
	4	30-40	Continuing with increasing orange/brown clay density and clay size. Flecks of orange clay, small gravels appearing in base of spit.
	5	40-50	Grading to a massive orange brown clay.

G2B - Foxground and Berry bypass (PASA 40)

Pit number	Spit number	Depth (mm)	Description
1			
	1	0-10	Grass onto brown loam grades quickly onto yellow/brown gravelly silty clay, charcoal flecks, some rubbish.
	2	10-20	As above, yellow/grey/brown silty clay with some gravel & charcoal flecks.
2			
	1	0-10	Grass onto brown loam, grades at base yellow/brown silty clay.
	2	10-20	Yellow/grey/brown silty clay some gravel charcoal noted.
3			
	1	0-10	Grass onto brown loam, some charcoal some yellow/brown clay in base.
	2	10-20	Grades quickly to yellow/brown silty clay some gravel, large charcoal patch in centre of pit.
4			
	1	0-10	.Grass onto brown loam, some charcoal.
	2	20-35	Onto yellow/grey/brown silty clay.
5			
	1	0-10	Grass onto brown loam, tree roots.
	2	10-20	Grades to yellow/brown silty clay at base.
	3	20-30	Grades to yellow/grey/brown silty clay some charcoal.
6			
	1	0-10	Grades onto brown loam.
	2	10-20	As above.
	3	20-30	Grades onto dark brown silty clay some water table.
8			
	1	0-10	De-turfed dark brown sandy clayey loam with fine roots water logged.
	2	10-20	Continuing with increasing clays, some gravels + burnt clay nodules in base of spit.
	3	20-30	Patches of orange/brown sandy clay, ground water in southern portion of pit. Continuing nodules of burnt clay.
	4	30-40	Grades onto large orange/brown clays, patches of decomposing bedrock, water logged.
10			
	1	0-10	De-turfed dark brown humic sandy clayey loam, fine roots nodules of clay.
	2	10-20	Continuing with increasing clay + compaction.
	3	20-30	Grading onto massive compacted orange/brown clays.
11			
	1	0-10	De-turfed rich dark brown sandy loamy clay, moist grass roots, small charcoal fragments.

Pit number	Spit number	Depth (mm)	Description
	2	10-20	Continuing with increasing smooth fine grained brown clays, flecks of charcoal.
	3	20-30	Continuing with patches of orange+brown sandy clay appearing in base of spit. Patches of charcoal.
	4	30-40	Grades onto massive orange/brown clays, flecks of orange decaying bedrock.
12			
	1	0-10	De-turfed rich dark brown sandy loamy clay, moist grass roots, small charcoal fragments.
	2	10-20	Continuing with increasing smooth fine grained brown clays, flecks of charcoal.
	3	20-30	Continuing with patches of orange+brown sandy clay appearing in base of spit. Patches of charcoal.
	4	30-40	Grades onto massive orange/brown clays, flecks of orange decaying bedrock.
13			
	1	0-10	Deturfed. Dark grey brown loamy sandy clay, fine-grained, grass roots. Flecks of burnt clay and charcoal.
	2	10-20	Continuing with increasing gravels and clays, patches of orange-brown sandy clay.
	3	20-30	Grades onto massive yellow brown sandy clays
14			
	1	0-10	Dark grey-brown sandy clayey loam with grass roots, grading onto a grey brown silty sandy gravelly clay.
	2	10-20	Continuing, grading onto large yellow brown clays, burnt roots, burnt clay nodules. Water table in patches
	3	20-25	Massive yellow brown clays and water table reach in half of the pit
15			
	1	0-10	Very thin layer of dark brown sandy clayey loam, ~5cm grades onto thick orange brown massive clays
16			
	1	0-10	Deturfed. Dark brown sandy loamy clays, flecks of orange clay, grass roots, bottle glass present
	2	10-20	~18cm grades onto a thick orange brown massive sandy clay
17			
	1	0-10	Deturfed. Orange grey brown loamy sandy clays. Grass roots. Some gravels in base of pit
	2	10-20	Grading onto massive yellow-brown sandy clays

G2B - Foxground and Berry bypass (PASA 41)

Pit number	Spit number	Depth (mm)	Description
1			
	1	0-10	De-turfed rich dark brown humic clayey 10cm, some sub-angular cobbles, fine roots + tree roots.
	2	10-20	Continuing with increasing clays + cobbles, spots of burnt roots + clays.
	3	20-30	Grading to a compact orange/brown sandy clay, gravels decreasing. *Artefacts.
	4	30-40	Increasing compaction, patches of decomposing bedrock.
	5	40-45	Grades onto compact sandy clay.
2			
	1	0-10	De-turfed rich dark brown humic clay 10cm. Some gravels appearing at base of spit, Grass roots
	2	10-20	Increasing clay with depth, roots continuing.
	3	20-30	Grading to orange/brown compact sandy clays.
	4	30-40	Increasing red brown sandy clays, increasing compaction.
	5	40-45	Grading onto compact red/brown clays.
3			
	1	0-10	De-turfed thin layer of dark brown sandy clayey loam, grading to mottled red brown large sandy clays ~ 2cm. Nodules of orange/grey clay. Grass roots, lots of glass fragments, charcoal lump.
	2	10-20	~12cm grades to dark brown gravelly loam, roof tile fragments.
	3	20-30	Continuing with increasing clays + appearance of gravels.
	4	30-40	Increasing clays red/brown compacted sandy clays in base of spit. Few flecks of decomposing orange bedrock.
	5	40-50	Grades onto compacted red-brown sandy clay.
4			
	1	0-10	.De-turfed rich dark brown sandy clayey loam, some gravels in base of spit. Grass roots, lots of glass fragments, continuing into base of spit.
	2	10-20	Increasing red-brown sandy clays in base of spit, glass continuing, roots continuing.
	3	20-30	Grades onto massive red/brown sandy clays.
5			
	1	0-10	De-turfed rich dark brown-black humic sandy clayey loam, grass roots.
	2	10-20	Continuing with increasing grey/brown clays. Specks of charcoal, patches of orange/brown sandy clay.
	3	20-30	Grading onto orange-brown sandy clays, some brown clay mottling.
	4	30-40	Onto massive orange-brown clays.

Pit number	Spit number	Depth (mm)	Description
6			
	1	0-10	Black grass roots, silty loam, organic soil.
	2	10-20	As above
	3	20-30	Black decreasing grass roots, black silty loam decreasing, surface is mottled lighter brown sandy loam with grass roots.
	4	30-37	Mid-brown sandy clay loam, some grass roots, much lighter than above, 3 spits, sticky and damp.
	5	37-47	Light to mild brown, charcoal lots inclusions, sticky and damp
	6	47-55	Decreasing charcoal, yellow clay, sticky loam.
7			
	1	0-10	Black-grey brown silty clay loam, De-turfed some grass roots.
	2	10-20	Black/grey clay.
	3	20-30	Black/grey clay loam.
	4	30-40	Yellow/grey clay.
8			
	1	0-10	.De-turfed rich dark brown-black sandy clayey loam, grass roots.
	2	10-20	~15cm grading to orange-grey brown sandy clays, fine-grained roots continuing.
	3	20-30	Grading to orange-brown sand clay, some brown mottling.
	4	30-40	Onto heavy orange clay.
9			
	1	0-05	Dark black/brown silty clay loam, De-turfed.
	2	05-10	Black dark brown silty clay loam.
	3	10-20	Black dark brown silty clay loam, coming down onto grey clay.
	4	20-30	Brown grey clay.
10			
	1	0-10	Black grassy organic soil, sandy loam.
	2	10-16	Dark brown, charcoal inclusions, sandy loam.
	3	16-26	Some charcoal inclusions, dark brown spit 2 decreasing, yellow clay coming through at surface.
	4	26-36	Charcoal inclusions, yellow brown sandy silty clay.
	5	36-40	Large charcoal inclusions, yellow light brown clay.
	6	40-45	Large charcoal inclusions, same as above.
	7	45-50	Yellow clay base, a few charcoal bits remain.

Pit number	Spit number	Depth (mm)	Description
11			
	1	0-10	Silty clay loam, De-turfed dark brown black.
	2	10-20	Silty clay loam, dark black brown.
	3	20-30	Silty clay dark brown loam.
	4	30-40	Dark brown silty clay loam with base of grey brown clay.
12			
	1	0-10	Black organic soil grass roots, silty loam.
	2	10-20	As above, some iron-clay inclusions.
	3	20-28	As above, more of a sandy loam.
	4	28-39	Mid-brown sandy clay loam
	5	39-45	Base is light brown-yellow some iron-rich clay inclusions, occasional charcoal speck.
	6	45-49	Light brown/yellow clay base a few charcoal specks.
13			
	1	0-10	Dark brown black silty clay loam.
	2	10-20	Dark brown black silty clay loam coming down onto a grey clay.
	3	20-30	Dark brown black silty clay loam more grey/orange clay coming through.
	4	30-40	Dark brown black silty clay, more grey loam orange clay.
	5	40-50	Orange grey clay base with a grey clay inclusion.

G2B - Foxground and Berry bypass (PASA 42)

Pit number	Spit number	Depth (mm)	Description
1			
	1	0-10	Grass onto brown loam.
	2	10-20	As above, drier with depth, angular large gravels & cobbles on base, lots tree roots.
	3	20-28	Grades quickly onto yellow/brown clay.
2			
	1	0-10	Thick grass onto brown loam, some large gravel in ½ pit.
	2	10-20	Grades quickly onto decomposing rock, gravel & clay, yellow/brown & orange.
3			
	1	0-10	Thick grass onto brown friable loam.
	2	10-20	Grades quickly at c17cm onto yellow/brown clay, tree roots, some degrading cobbles.
4			
	1	0-10	Thick grass onto brown friable loam some gravel.
	2	10-20	Grades onto clay & gravel at c17cm.
5			
	1	0-10	Thick grass onto brown loam, friable.
	2	10-20	Grades to yellow/brown clay.
6			
	1	0-10	Thick grass onto brown loam.
	2	10-20	Grades quickly onto yellow/brown clay, tree roots some gravel & cobbles.

Pit number	Spit number	Depth (mm)	Description
1			
	1	0-10	Some turf onto brown sandy loam, grades quickly at base to orange/brown sandy clay.
	2	10-20	Orange/brown sandy clay.
2			
	1	0-10	Bare ground, some gravel on surface, brown loam, some orange/brown clay with depth worms.
	2	10-20	Mixed loam and orange/brown sandy clay.
	3	20-30	Orange/brown sandy clay, tree roots.
3			
	1	0-10	Bare loam some gravels, grades to mixed with orange/brown sandy clay base.
	2	10-20	Orange/brown clay.
4			
	1	0-10	Bare loam, some gravel, more orange/brown clay with depth.
	2	10-20	Brown clayey loam.
	3	20-30	As above, more orange with depth, tree roots continued.
	4	30-40	Grades to orange/brown sandy clay.
5			
	1	0-10	Bare loam some gravel, more orange clay with depth.
	2	10-20	As above, more clay with depth, tree roots.
	3	20-30	As above.
	4	30-40	More sandy clay with depth.
	5	40-50	Grades to orange/brown sandy clay.
6			
	1	0-10	Bare brown loam, some gravel, more clay with depth, damp.
	2	10-20	As above, tree roots, more compact.
	3	20-30	More orange clay with depth.
	4	30-40	As above, sandy clay, orange/brown tree roots, some charcoal.
	5	40-50	Grades to orange/brown sandy clay.
7			
	1	0-10	Bare brown loam, damp.
	2	10-20	As above, some charcoal, more orange clay with depth, tree roots.
	3	20-30	As above, sandy with depth.

Pit number	Spit number	Depth (mm)	Description
	4	30-40	Grades to orange/brown sandy clay.
	5	40-50	Orange/brown sandy clay.
8			
	1	0-10	Stubble onto brown friable loam.
	2	10-20	As above.
	3	20-30	As above.
	4	30-40	More sand with depth. Pit filled in at end of clay and emptied on 23/08/11 and continued.
	5	40-50	As above, more clay with depth.
	6	50-60	As above.
	7	60-70	As above, some orange/brown mottling some charcoal.
	8	70-80	Grading slowly to orange/brown sandy clay.
	9	80-90	Orange/brown sandy clay.
9			
	1	0-10	Weeds etc. onto brown loam.
	2	10-20	As above.
	3	20-30	As above, tree roots.
	4	30-40	Slightly lighter brown, some increase in clay.
	5	40-50	Grades to more orange/brown clayey sand.
	6	50-60	Grades to orange/brown sandy clay.
10			
	1	0-10	Rich dark brown sandy clayey loam. Recently ploughed.
	2	10-20	Continuing with dark black/brown clays increasing.
	3	20-30	Continuing, increasing clays + compaction.
	4	30-40	Grading onto large orange/brown sandy clays.
	5	40-50	Onto solid orange/brown sandy clays.
11			
	1	0-10	Rich dark brown sandy clayey loam. Recently ploughed.
	2	10-20	Continuing, increasing compaction + orange/brown sandy clays.
	3	20-30	Continuing, some tree roots.
	4	30-40	As above, roots decreasing.
	5	40-50	As above.
	6	50-60	Some orange/brown sandy compact clays in base.
	7	60-70	Large orange/brown sandy clays.

Pit number	Spit number	Depth (mm)	Description
12			
	1	0-10	Recently ploughed field, brown loose loam onto slightly orange/brown loam, more compact.
	2	10-20	As above, tree roots.
	3	20-30	As above, more compact, more clay.
	4	30-40	As above, more orange colour & clay with depth.
	5	40-50	Grades to orange/brown sandy clay.
13			
	1	0-10	Recently ploughed loose loam, more compact with depth.
	2	10-20	As above, more orange colour, more clay.
	3	20-30	As above, tree roots, some charcoal noted.
	4	30-40	As above, tree roots.
	5	40-50	As above.
	6	50-60	More clay & orange colour with depth clayey silt.
	7	60-70	Grades to orange/brown clay sandy.
14			
	1	0-10	Rich dark brown sandy clayey loam. Recently ploughed.
	2	10-20	Continuing with increasing brown clays.
	3	20-30	Increasing orange/brown clays + compaction, flecks of charcoal, tree roots in base of spit.
	4	30-40	Continuing, tree roots continuing into base of spit.
	5	40-50	Continuing clay size increasing.
	6	50-60	Increasing compaction.
	7	60-70	Large heavily compact orange/brown sandy clays.
15			
	1	0-10	Rich dark brown sandy clayey loam, some tree roots.
	2	10-20	Continuing with increasing orange/brown sandy clay.
	3	20-30	Increasing clays + compaction, decaying roots.
	4	30-40	Continuing.
	5	40-50	Grading onto compact orange/brown sandy clays in base of spit.
	6	50-60	Onto compact large sandy clays.
16			
	1	0-10cm	Ploughed brown loose loam, more compact with depth.
	2	10-20cm	As above, charcoal, patch of charcoal in centre of pit with burnt clay nodules linear feature.
	3	20-30cm	As above, charcoal ends some flecks in base, darker brown.

Pit number	Spit number	Depth (mm)	Description
	4	30-40cm	As above, darker brown from charcoal & burning, charcoal noted, clay + compactions increasing with depth
	5	40-50cm	As above.
	6	50-60cm	As above more clay with depth.
	7	60-70cm	Grades to orange/brown sandy clay.
17			
	1	0-10cm	Dark brown sandy clayey loam, fine roots.
	2	10-20cm	Grading to compact orange sandy clays, patches of brown silty clays (possible tree roots) Some tree roots.
	3	20-30cm	Onto large sandy orange clays.
18			
	1	0-10cm	Rich dark brown sandy clayey loam with grass roots.
	2	10-20cm	Continuing, increasing clays.
	3	20-30cm	As above.
	4	30-40cm	Grading onto thick orange/brown sandy clays.
	5	40-50cm	Heavy orange/brown clays.
19			
	1	0-10cm	Thick grass onto brown loam.
	2	10-20cm	Grades to mixed loam & sandy clay.
	3	20-30cm	Grades to orange/brown sandy clay.
20			
	1	0-10cm	Thick grass onto brown loam.
	2	10-20cm	Grades to mixed loam & orange/brown sandy clay.
	3	20-30cm	Orange/brown sandy clay.
21			
	1	0-10cm	Deturfed, rich dark brown sandy clayey loam grass roots. Some gravels in base of spit.
	2	10-20cm	Increasing orange/brown sandy clays with depth.
	3	20-30cm	Grading onto heavy orange/brown sandy clays.
	4	30-35cm	Massive orange clays.
22			
	1	0-10cm	Thick grass onto brown loam, damp.
	2	10-20cm	As above, some charcoal, sandy & clay.
	3	20-30cm	As above, soft section (rabbit burrow).
	4	30-40cm	As above, soft section in north end.
	5	40-50cm	As above, grades to brown sand, some clay.

Pit number	Spit number	Depth (mm)	Description
	6	50-60cm	As above, coarser sand in eastern end.
	7	60-70cm	As above, small burrow in centre some charcoal.
	8	70-80cm	Darker brown clayey sand, damp, some charcoal, burrow continued.
	9	80-90cm	As above, more damp.
	10	90-100cm	Grades quickly onto grey sandy clay, wet.
23			
	1	0-10cm	Thin layer of dark brown sandy clayey loam, grading to an orange/brown clayey sand with small (<50mm) sub-rounded cobbles.
	2	10-20cm	Orange/brown clayey sands+ cobbles continuing tree roots.
	3	20-30cm	Increasing clays, roots continuing cobbles decreasing.
	4	30-40cm	As above, rounded cobbles (<60mm) in base of spit.
	5	40-50cm	Increasing clay density patches of decomposing re + yellow rock.
	6	50-60cm	Continuing gravels increasing.
	7	60-70cm	Increasing gravels + patches of coarse sand.
	8	70-80cm	Grades onto orange & gravelly sands in western side of pit, brown silty sandy clay on eastern side.
	9	80-90cm	Orange clayey gravelly sands across base of spit.
24			
	1	0-10cm	Thick grass onto brown loam.
	2	10-20cm	As above, more clay with depth.
	3	20-30cm	As above.
	4	30-40cm	Grades to dark brown sandy clay.
	5	40-50cm	Dark brown clay, compact.
	6	50-60cm	Some orange nodules of clay.
	7	60-70cm	As above.
	8	70-80cm	Grades onto brown damp sandy clay, ironstone gravels, dark brown patch in centre.
	9	80-90cm	As above, water table reached.
25			
	1	0-10cm	Rich dark brown sandy clayey loam, grass roots.
	2	10-20cm	Increasing clays + compaction.
	3	20-30cm	Orange/brown sandy clays grading in at 26cm.
	4	30-40cm	Increasing clays, moist patches of decaying roots.
	5	40-50cm	Onto massive orange clays.
26			
	1	0-10cm	Rich dark brown sandy gravelly clayey loam with grass roots.

Pit number	Spit number	Depth (mm)	Description
	2	10-20cm	Continuing gravels decreasing clay increasing.
	3	20-30cm	Increasing orange/brown sandy clays.
	4	30-40cm	Increasing density, increasing clays.
	5	40-50cm	Orange large chunky sandy clays in base of spit.
	6	50-55cm	Onto massive orange clays with flecks of decomposing bedrock.
27			
	1	0-10cm	Thick grass onto brown clayey loam.
	2	10-20cm	As above, worms.
	3	20-30cm	As above, some rounded pebbles.
	4	30-40cm	As above.
	5	40-50cm	As above, darker brown clayey silty sand.
	6	50-60cm	As above, some orange/brown clay flecks, some charcoal.
	7	60-70cm	As above.
	8	70-80cm	As above, more clay with depth.
	9	80-90cm	As above.
	10	90-100cm	Grades to brown sandy clay.
	11	100-110cm	Brown sandy clay.
28			
	1	0-10cm	Deturfed orange/brown clayey silt, some tree roots.
	2	10-20cm	Increasing compaction, tree roots continuing.
	3	20-30cm	Grading to orange clayey sands, roots continuing.
	4	30-40cm	Increasing clay concentration + compaction massive.
29			
	1	0-10cm	Thick grass onto brown loam.
	2	10-20cm	As above, grades to brown & orange/brown loam & clay, some gravel.
	3	20-28cm	Grades onto orange/brown sandy clay, some ironstone gravel.
30			
	1	0-10cm	Deturfed dark brown fine grained clayey silt with grass roots.
	2	10-20cm	Increasing brown clays, flecks of decaying roots + bedrock.
	3	20-30cm	~25cm grades onto large yellow/brown sandy clays with flecks of decomposing rock.
31			
	1	0-10cm	Thick grass onto brown loam, some yellow clay in base.
	2	10-20cm	Grades quickly onto yellow brown sandy clay.

Pit number	Spit number	Depth (mm)	Description
32			
	1	0-10cm	Deturfed rich dark brown clayey silt with grass.
	2	10-20cm	Increasing brown clays + compaction, some small decomposing gravels.
	3	20-30cm	Onto large orange & sandy clays.
33			
	1	0-10cm	Thick grass onto brown loam.
	2	10-20cm	As above, grades to yellow/brown clayey silt.
	3	20-30cm	Grades onto brown sandy clay.

Pit number	Spit number	Depth (mm)	Description
1			
	1	0-10cm	Deturfed, thin layer of dark brown sandy clayey silt grading onto compact sandy clay ~5cm, grass roots.
	2	10-20cm	Grading onto large orange brown compact clays.
2			
	1	0-10cm	Deturfed, thin layer of dark brown sandy clayey silt, quickly grading onto dark brown compact sandy clays.
	2	10-20cm	Grades onto massive orange/brown sandy clay.
3			
	1	0-10cm	Dark brown sandy clayey silt, increasing clays towards bottom of a spit.
	2	10-20cm	Continuing with increasing clays.
	3	20-30cm	Grading onto large orange/brown clays.
4			
	1	0-10cm	Deturfed, grey brown clay loam.
	2	10-20cm	Getting lighter grey clay loam.
	3	20-30cm	Grey clay loam with some orange clay inclusions. Charcoal.
	4	30-40cm	Light grey orange clays, white-ware ceramic piece.
5			
	1	0-10cm	Deturfed, dark brown silty clay loam in centre.
	2	10-20cm	Dark brown silty clay loam, coming down onto yellow/grey clay.
6			
	1	0-20cm	Top layer of light orange/grey clay, silty clay loam (dark black/brown) deturfed.
	2	20-30cm	Silty clay loam (dark black/brown) coming down onto clay (yellow/grey) some red clay inclusions.
	3	30-40cm	Dense clay, mottled colour red inclusions, some charcoal, clay – mainly yellow/grey.
7			
	1	0-10cm	Dark brown silty clay loam, charcoal inclusions, deturfed.
	2	10-20cm	Dark brown silty clay loam, getting more compact, charcoal inclusion, yellow/grey clay appearing.
	3	20-35cm	Brown silty clay loam, coming down onto yellow grey clay.
8			
	1	0-10cm	Deturfed, rich dark orange/brown sandy clayey loam, increasing clay + compaction at base of spit. Grass roots.

Pit number	Spit number	Depth (mm)	Description
	2	10-20cm	Increasing clays + compaction.
	3	20-30cm	Grades onto compact yellow/brown massive clays.
9			
	1	0-10cm	Deturfed, orange/brown sandy clayey loam, grass roots.
	2	10-20cm	Increasing orange brown clays + compaction.
	3	20-30cm	Grades onto heavy brown/orange massive clays.

Appendix F

Artefact inventory (raw data)

Artefact inventory (raw data)

Key to Raw Data Table

Types

Fl	Flake
Rt	Retouched
Rd	Redirecting
HF	Heat fragment
RS	Ridge straightening
SP	Single platform
S-D	Semi-discoidal
Bi	Bipolar
Mp	Multiplatform
Ha	Hammerstone
An	Anvil
Co	Core
Bk	Backed
Asy Bk	Asymmetric backed artefact
Sy Bk	Symmetric backed artefact
FCR	Fire cracked rock
Bu	Burin
No	Notch
Si	Side
En	End
Sc	Scraper
Mbl	Microblade
FP	Flake piece
Rt FP	Retouched flaked piece
BTF	Biface thinning flake
EGAF	Edge ground axe flake

Breakage

C	Complete
B	Broken
P	Proximal fragment
M	Medial fragment
D	Distal fragment
S	Surface fragment
Ma	Marginal fragment
L	Left half
R	Right half
RP	Right proximal fragment
LP	Left proximal fragment
L	Left medial fragment
RM	Right medial fragment
LD	Left distal fragment
RD	Right distal fragment

Raw material type

Si	Silcrete
Cht	Chert
Chl	Chalcedony
Snd	Sandstone
And	Andesite
Qtz	Quartz
Qtzt	Quartzite
Ba	Basalt
Slg	Slag
Mds	Mudstone

Termination type

F	Feather
H	Hinge
S	Step
O	Outrépassé
Cr	Crushed

Heat shattered

Y	Yes

Platform preparation

OR	Overhang removal
F	Faceting
B	Overhang removal and faceting

Cortex type

R	Rounded
A	Angular
I	Irregular

Cortex location

P	Platform of core or flake
D	Dorsal surface of flake
B	Platform and dorsal surfaces of flake
F	Core face
D	Distal end of core
F&D	Face and distal of core
P&D	Platform and distal of core
P&F	Platform and face of core

Platform type

SC	Single conchoidal
C	Cortical
Cr	Crushed
F	Focalised
MC	Multiple conchoidal
C&S	Cortical and single conchoidal
F&S	Focalised and single conchoidal
F&M	Focalised and multiple conchoidal
NFS	Non-flaked surface
HC	Heat cracked

Retouch location

V	Ventral only
D	Dorsal only
B	Bidirectional
L	Lateral (Burinate)
VF	Ventral first
DF	Dorsal first
Alt	Alternating
DVD	Dorsal-ventral-dorsal
VDV	Ventral-dorsal-ventral

Contact material

H	Hide
W	Wood

Action

T	Transverse

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
1	41	13	1	flake	Chert	broken		left			6.58	32.44				6.8			
2	41	8	3	flake	Chert	complete			yes	pot lidded	9.09	27.48	23.29	24.12	16.59	11.95	1.14	13.90	1
3	41	2	2	core	Quartzite	complete					45.27	48.31		37.18		24.89	1.30		
4	41	6	3	flake	Chert	broken	medial		yes	pot lidded	0.68	16.63							
5	41	3	1	flake	Chert	broken		marginal	yes	pot lidded	0.46	12.62							
6	41	4	1	retouched glass artefact	Glass	broken	side of bottle				6.68	36.51		29.35		4.96	1.24		
7	41	5	2	flake	Chert	broken		left proximal			8.8	27.09							
8	41	1	3	fire cracked rock	Sedimentary	broken					35.72	47.98							
9	41	1	3	flake	Chert	broken		marginal	yes	surface	1.29	21.98							
10	41	1	3	flake	Chert	broken		marginal	yes	pot lidded	1.24	20.53							
11	41	1	3	flake	Chert	broken	distal				0.64	18.65							
12	41	1	2	flake	Quartz	broken	proximal				0.68	14.51	10.2					38.73	
13	41	1	2	flake	Chert	complete					0.08	6.07	5.47	7.45	6.27	1.32	0.81	-7.54	
14	41	1	3	flaked piece	Chert	broken					0.11	8.09							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
15	16	4	3	flake	Quartz	broken		right			0.28	12.3				3.64			
16	16	4	3	flake	Quartz	broken	proximal				0.18	10.5							
17	16	4	2	flaked piece	Chert	broken					0.62	22							
18	16	4	2	flaked piece	Quartz	broken					0.75	17.27							
19	16	4	2	flaked piece	Quartz	broken					0.36	11.45							
20	16	1	2	flake	Chert	broken		marginal			0.18	9.61							
21	16	2	3	flake	Chert	complete					11.24	39.78	15.94	26.35	18.39	10.68	1.51	-3.53	
22	16	2	3	flake	Chert	complete					1.4	23.99	6.09	12.35	10.29	4.09	1.94	-10.01	1
23	16	2	3	flake	Chert	complete					0.28	10.63	9.77	10.67	6.41	2.23	1.00	17.96	
24	16	2	3	flake	Chert	complete					0.73	17.67	13.85	11.1	5.24	2.93	1.59	27.38	1
25	16	2	3	heat fragment	Chert	broken			yes	shattered piece	4.52	33.18							
26	16	2	3	flake	Chert	broken	distal				0.1	9.52		5.05	4.02	2.63	1.89	-23.84	1
27	16	2	2	microblade	Silcrete	complete					1.47	31.1	2.14	7.27	7.5	4.89	4.28	-9.85	2
28	16	2	2	flake	Chert	broken		marginal			1.74	23.97							
29	16	2	2	flake	Chert	broken		right proximal			0.45	14.58							
30	16	2	2	flaked piece	Chert	broken					2.65	40.51							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
31	16	2	4	flake	Chert	broken	proximal				0.72	14.6	10.26		12.67	3.94		-9.44	
32	16	2	4	flaked piece	Chert	broken					0.8	13.42							
33	16	2	4	flake	Chert	broken		marginal			1.03	21.4							
34	25	8	4	flake	Chert	broken		left	yes	pot lidded	0.36	16.54							
35	25	8	2	core	Mudstone	complete					104.68	67.95		55.53		27.16	1.22		
36	25	8	2	flake	Quartz	broken		right			4.11	23.5				7.84			
37	25	8	2	flake	Chert	broken					1.17	15.92	14.91					50.19	
38	25	8	2	flake	Chert	complete					0.66	9.36	9.16	9.77	5.25	4.3	0.96	23.60	
39	25	4	5	flake	Chert	broken					0.94	19.95	10.52	7.33	0	6.46	2.72	29.54	1
40	25	5	1	flake	Chert	complete					0.87	19.58	8.8	14.36	7.96	2.74	1.36	2.46	
41	25	5	4	multiplatform core	Mudstone	complete					347.69	34.1		90.39		63.48	0.38		
42	25	6	2	flake	Chert	complete					36.64	44.41	27.07	33.1	14.11	15.49	1.34	16.60	
43	25	6	2	flake	Quartz	complete					0.49	13.15	6.28	8.42	7.17	3.76	1.56	-3.88	
44	25	7	1	flake	Chert	complete					3.71	24.19	9.72	18.54	22.69	4.94	1.30	-30.01	
45	25	7	1	flake	Silcrete	complete					1.45	19.28	8.66	15.71	8.58	4.32	1.23	0.24	

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
46	25	7	2	retouched flake fragment	Chert	broken		marginal	yes	pot lid	0.58	16.55							
47	25	1	4	redirecting flake	Mudstone	complete					0.51	5.98	9.59	10.79	10.22	4.92	0.55	-6.03	
48	25	1	4	flaked piece	Chert	?					1.9	22.77							
49	20	16	2	redirecting flake	Chert	complete					0.98	20.5	3.42	11.45	2.03	5.12	1.79	3.88	
50	20	23	5	flake	Quartz	broken	proximal				0.2	7.36							
51	20	18	1	flake	Volcanic?	complete					0.29	7.72	11.87	8.07	1.46	2.64	0.96	67.98	
52	20	20	1	bipolar core?	Chert	complete					4.83	23.72							
53	20	20	3	heat fragment	Chert	broken			yes	shatter	0.57	12.35							
54	20	20	3	heat fragment	Chert	broken			yes	surface	0.45	18.77							
55	20	20	2	flaked piece	Chert	broken					15.77	41.92							
56	20	20	2	flaked piece	Sandstone	broken					1.23	15.28							
57	20	20	2	flake	Chert	complete					1.08	9.64	12.4	20.29	11.66	3.62	0.48	4.40	
58	20	20	2	flake	Chert	broken		right			0.57	15.1							1
59	20	12	3	hammerstone	Metamorphic (Granite?)	broken					68.26	49.27							
60	20	12	3	flake	Chert	complete					23.81	36.45	29.67	38.84	37.63	16.37	0.94	-12.46	

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
61	20	12	3	flake	Chert	broken		mesial			0.6	18.39							
62	20	12	1	flaked piece	Chert	?					7.17	33.72							
63	20	12	2	flaked piece	Chert	broken					0.36	13.17							
64	20	12	3	flake	Silcrete	broken	proximal				0.52	15.08	12.41					44.73	
65	20	4	2	hammerstone and anvil	Mudstone	complete					356.91	92.71		73.31		44.87	1.26		
66	20	4	2	heat fragment	Chert	broken			yes	shatter	32.11	53.33							
67	20	4	2	heat fragment	Chert	broken			yes	shatter	1.77	28.55							
68	20	17	3	retouched flake fragment	Chert	broken			yes	surface	2.12	26.26							
69	20	17	8	flake	Quartz	broken	proximal				1.43	16.42							
70	20	19	12	flaked piece	Chert	broken					0.47	13.23							
71	20	3	3	flake	Quartz	broken					3.2	27.62							
72	20	19	13	flake	Chert	complete					1.64	10.6	17.81	15.85	5.27	5.3	0.67	61.21	
73	20	5	3	flake	Chert	broken		marginal			3.08	34.93							
74	20	5	3	flake	Quartz	broken	proximal				0.96	16.74							
75	20	13	1	flake	Chert	complete					4.59	32.57	9.21	12.09	11.29	7.67	2.69	-3.66	
76	20	13	1	redirecting flake	Chert	complete					0.87	19.59	3.26	9.74	8.12	5.25	2.01	-14.14	1

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
77	20	3	3	flaked piece	Quartz	broken					0.35	10.76							
78	20	3	3	heat fragment	Chert	broken			yes	shatter	0.55	13.12							
79	20	14	2	flake	Sandstone	broken	distal				1.08	23.98							
80	20	11	4	flake	Chert	complete					5.86	20.74	12.21	19.4	11.69	8.51	1.07	1.44	
81	20	11	4	flaked piece	Volcanic?	broken					1.06	14.93							
82	20	11	4	flake	Quartzite	broken	distal				17.69	41.38							
83	20	11	4	flake	Chert	complete					75.85	71.09	25.46	36.88	27.12	19.96	1.93	-1.34	
84	20	2	4	ochre crayon	Ochre	complete					20.86	38.79		28.67		17.98	1.35		
85	20	2	4	hammerstone?	Metamorphic (Granite?)	broken					70								
86	20	10	1	flake	Quartz	broken		right proximal			0.45	13.62							
87	20	9	2	flake	Chert	broken	p				5.42	33.01	23.91					39.82	
88	20	9	2	flake	Chert	complete					0.63	9.56	5.1	12.43	18.04	5.12	0.77	-68.18	
89	28	1	3	flake	Volcanic?	broken	proximal				3.16	27.83							
90	28	1	2	flake	Sandstone	broken	medial				0.79	19.37							
91	28	3	1	heat fragment	Chert	broken			yes	surface	1.28	22.94							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
92	28	2	3	flake	Chert	broken	distal		yes	pot lid removal	1.35	26.51							
93	28	21	4	heat fragment	Chert	broken			yes	surface	0.82	23.48							
94	28	13	1	flake	Chert	broken		marginal			0.15	11.45							
95	28	8	1	flake	Chert	complete					6.29	24.62	13.88	24.88	25.94	9.52	0.99	-27.52	
96	28	8	3	flake	Chert	complete					6.03	24.06	17.46	23.72	20.4	6.88	1.01	-6.99	
97	14	3	3	flake	Chert	broken	distal				0.93	15.18							
98	14	12	4	pot lid	Chert	broken			yes	pot lid	0.13	9.34							
99	14	10	2	flake	Chert	complete			yes	pot lid removal	6.26	18.84	36.43	23.63	12.46	6.81	0.80	64.92	
100	14	6	3	flake	Chert	complete					0.71	13.35	7.55	10.31	10.32	3.39	1.29	-11.85	
101	14	6	1	flake	Chert	complete					1.06	11.86	13.6	18.5	22.97	3.78	0.64	-43.11	
102	14	8	2	flake	Chalcedony	complete					0.72	13.42	8.16	12.57	18.06	3.33	1.07	-40.49	
103	14	8	2	flake	Chert	broken	distal				0.4	16.46							
104	14	8	2	flake	Chert	broken	proximal				1.03	23.55							
105	14	8	2	flake	Chert	broken	proximal				1.49	22.75							
106	14	8	2	flake	Chalcedony	broken	distal				1.07	16.7							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
107	14	8	2	flake	Chert	complete					0.29	13.34	4.81	10.28	9.36	1.78	1.30	-19.36	
108	14	8	2	flaked piece	Chert	broken					0.09	8.86							
109	14	8	6	heat fragment	Chert	broken			yes	shatter	0.2	12.85							
110	14	8	6	heat fragment	Chert	broken			yes	shatter	0.2	10.48							
111	14	9	3	redirecting flake	Chert	broken		right			9.2	32.75							
112	14	9	3	flake	Chert	complete					7.78	35.24	13.45	23.85	19.16	6.75	1.48	-9.26	
113	14	9	3	flaked piece	Chert	broken					0.19	10.67							
114	14	11	2	flake	Chert	complete					2.38	21.47	18.6	16.35	5.18	5	1.31	34.71	
115	21	8	11	asymmetric backed	Chert	complete					0.41	16.87	0	7.92	0	3.71	2.13		
116	43	20	6	flaked piece	Chert	broken					0.1	10.94							
117	43	31	2	flake	Chert	complete				pot lid removal	6.02	24.5	20.75	23.94	22.07	7.73	1.02	-3.09	
118	43	30	1	burin spall	Chert	broken	distal				2.8	36.21							
119	43	30	1	flake	Volcanic?	complete					3.55	25.49	8.24	22.08	11.38	6.68	1.15	-7.05	
120	43	30	1	flake	Chert	broken		marginal			0.2	12.51							
121	43	30	1	flake	Chert	complete					0.78	11.84	10.01	12.54	5.98	2.91	0.94	19.32	
122	43	30	1	flaked piece	Chert	broken			yes	surface	0.62	18.9							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
123	43	30	1	flaked piece	Chert	broken					0.2	11.83							
124	43	30	1	flaked piece	Chert	broken					0.15	10.94							
125	43	30	2	flake	Chert	complete					1.8	16.37	10.52	12.8	14.53	7.36	1.28	-13.97	
126	18	1	4	flake	Chert	broken		right			1.21	17.99				3.12			
127	18	3	1	flaked piece	Chert	broken					0.54	17.54							
128	15	3	3	flake	Chert	broken	proximal				3.75	30.96							
129	15	1	4	flaked piece	Chert	broken					0.37	10.57							
130	15	5	2	flake	Chalcedony	complete					1.26	21.18	21.47	17.21	11.25	2.49	1.23	27.13	
131	15	5	1	flake	Chert	broken	medial				0.18	13.06							
132	13	22	1	flake	Chert	complete					1.22	14.48	13.36	11.59	6.46	5.55	1.25	26.80	
133	13	13	7	flake	Chert	complete					1.31	8.25	6.95	8.83	6.83	7.62	0.93	0.83	1
134	24	6	4	flake (split cobble)	Quartzite	complete					790	131.33	120.81	140.15	88.96	22.94	0.94	13.83	
135	24	6	4	multiplatform core	Mudstone	complete					620	119.22		90.55		45.92	1.32		
136	24	3	6	flake	Mudstone	complete					11.1	47.31	25.79	20.49	0	7.69	2.31	30.49	1
137	24	3	6	flake	Chert	complete					0.07	5.79	8.2	905	7.92	1.15	0.01	2.77	
138	24	3	6	flake	Quartz	complete					0.54	13.56	4.54	15.44	8.05	2.94	0.88	-14.75	

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
139	24	3	6	flake	Chert	broken		marginal			0.11	9.66							
140	24	3	6	flake	Chert	broken		marginal			0.26	13.4							
141	24	3	6	flake	Chert	broken	distal				0.05	8.38							
142	24	3	6	redirecting flake	Chert	broken		marginal			0.18	10.61							
143	24	3	6	flake	Quartz	broken		mesial			0.29	12.9							
144	24	3	6	flake	Quartz	broken	proximal				0.26	10.48							
145	24	3	6	flake	Quartz	broken					0.16	10.98							
146	24	7	3	multiplatform core	Chert	complete					63.9	55.29		38.84		38.42	1.42		
147	24	2	4	flaked piece	Chert	broken					0.65	12.77							
148	27	12	1	retouched flake fragment	Silcrete	broken	proximal				21.26	52.18							
149	27	12	3	flake	Chert	complete					16.95	35.41	20.39	35.72	20.9	10.64	0.99	-0.83	1
150	27	12	3	redirecting flake	Chalcedony	complete					3.67	15.3	7.76	19.11	19.35	7.29	0.80	-41.49	
151	27	12	3	end scraper	Chert	complete					1.8	17.87	13.66	14.09	4.96	6.66	1.27	27.36	
152	27	12	2	flake	Chert	broken	distal		yes	pot lid removal	0.32	12.24							
153	27	12	4	flake	Chert	broken		right			0.66	20.34							
154	27	12	4	flake	Chert	broken		left			0.85	15.93							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
155	27	3	4	flake	Chert	complete					0.58	13.34	80.4	10.75	6.7	2.93	1.24	140.20	
156	27	3	4	flake	Chert	broken		right proximal			0.46	17.19							
157	27	3	4	flaked piece	Chert	broken			yes	pot lid removal	0.75								
158	27	3	4	flaked piece	Chert	broken					3.32	23.67							
159	27	5	3	flaked piece	Quartz	broken					2.36	16.86							
160	29	17	1	flake	Chert	complete					2.05	18.42	10.34	18.77	26.07	5.36	0.98	-46.24	
161	29	16	3	pot lid	Chert	broken			yes	pot lid	0.28	15.87							
162	29	16	3	flaked piece	Chert	broken					0.4	11.83							
163	29	15	1	flake	Silcrete	broken	distal				0.1	10							
164	29	5	1	bipolar flake	Silcrete	broken	proximal				0.63	14.43							
165	29	3	2	notch	Chert	broken		marginal			48.76	60.2							
166	29	3	2	flaked piece	Chert	broken					0.48	13.54							
167	29	3	2	flake	Chert	complete					0.21	8.27	8.44	5.59	0	2.35	1.48	54.07	
168	29	9	2	flake	Chalcedony	broken		left distal			0.64	19.7							
169	29	7	3	flake	Chert	broken	surface		yes	surface	0.41	0.02							
170	29	7	4	flake	Chert	broken		proximal mesial			0.67	0.67	17.78					171.38	

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
171	29	7	4	flake	Chert	broken		right			0.56	17.32							
172	29	7	4	retouched flaked piece	Chert	broken					2.09	20.6							
173	40	16	1	flake	Chert	broken		right	yes	pot lid removal	3.82	24.76							
174	44	4	3	flaked piece	Chert	broken					0.75	15.33							
175	44	4	3	heat fragment	Chert	broken			yes	shatter	0.58	0.58	14.03					170.55	
176	44	4	3	flake	Chert	broken		marginal			1.85	19.04							
177	44	4	3	flaked piece	Chert	broken	surface		yes	surface	0.56	15.6							
178	23	18	1	flaked piece	Quartz	broken					0.2	9.81							
179	23	18	2	redirecting flake	Chert	broken	distal		yes	pot lid removal	4.54	26.53							
180	23	18	2	flake	Chert	complete					1.48	21.37	13.34	13.31	11.26	6.68	1.61	5.57	
181	23	18	1	flake	Volcanic?	broken					0.49	20.22							
182	23	18	1	flaked piece	Volcanic?	broken					2.34	27.48							
183	23	18	1	flaked piece	Volcanic?	broken					0.68	23.65							
184	23	18	1	flaked piece	Volcanic?	broken					0.27	10.85							
185	23	18	1	flaked piece	Quartz	broken					0.35	11.76							
186	23	18	1	flaked piece	Quartz	broken					0.19	10.2							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
187	23	18	1	flake	Quartz	complete					0.22	11.21	7.93	8.66	2.19	1.36	1.29	28.72	
188	23	18	1	flake	Quartz	complete					0.19	7.2	4.94	10.82	8.84	2.29	0.67	-30.31	
189	23	17	1	flake	Chert	broken		marginal			1.59	26.61							
190	23	16	3	flake	Chert	complete					0.76	12.65	7.12	9.78	14.23	4.09	1.29	-31.39	
191	12	3	1	flake	Chert	complete					0.36	18.81	5.13	6.4	4.73	2.85	2.94	1.22	1
192	12	50	6	heat fragment	Chert	broken	surface		yes	surface	0.33	13.3							
193	12	50	3	flake	Chert	complete					0.32	7.38	8.86	10.27	11.07	3.26	0.72	-17.03	
194	12	50	4	flake	Chert	broken	distal				1.9	24.79							
195	12	48	4	flaked piece	Chert	broken					1.29	22.52							
196	12	47	3	flake	Chert	complete					0.58	19.87	8.05	6.82	6.9	3.07	2.91	3.32	1
197	12	47	2	retouched flake	Chert	broken					11.13	33.53							
198	12	47	2	flake	Chert	broken	proximal				0.76	18.9							
199	12	47	2	heat fragment	Chert	broken			yes	shatter	0.6	15.35							
200	12	46	2	flake	Chert	broken		marginal			0.16	12.56							
201	12	44	1	flake	Chert	complete					1.15	16.05	10.93	14.23	14.84	6.77	1.13	-13.89	
202	12	44	1	flake	Chert	complete					0.47	8.57	6.2	8.46	8.05	5.25	1.01	-12.32	

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
203	12	44	3	flake	Chert	broken		left			0.47	9.65							
204	12	44	2	flake	Chert	complete					0.42	15.19	5.07	7.85	3.04	3.8	1.94	7.65	
205	12	44	2	flake	Chert	complete					0.03	7.98	1.78	4.2	2.86	0.67	1.90	-7.74	
206	12	24	3	flake	Chert	complete					0.13	6.91	7.23	7.17	4.71	1.58	0.96	20.67	
207	12	24	3	pot lid	Chert	broken					0.23	9.53							
208	12	10	1	flake	Quartz	complete					0.76	17.71	4.83	1009	9.09	3.32	0.02	-13.72	
209	12	27	4	flaked piece	Chert	broken					0.56	11.76							
210	12	25	5	flake	Chert	broken	medial				0.5	12.69							
211	12	41	1	flake	Chert	complete					4.77	21.67	9.42	20.81	22.03	9.71	1.04	-32.45	
212	12	41	1	flake	Quartz	broken		left proximal			0.9	15.81							
213	12	40	1	flake	Chert	complete					0.45	12.73	10.2	16.67	12.88	2.69	0.76	-12.02	
214	12	40	1	flake	Volcanic?	complete					3.89	17.71	14.37	18.54	16.82	7.19	0.96	-7.91	1
215	12	40	1	flaked piece	Volcanic?	broken					1.64	23.76							
216	12	40	1	flake	Chert	complete			yes	pot lid removal	1.49	13.04	10.89	12.68	15.44	7.72	1.03	-19.79	1
217	12	40	1	flake	Chert	broken	surface		yes	surface	0.21	14.07							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
218	12	40	1	flaked piece	Chert	broken					0.81	16.88							
219	12	40	1	flaked piece	Chert	broken					1.29	19.46							
220	12	40	1	flake	Chert	complete					0.19	4.84	8.27	6.4	5.21	3.43	0.76	35.09	
221	12	40	1	flake	Chert	broken	proximal				0.28	14.98							
222	12	40	1	pot lid	Chert	broken			yes	pot lid	0.04	6.1							
223	12	39	3	ventral side scraper	Chert	complete					19.9	28.05	22.19	38.19	20.81	12.66	0.73	2.82	
224	12	39	3	core fragment	Chert	broken			yes	pot lid removal	10.74	26.45							
225	12	39	2	flake	Chert	complete					0.08	6.65	5.35	5.88	5.58	1.27	1.13	-1.98	
226	12	39	2	heat fragment	Chert	broken			yes	shatter	0.83	13.86							
227	12	42	4	flake	Chert	broken	distal				0.14	11.46							
228	12	42	3	flake	Chert	complete					0.72	12.57	9.6	12.19	5.28	0.07	1.03	19.50	
229	12	42	1	pot lid	Chert	broken	surface		yes	surface	0.08	7.39							
230	12	42	1	flaked piece	Chert	broken	surface		yes	surface	0.84	16.67							
231	12	42	2	flaked piece	Chert	?					3.06	31.2							
232	12	42	2	flaked piece	Quartz	?					0.17	7.86							
233	12	42	2	flake	Silcrete	complete					0.21	13.52	3.75	5.62	3.05	2.09	2.41	2.97	1
234	12	42	2	flaked piece	Chert	broken					0.1	7.86							

Record Number	PASA	Pit	Spit	Type	Raw Material	Broken?	Transverse break	.ongitudinal Break	Heat Related Damage?	Type of heat break	Weight	Length	Proximal Width	Medial Width	Distal Width	Thickness	Elongation	Marginal Angle	No. Dorsal Ridges
235	12	36	4	notched double side and end scraper	Chalcedony	complete					12.62	26.59	15.95	22.09	17.96	13.86	1.20	-4.33	
236	12	36	5	bipolar flake?	Quartz	complete					4.34	19.85	8.28	14.61	19.7	9.19	1.36	-32.10	

Appendix G

Lithic terminology

Lithic terminology

Type **-** Classification of artefacts was based on technical criteria. The following classes have been identified in the assemblage:

Core: Cores are a piece of rock from which flakes have been detached. Cores are characterised by negative flake scars where flakes have been detached.

Edge-ground axe: implement shaped on at least one margin by grinding against another surface. Such implements are often shaped by flaking, pecking, flaking and pecking or grinding and/or burnishing around much of their exterior.

Flake: A sharp edged piece of stone detached from a core by the application of force. Flakes are characterised by a number of features which may include a platform, bulb of percussion, a bulbar scar, ripple marks and fissures on the ventral surface and negative flake scars on the dorsal surface.

Flaked piece: A flaked piece is an artefact that exhibits features such as negative flake scars but does not have any other features that would allow differentiation between a flake, a retouched flake or core.

Retouched flake: An artefact which has had flakes removed subsequent to its original manufacture.

Backed artefact: A retouched flake possessing one or more margins, which have been retouched on a steep angle; that margin is situated opposite to the unretouched sharp edge.

Anvil: A piece of stone, usually a pebble or cobble, which possesses pitting or furrowing indicative of hard hammer impacts.

Hammer: An artefact, usually a pebble or cobble, identified by characteristic pitting and negative scars indicative of percussive force on one or more ends

Manuport: An unmodified piece of rock situated away from its original context; assumed to have been humanly transported by an Aboriginal person.

Raw material - The raw material of each artefact is categorized according to the following:

Colour – The purpose of recording the colour of raw material is to assist during analysis in identifying source material (if possible), related objects within an episode or episodes of stone reduction and to infer heat treatment.

Raw material – The following raw materials were identified to be present in the assemblage:

Silcrete: This rock is formed by the impregnation of a sedimentary layer with silica; it consists of quartz grains in a matrix of either amorphous or fine-grained silica. The flaking qualities of silcrete are dependent of the size of the quartz grains.

Chert: A cryptocrystalline siliceous rock of organic or inorganic origin. Chert is isotropic and brittle. It is accordingly a highly favoured rock for artefact manufacture.

Quartz: The mineral quartz is crystalline silica with a hardness value of 7 (Mohs' hardness scale). Given this property quartz flakes possess highly durable sharp edges. However, given quartz possesses internal flaws and cleavage planes it typically flakes in an unpredictable manner.

Quartzite: Quartzite is formed by the cementing together of siliceous grains through pressure or chemical processes.

Hornfels: Altered volcanic rock characterised by inclusions in a fine grained groundmass

Quality – Raw material has been classified in terms of its quality based on size of mineral grains and homogeneity (in regard to quartz quality refers to the presence or absence of internal flaws and the general homogeneity of the stone) as follows:

High; Medium; and Low.

Initiation type – The type of primary fracture initiation including the following:

Conchoidal: (Hertzian fracture) Formed when stone is struck by a hammer forming a ring crack; the ring crack forms a cone that bends backward towards the surface of the core.

Bending: Formed when the angle between the platform and surface of the core is acute. Flakes do not possess clear ring cracks or well defined bulbs of percussion.

Bipolar: A bipolar flake is formed as a result of compression forces. Bipolar flakes often show signs of impact on opposing ends and have compression rings moving in two directions towards each other.

Initiation surface = platform

Single: Single flake scar.

Multiple scars: With three or more scars.

Cortical: Retaining evidence of cortex.

Shattered: Damaged: platform attributes cannot be identified.

Facetted: Three or more flake scars in uniform arrangement.

Focused: Struck from close to the edge of the platform.

Bipolar: Flake or core with evidence of fracture initiation on both ends.

Termination type

Feather: Exhibits minimal thickness at the distal end and acute angle between ventral and dorsal surface.

Hinge: Forms when the fracture meets the surface of the core at c. 90º to the longitudinal axis of the flake.

Step: Forms when flake terminates abruptly in a right angle break.

Outré passé (plunge): Forms when the fracture plane curves away from the face of the core removing the base of the core.

Percentage of cortex – An estimate of the percentage of cortex present on an artefact. On flakes the estimate refers to the dorsal surface only; recorded as dorsal cortex present in 25 per cent increments.

Cortex type – The type of cortex (weather worn surface) on an artefact is listed. The following cortex types were identified in the assemblage:

Pebble: A water worn surface indicative of an alluvial origin. It is noted here that the majority of water worn cortex was observed to be minimally worn.

Terrestrial: A weathered surface indicative of terrestrial origin.

***Breakage*:** Where artefacts were broken the portion of the artefact was classified using the following categories.

Flake distal: A broken flake: the distal end, exhibiting the termination.

Flake medial: A broken flake: the mid section, exhibiting dorsal scars and/or ventral surface features.

Flake proximal: A broken flake: the proximal end exhibiting the platform and initiation.

Longitudinal cone split: A broken flake: broken longitudinally; typically occurs during flaking event. Separate categories for left and right LCS portions were used to facilitate artefact number estimates.

Margin Missing: A broken flake where width cannot be measured due to missing marginal sections.

Platform shattered: A broken flake where percussion length cannot be measured due to shattered platform.

***Core attributes - including*:**

Type of core: Refers to number of platform and/or initiation type.

Number of scars: Expressed numerically.

Length of longest complete scars: Measured in mm.

Comments - Comments are made in regard to the following:

The presence or absence of use-wear is noted.

Nature of breaks (along faults, orientation).

Damage and its antiquity or otherwise.

Specific descriptions of various attributes and features.

Associations between artefacts.

Appendix H

Aboriginal stakeholder responses

Jerrinja Local Aboriginal Land Council
PO Box 167
Culburra Beach NSW 2540
Phone: (02) 44 474207
Fax: (02) 44 474230

18th November 2011

To Ron de Rooy
Project Manager
RTA
Berry bypass

Dear Ron,

Jerrinja LALC would like to comment on the Draft Cultural Heritage Assessment Report for Foxground and Berry Bypass.

It is a fact that RTA is the biggest destroyer of Aboriginal artifacts in NSW. This is because the method of locating of artifacts is basically flawed.

Archeologists are engaged to dig test pits at likely locations and then analyze the results.

Jerrinja LALC feel there is inadequate participation of Aboriginal sites officers in the preliminary site excavations by RTA on new road construction.

Jerrinja LALC propose that, during the removal of the first 500mm- 1000mm of topsoil on new road construction, Aboriginal sites officers be present at all times to inspect for artifacts.

This improved practice would uncover more artifacts, limit the damage to artifacts and give the people of Australia, a clearer picture of pre-European settlement.

It is important for RTA to understand that in modern times, consultation with Aboriginal communities should not be seen as merely paying "lip service" to this process, but actually implementing the recommendations offered.

This would help demonstrate NSW government's true commitment to reconciliation with Aboriginal people.

Yours sincerely

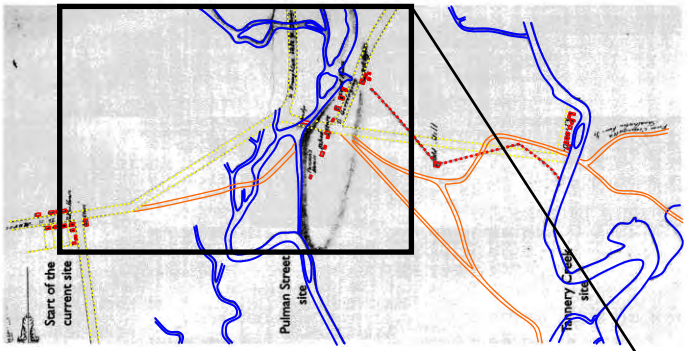
Andrew Harvey
CEO

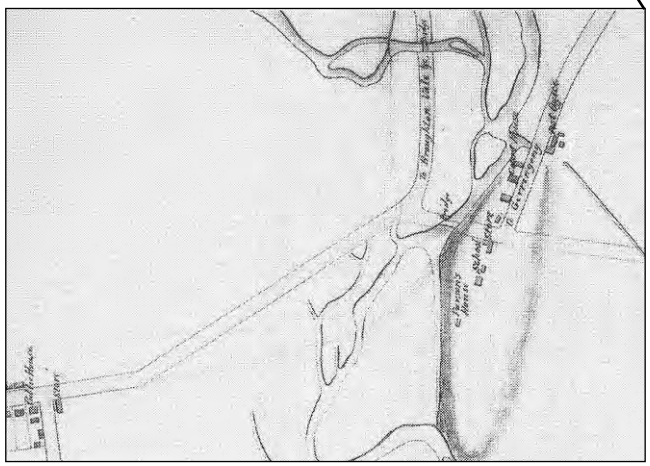
Appendix I

Analysis of previous road construction disturbance zones in area of proposed roundabout at the intersection of Woodhill Mountain Road and the current Princes Highway

Tracings of disturbance from source material overlaid onto Google Pro (2006) aerial image

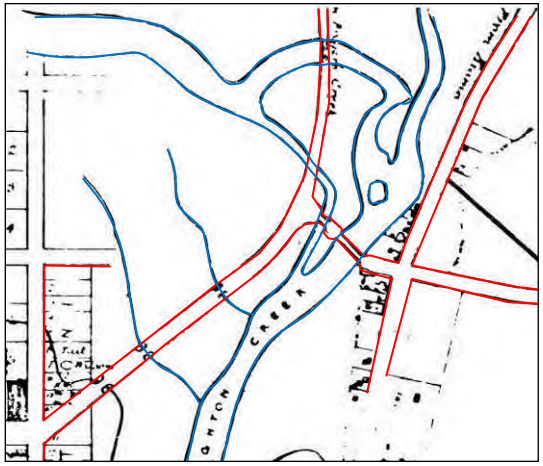
Early map of Broughton Creek Village area, probably 1870s (Berry Museum n.d.: 15)





Base image from Google Earth Pro 2012 (image date 1/30/2006)

Sketch plan of Broughton Township 1883
(Lidbetter 1993:18)



Base image from Google Earth Pro 2012 (image date 1/30/2006)

1949 aerial photograph

SVY662/NOWRA Run 2, 5164 (I55-166) 4 Apl 1949

Base image from Google Earth Pro 2012 (image date 1/30/2006)

1958 aerial photograph

NSW 699-5036 SH.I DAPTO – ULLADULLA Run GKII 23/7/1958

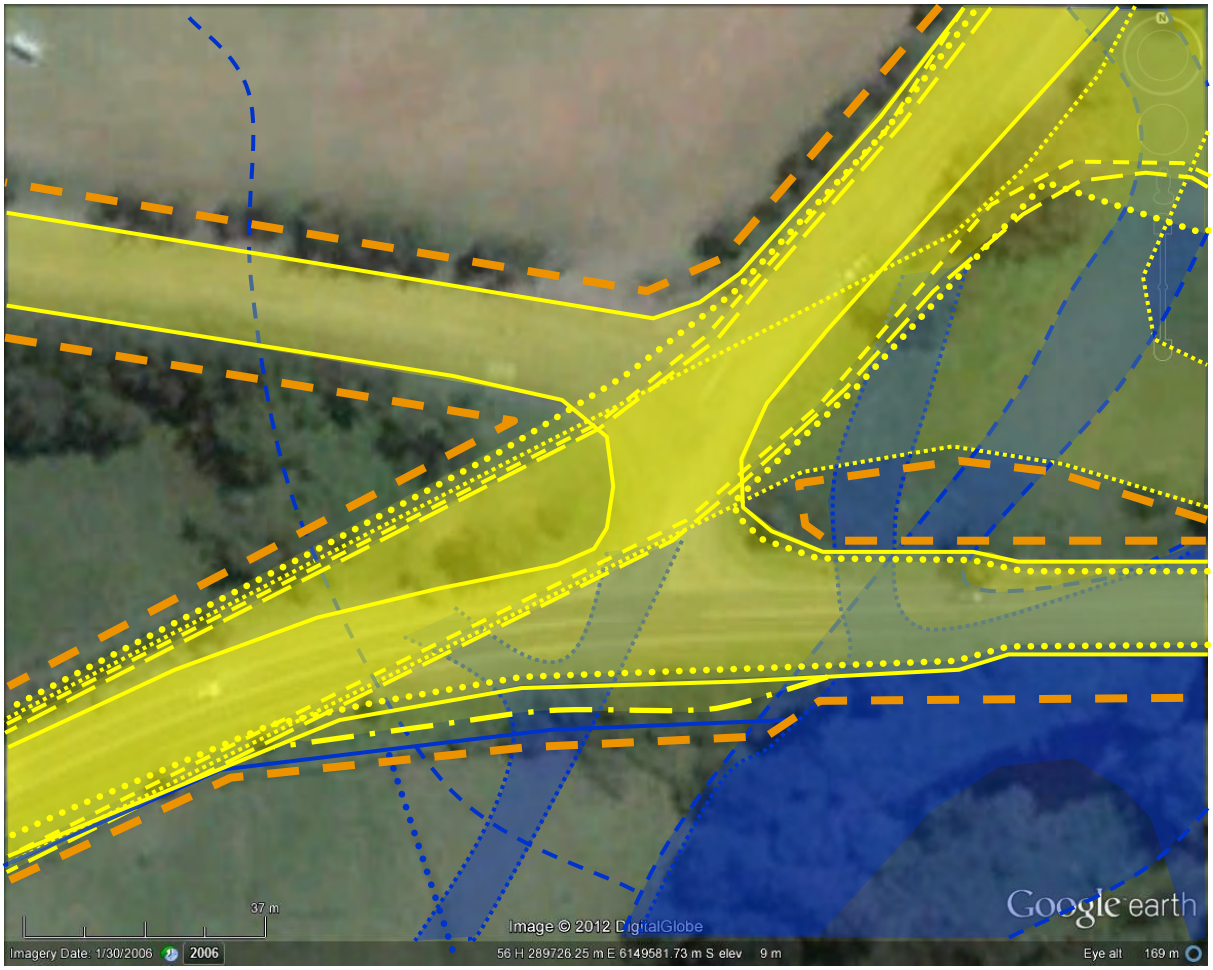
Base image from Google Earth Pro 2012 (image date 1/30/2006)

1986 aerial photography

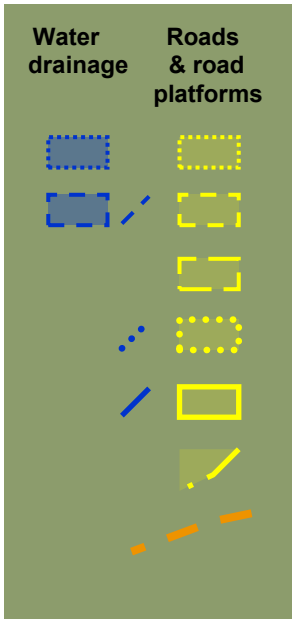
NSW 2652-138 SHI – SUTHERLAND TO NOWRA
Run XD15 7/3/1986

Base image from Google Earth Pro 2012 (image date 1/30/2006)

Detail of proposed roundabout area showing composite of past disturbance and drainage features (as interpreted from source material)



Base image from Google Earth Pro 2012 (image date 1/30/2006)



1870s (approx. boundaries)

1883 (approx. boundaries)

1949

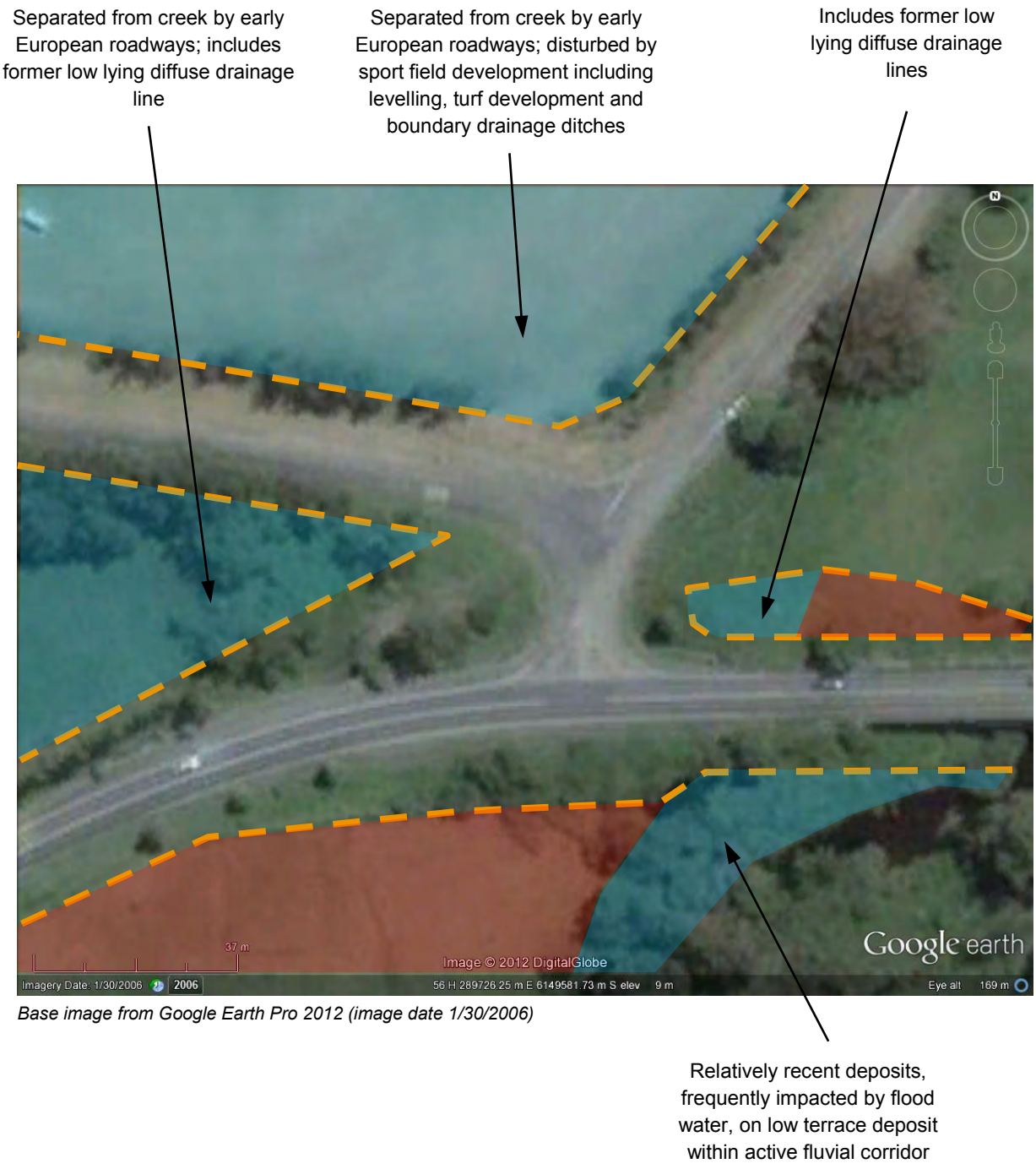
1958

1986

2010 (extension to road platform for construction of footpath)

Net boundary of previous disturbance (including road easements)

Archaeological sensitivity of surrounding areas outside of net disturbance boundary



Base image from Google Earth Pro 2012 (image date 1/30/2006)

Draft roundabout design relative to existing disturbance zones and adjacent historical Aboriginal archaeological sensitivity

Note placement of whole roundabout footprint within existing disturbance zone and no construction south of the existing footpath on southern edge of proposed works.

Base image and draft roundabout design provided by AECOM 13/8/2012)

Low potential for archaeological remains

Greater potential for archaeological remains

Net boundary of previous disturbance (including road easements)

Appendix J

Information from Keith Campbell relating to the *Boongaree* Aboriginal Encampment

Attn. N. Officer.
fax 62829416

SUBMISSION RE ROUTE OPTIONS, GERRINGONG TO BERRY PRINCE'S HIGHWAY UPGRADE

1. I wish to draw attention to the fact that a traditional Aboriginal camp site was located near Berry which I believe should be avoided by the proposed upgrade. The northern part of the camp site is close to or in the path of two of the existing proposed routes (the orange route and the brown route). I understand that another route, to the east and south of the township, is being proposed by Shoalhaven City Council. Such an option, depending on its exact route, might also run across land occupied by the camp.

2. The Aboriginal name of the camp was Boon-ga-ree. It was the birthplace of two well-known Aboriginal brothers of the early 19th century, Boger and Toodwick. Toodwick exchanged names with William Broughton, the Assistant Commissary General. As a result, he became universally known as Broughton. Broughton Creek and several other geographical features were named after him. The township of Berry was also named after him – it was known as Broughton Creek until the 1880s. Broger's Creek is named after his brother Broger.

3. The Aboriginal camp of Boon-ga-ree was apparently occupied permanently or at least semi-permanently in the first decade of European occupation of the area (in the 1820s). It was therefore almost certainly occupied permanently or semi-permanently in pre-colonial days. Broger was especially noted for being attached to Boon-ga-ree. He was widely known for calling the spot 'his place'.

4. The site was located on a clear area at the junction of Broughton Creek and Broughton Mill Creek. The area was not on the eastern and western banks of these creeks, but on the point between the two, and running north to where Pulman Street is today. The cleared area was surrounded by dense brush or rainforest.

5. I am unaware whether any archaeological work has been carried out at the site, but I believe it should be thoroughly examined before any major disturbance occurred there. I therefore would object to any change in plans to re-route the highway through this area at this stage.

6. Sources

   a) For reference to Boon-ga-ree as Broughton's birthplace, see letter of 8 April 1822, from Charles Throsby to Alexander Berry, in Berry Papers, (Mitchell Library), vol 46, p81.
   b) For reference to Broughton's birthplace extending from the junction of the creeks to the ridge (along which Pulman Street runs today) see "Recollections of the Aborigines" pp569-570, by Alexander Berry.
   c) For reference to Broger's claim that Boon-ga-ree was "his own place", see Criminal Investigations, T 146, at State Records.
   d) For references to thick brush surrounding the cleared area, see RF Pleaden, 'Coastal Explorers', p25 (note by Meehan on his map).

Keith Campbell

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1/89 Albert St
Nowra

Appendix K

Archaeological survey coverage mapping and visibility variables

K.1 Table of survey coverage data

Survey Unit	Landform	Survey unit area (ha)	Proportion of unit surveyed (%)	Area of unit surveyed (ha)	Average Incidence of exposure %	Average visibility within Exposures %	Effective coverage area (ha) survey unit area x proportion surveyed % x inc. exp. % x exp. vis.%)	Effective Coverage % (effective coverage area / survey unit area x 100)
1	CU	3.0	80	2.4000	2.0	50	0.0240	0.8
2	MS	2.2	60	1.3200	5.0	65	0.0429	1.9
3	MS	0.7	55	0.3850	2.0	65	0.0050	0.7
4	BS	0.8	40	0.3200	10.0	60	0.0192	2.4
5	VF	4.0	20	0.8000	5.0	75	0.0300	0.7
6	CU	4.1	85	3.4850	5.0	70	0.1220	3.0
7	CU/RLC	2.5	30	0.7500	5.0	60	0.0225	0.9
8	MS	5.4	60	3.2400	8.0	30	0.0777	1.4
9	MS	2.0	0	0.0000			0.0000	0.0
10	MS	2.2	20	0.4400	5.0	45	0.0099	0.4
11	MS	2.7	10	0.2700	2.0	70	0.0073	0.3
12	CU	5.3	30	1.5900	1.0	30	0.0048	0.1
13	MS/RC	0.6	20	0.1200	15.0	75	0.0135	2.2
14	BS	3.4	60	2.0400	2.0	40	0.0163	0.5
15	VF/RC	4.4	30	1.3200	10.0	50	0.0660	1.5
16	VF/RC	12.4	30	3.7200	10.0	30	0.1116	0.9
17	CU/RC	0.4	80	0.3200	2.0	50	0.0032	0.8
18	CU	0.6	80	0.4800	2.0	30	0.0014	0.2
19	BS	3.6	50	1.8000	8.0	45	0.0648	1.8
20	VF	4.3	10	0.4300	15.0	65	0.0419	1.0
21	VF/RC	7.6	10	0.7600	5.0	45	0.0171	0.2
22	VF/RC	1.0	70	0.7000	2.0	45	0.0063	0.6
23	VF	0.3	80	0.2400	2.0	30	0.0014	0.5
24	VF/RC	8.5	65	5.5250	15.0	75	0.6216	7.3

Survey Unit	Landform	Survey unit area (ha)	Proportion of unit surveyed (%)	Area of unit surveyed (ha)	Average Incidence of exposure %	Average visibility within Exposures %	Effective coverage area (ha) survey unit area x proportion surveyed % x inc. exp. % x exp. vis.%)	Effective Coverage % (effective coverage area / survey unit area x 100)
25	CU	1.0	20	0.2000	5.0	45	0.0045	0.4
26	BS	3.2	10	0.3200	5.0	30	0.0048	0.1
27	MS	3.2	20	0.6400	5.0	30	0.0096	0.3
28	CU	3.6	65	2.3400	5.0	50	0.0585	1.6
29	MS	6.5	30	1.9500	10.0	50	0.0975	1.5
30	CU	0.2	20	0.0400	5.0	85	0.0017	0.8
31	MS	1.3	30	0.3900	8.0	60	0.0187	1.4
32	CU	0.2	25	0.0500	8.0	50	0.0020	1.0
33	MS	1.4	10	0.1400	5.0	50	0.0035	0.2
34	CU	1.5	10	0.1500	2.0	25	0.0007	0.05
35	BS	1.0	20	0.2000	2.0	25	0.0010	0.1
36	VF	2.3	45	1.0350	2.0	25	0.0052	0.2
37	BS	0.1	75	0.0750	5.0	45	0.0017	1.7
38	CU	0.5	85	0.4250	15.0	30	0.0191	3.8
39	MS	0.3	80	0.2400	8.0	30	0.0058	1.9
40	CU	1.3	60	0.7800	20.0	60	0.0936	7.2
41	MS	2.0	20	0.4000	5.0	45	0.0090	0.4
42	CU	1.0	45	0.4500	10	25	0.0112	1.1
43	MS	0.7	80	0.5600	5.0	20	0.0056	0.8
44	BS	0.9	60	0.5400	10.0	50	0.0270	3.0
45	MS	3.2	70	2.2400	10.0	45	0.1008	3.1
46	CU	0.2	60	0.1200	2.0	35	0.0008	0.4
47	CU/RLC	9.0	60	5.4000	10.0	65	0.3510	3.9
48	MS	0.4	60	0.2400	2.0	45	0.0022	0.5
49	MS	4.4	5	0.2200	2.0	45	0.0020	0.05

Survey Unit	Landform	Survey unit area (ha)	Proportion of unit surveyed (%)	Area of unit surveyed (ha)	Average Incidence of exposure %	Average visibility within Exposures %	Effective coverage area (ha) survey unit area x proportion surveyed % x inc. exp. % x exp. vis.%)	Effective Coverage % (effective coverage area / survey unit area x 100)
50	CU/RLC	4.7	80	3.7600	15.0	35	0.1974	4.2
51	MS	0.2	75	0.1500	5.0	65	0.0049	2.4
52	MS	0.5	50	0.2500	25.0	75	0.0469	9.4
53	BS	1.6	60	0.9600	15.0	60	0.0864	5.4
54	VF	1.2	30	0.3600	65.0	80	0.1872	15.6
55	VF/RC	8.8	50	4.4000	20.0	65	0.5720	6.5
56	MS/RC	0.9	70	0.6300	5.0	35	0.0110	1.2
57	VF	5.4	20	1.0800	35.0	75	0.2835	5.2
58	VF/RC	18.8	35	6.5800	15.0	65	0.6415	3.4
59	VF/RC	2.0	0	0.0000			0.0000	0.0
60	VF	2.7	15	0.4050	95	90	0.3463	12.8
61	VF	3.0	10	0.3000	2.0	15	0.0009	0.03
62	VF	1.9	10	0.1900	10.0	45	0.0085	0.4
63	VF	0.6	0	0.0000			0.0000	0.0
64	VF	0.1	60	0.0600	10.0	50	0.0030	3.0
65	VF	0.6	0	0.0000			0.0000	0.0
66	VF	0.8	60	0.4800	10.0	65	0.0312	3.9
67	VF/RC	1.6	35	0.5600	2.0	35	0.0039	0.2
68	BS/RC	0.5	20	0.1000	2.0	15	0.0003	0.1
69	MS	0.2	20	0.0400	2.0	15	0.0001	0.1
70	CU	0.8	25	0.2000	10.0	45	0.0090	1.1
71	MS	1.7	35	0.5950	10.0	40	0.0238	1.4
72	BS	1.7	55	0.9350	10.0	55	0.0514	3.0
73	VF	0.4	70	0.2800	15.0	45	0.0189	4.7
74	VF/RC	1.5	40	0.6000	3.0	30	0.0054	0.4

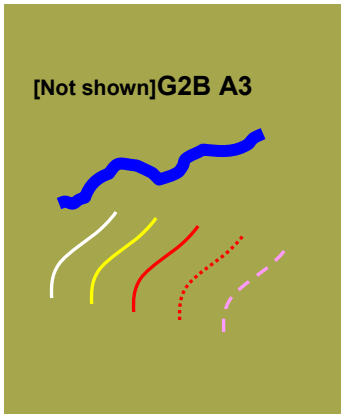
Survey Unit	Landform	Survey unit area (ha)	Proportion of unit surveyed (%)	Area of unit surveyed (ha)	Average Incidence of exposure %	Average visibility within Exposures %	Effective coverage area (ha) survey unit area x proportion surveyed % x inc. exp. % x exp. vis.%)	Effective Coverage % (effective coverage area / survey unit area x 100)
75	BS/RC	0.5	25	0.1250	5.0	30	0.0019	0.4
76	MS	0.2	10	0.0200	5.0	50	0.0005	0.2
77	CU	0.3	10	0.0300	5.0	50	0.0007	0.2
78	MS	0.4	5	0.0200	5.0	30	0.0003	0.1
79	BS/RC	0.3	0	0.0000			0.0000	0.0
80	VF/RC	0.9	5	0.0450	2.0	15	0.0001	0.01
81	VF	0.1	0	0.0000			0.0000	0.0
82	BS	0.4	20	0.0800	2.0	15	0.0002	0.1
83	MS	0.8	85	0.6800	15.0	45	0.0459	5.7
84	CU	0.6	10	0.0600	5.0	45	0.0013	0.2
85	MS	0.4	10	0.0400	5.0	30	0.0006	0.1
86	BS	0.1	10	0.0100	5.0	30	0.0001	0.1
		198.6 ha (100%)		***75.625 ha (38.1%)***			***4.753 ha (2.4%)***	***2.4***

K.2 Summary table of and sampled areas

Landform (not all categories are mutually exclusive)	**Landform area (ha)**	**Area of unit surveyed (ha)**	**Area effectively surveyed (ha)** **(effective coverage area)**	**% Landform effectively surveyed** **(area effectively surveyed / landform area x 100)**	**Number of sites**
Basal slopes (BS)	18.1	7.5050	0.2751	1.5	1
Crest and upper slopes (CU)	40.8	23.0300	0.9294	2.3	1
Mid slopes (MS)	44.5	15.2200	0.5450	1.2	1
Valley floor (VF)	95.2	29.8700	3.0035	3.1	
Ridgeline crest (RLC)	16.2	9.91	0.5709	3.5	
Riparian corridor (RC)	70.7	25.505	2.0754	2.9	1

K.3 Location of archaeological surface survey traverses relative to landform boundaries

KEY

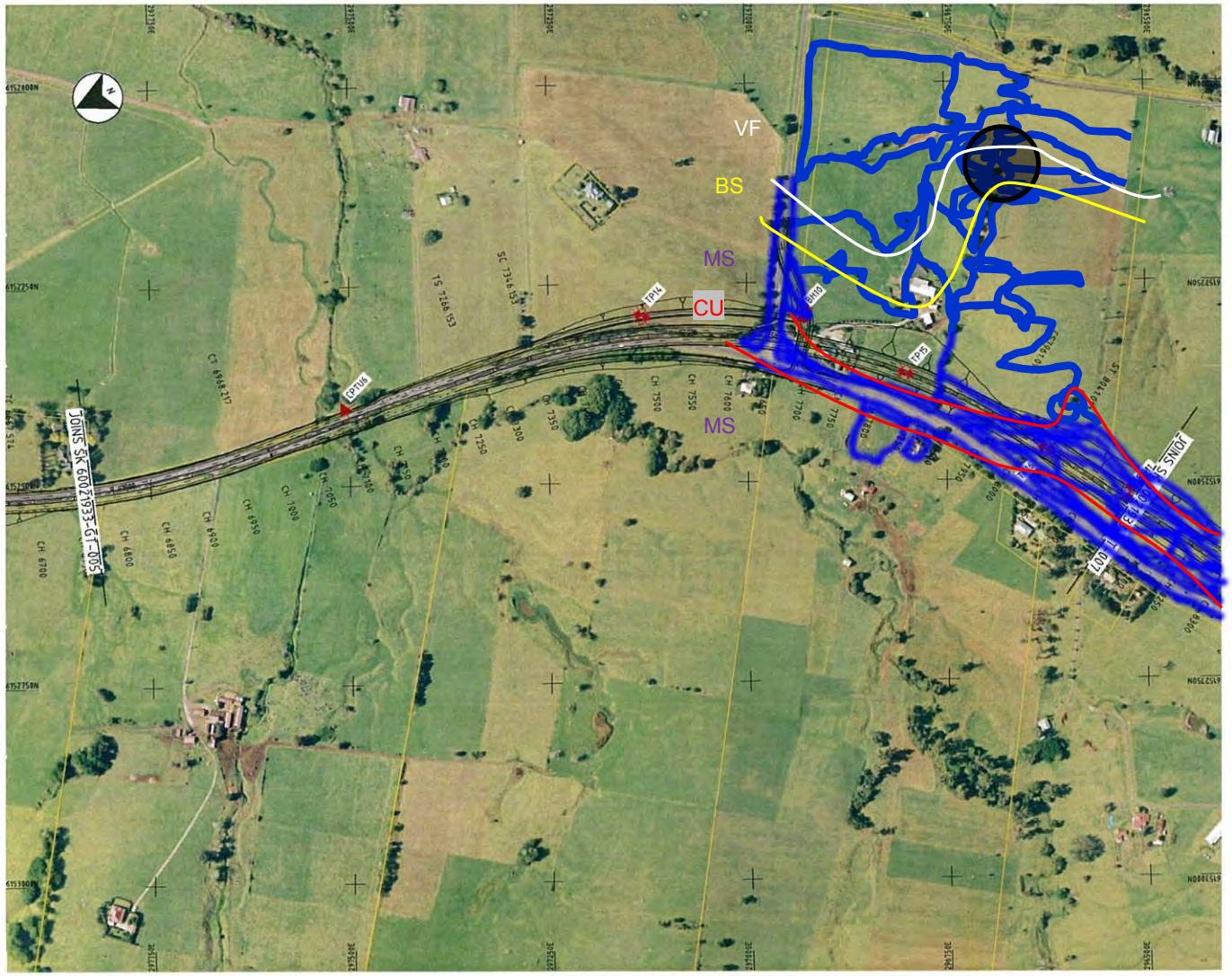


Aboriginal cultural heritage site and site code

Archaeological survey traverse

Landform unit boundaries:
VF – Valley Floor
BS – Basal Slopes
CU – Crest and Upper slopes
MS – Mid Slopes
RC – Riparian Corridor
RLC – Ridge Line Crest

NOTE: The base mapping shown in this Appendix dates from the time of the main survey and does not reflect the current project design. This original mapping is retained in order to illustrate the integrity of and justification for the survey traverses. Note also that the graphic scale (the graduated horizontal bar in the bottom, middle left of the Figures) is incorrect on these maps – the stated interval of 100m on this scale is actually only 50 metres. (Despite this, the marked chainage intervals along the alignment remain correct).



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SHEET 6

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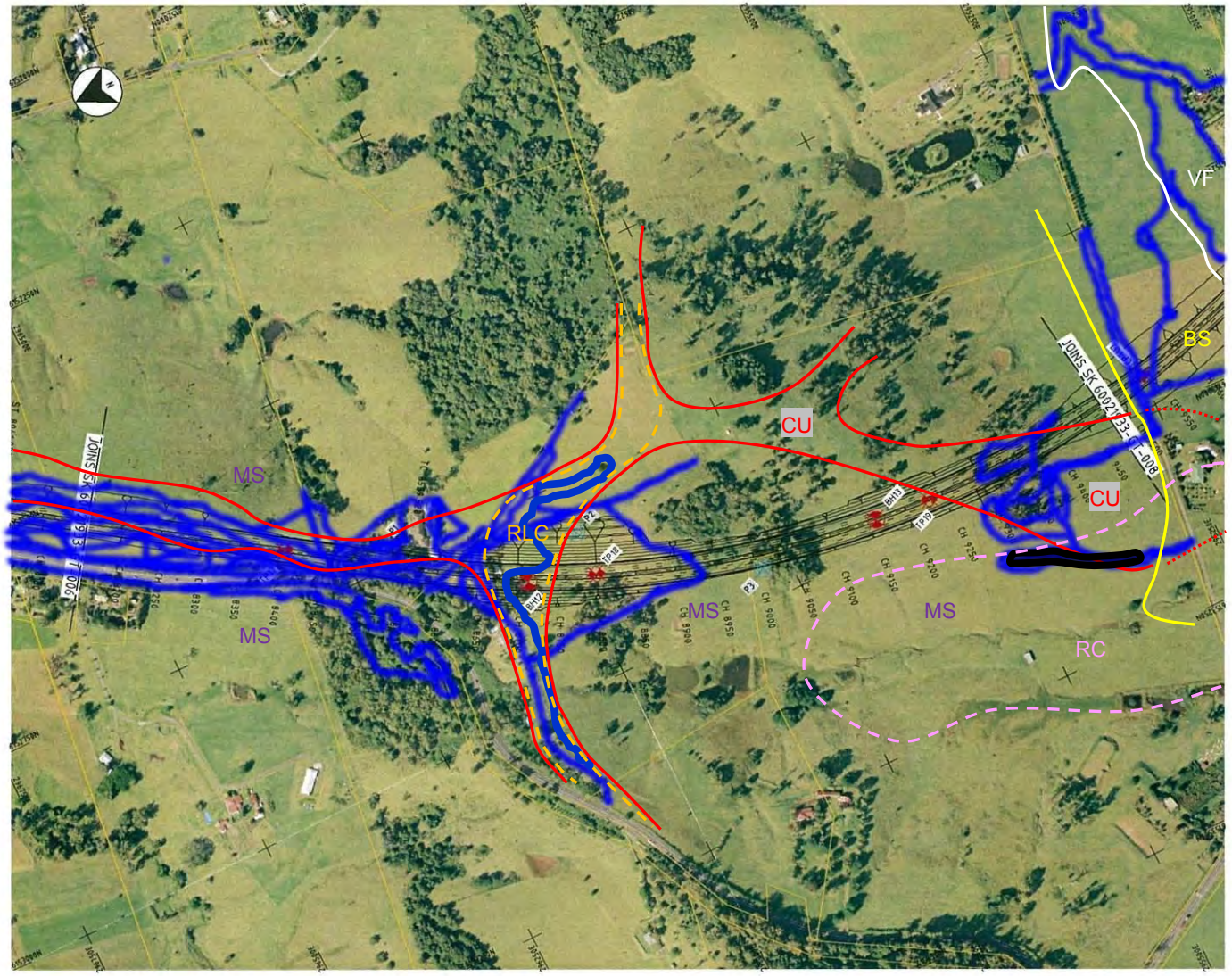


LEGEND

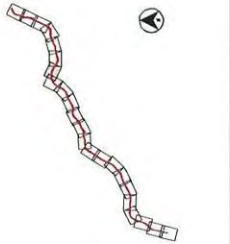
PROPOSED INVESTIGATION

- BOREHOLE (BH)
- TEST PIT (TP)
- CONE PENETRATION TEST WITH PIEZO CONE (CPTU)

PREVIOUS INVESTIGATION

- PREVIOUS BOREHOLE BY COFFEY (CBH)
- PREVIOUS TEST PIT BY COFFEY (CTP)
- PREVIOUS CPT BY COFFEY (CPT)
- PREVIOUS BOREHOLE BY GOLDER (GT)

KEYPLAN



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SHEET 7

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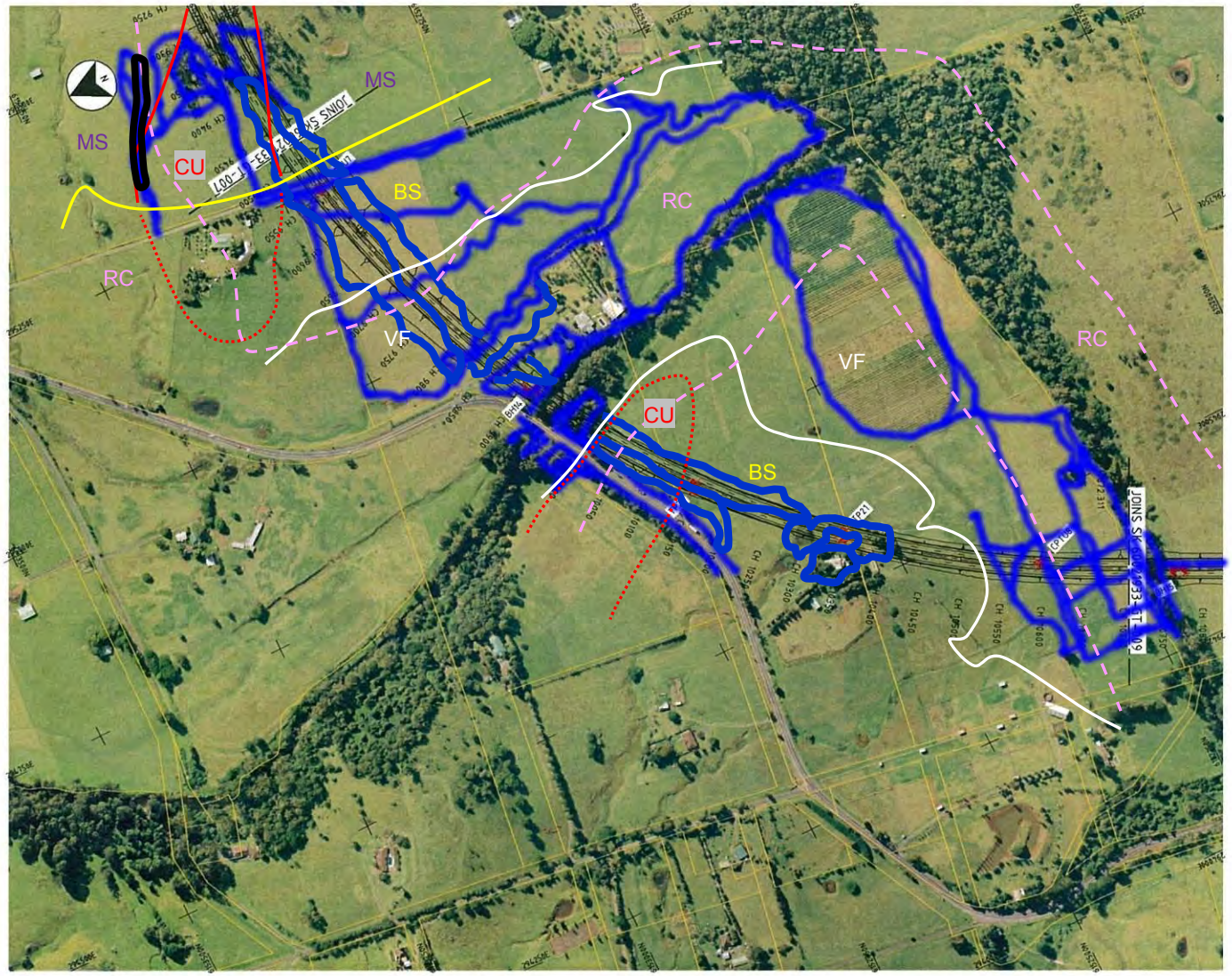


LEGEND

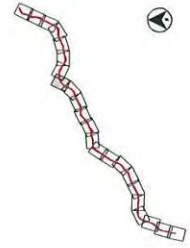
PROPOSED INVESTIGATION

- BOREHOLE (BH)
- TEST PIT (TP)
- CONE PENETRATION TEST WITH PIEZO CONE (CPTU)

PREVIOUS INVESTIGATION

- PREVIOUS BOREHOLE BY COFFEY (CBH)
- PREVIOUS TEST PIT BY COFFEY (CTP)
- PREVIOUS CPT BY COFFEY (CPT)
- PREVIOUS BOREHOLE BY GOLDER (GT)

KEYPLAN



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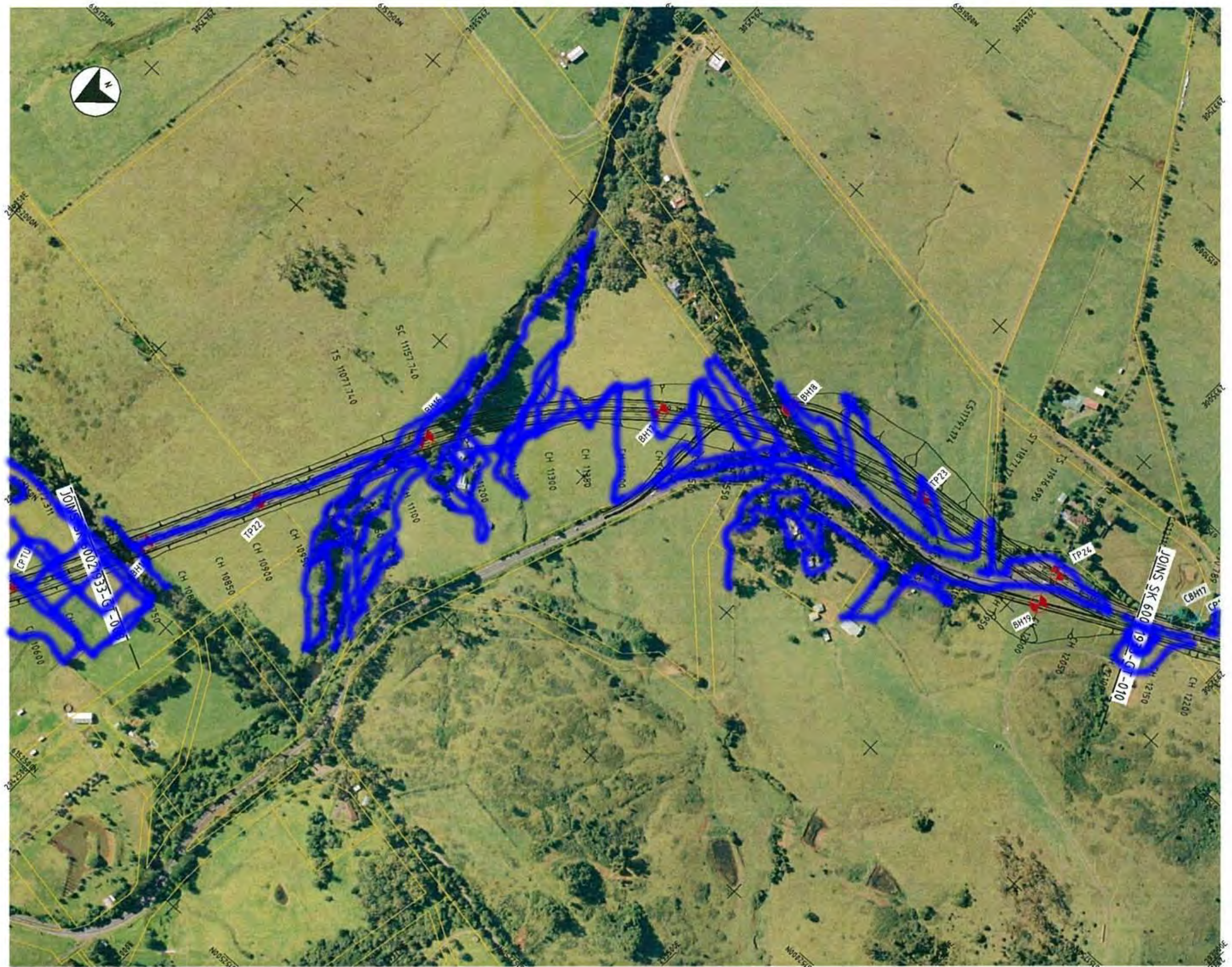


LEGEND

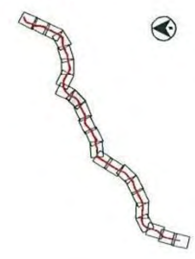
PROPOSED INVESTIGATION

- BOREHOLE (BH)
- TEST PIT (TP)
- CONE PENETRATION TEST WITH PIEZO CONE (CPTU)

PREVIOUS INVESTIGATION

- PREVIOUS BOREHOLE BY COFFEY (CBH)
- PREVIOUS TEST PIT BY COFFEY (CTP)
- PREVIOUS CPT BY COFFEY (CPT)
- PREVIOUS BOREHOLE BY GOLDER (GT)

KEYPLAN



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SHEET 9

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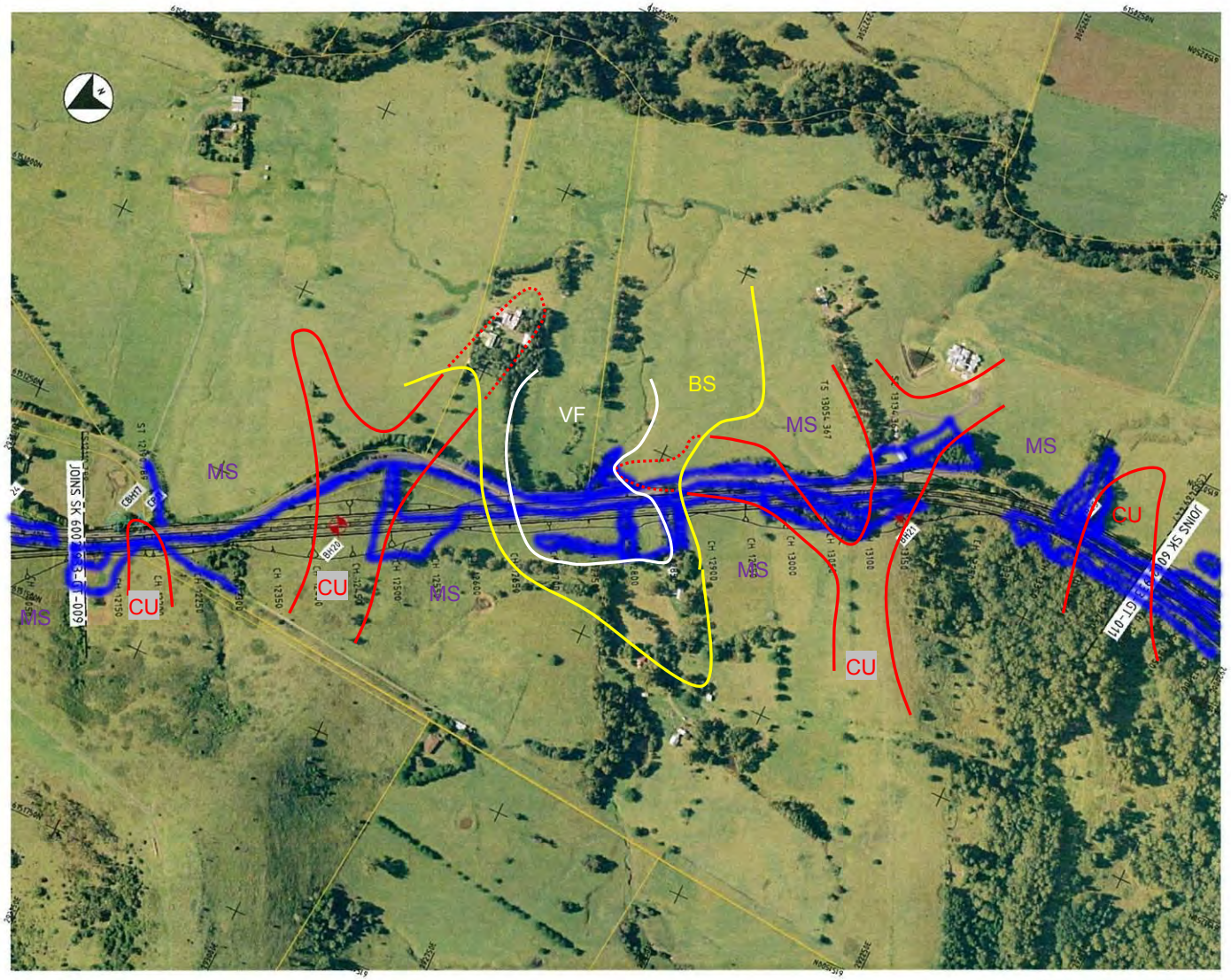


LEGEND

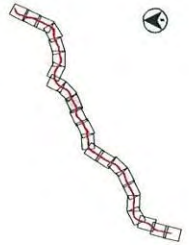
PROPOSED INVESTIGATION

- BOREHOLE (BH)
- TEST PIT (TP)
- CONE PENETRATION TEST WITH PIEZO CONE (CPTU)

PREVIOUS INVESTIGATION

- PREVIOUS BOREHOLE BY COFFEY (CBH)
- PREVIOUS TEST PIT BY COFFEY (CTP)
- PREVIOUS CPT BY COFFEY (CPT)
- PREVIOUS BOREHOLE BY GOLDER (GT)

KEYPLAN



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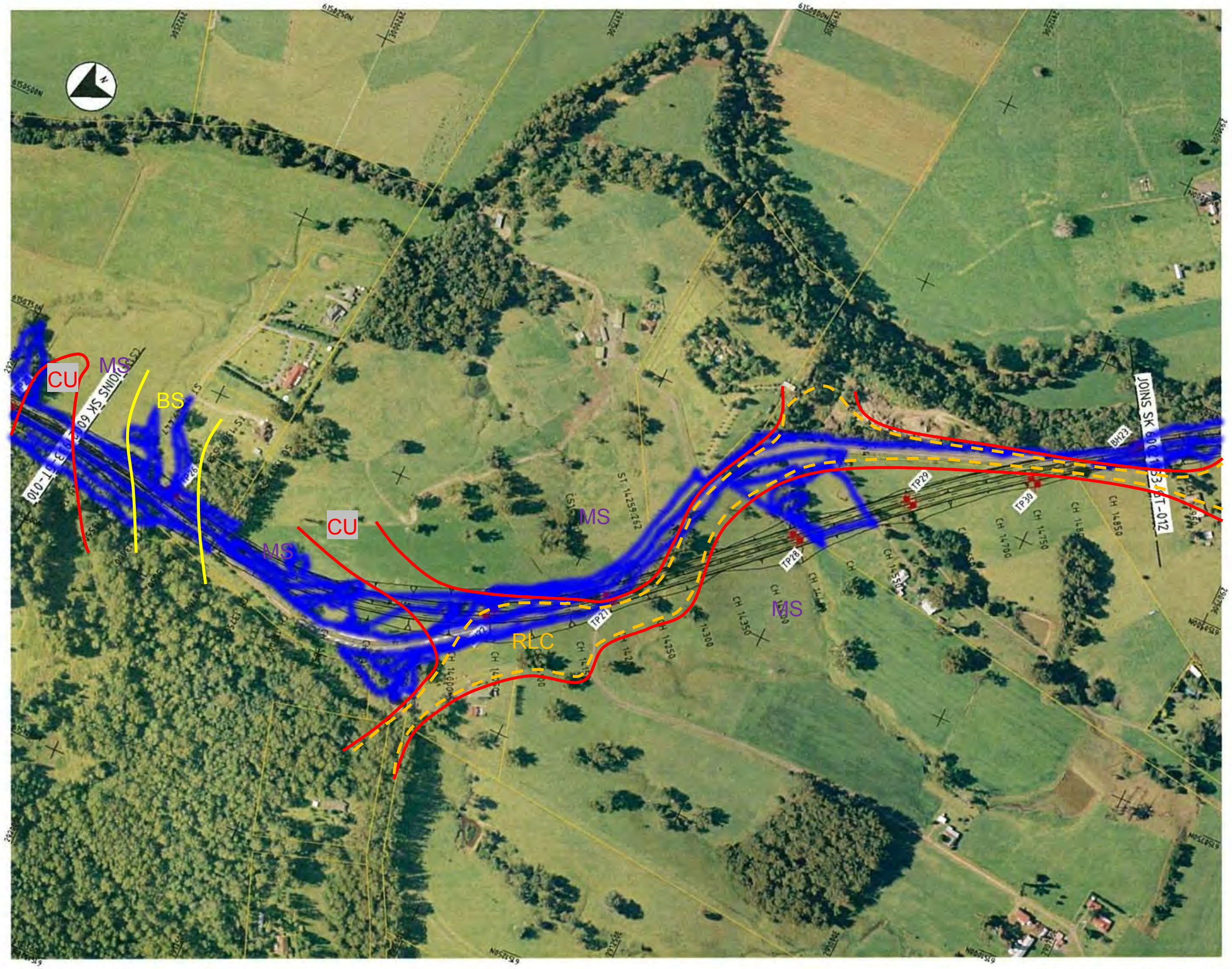


LEGEND

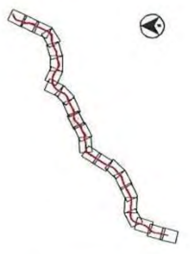
PROPOSED INVESTIGATION

- BOREHOLE (BH)
- TEST PIT (TP)
- CONE PENETRATION TEST WITH PIEZO CONE (CPTU)

PREVIOUS INVESTIGATION

- PREVIOUS BOREHOLE BY COFFEY (CBH)
- PREVIOUS TEST PIT BY COFFEY (CTP)
- PREVIOUS CPT BY COFFEY (CPT)
- PREVIOUS BOREHOLE BY GOLDER (GT)

KEYPLAN



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SHEET 11

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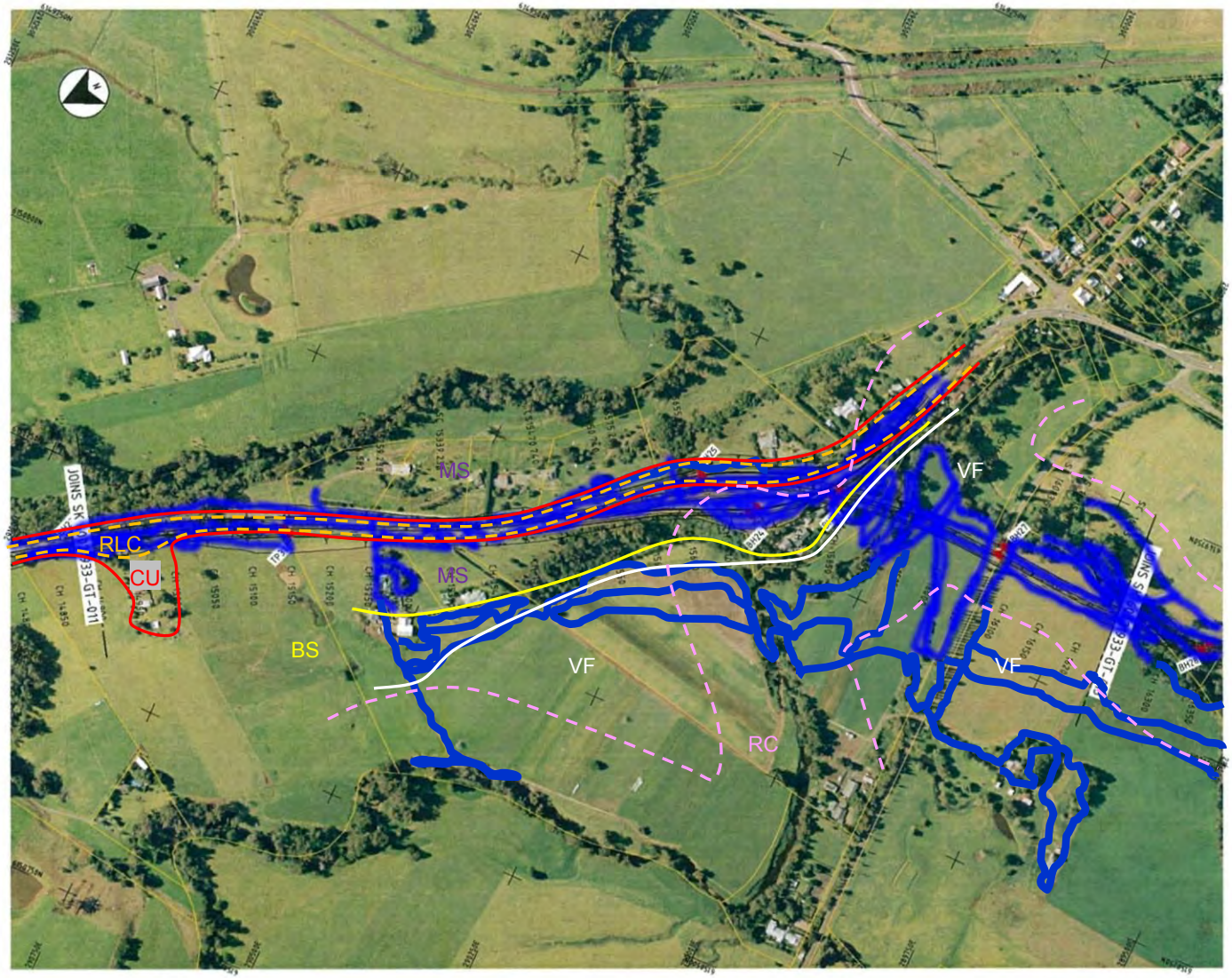

LEGEND

PROPOSED INVESTIGATION

- BOREHOLE (BH)
- TEST PIT (TP)
- CONE PENETRATION TEST WITH PIEZO CONE (CPTU)

PREVIOUS INVESTIGATION

- PREVIOUS BOREHOLE BY COFFEY (CBH)
- PREVIOUS TEST PIT BY COFFEY (CTP)
- PREVIOUS CPT BY COFFEY (CPT)
- PREVIOUS BOREHOLE BY GOLDER (GT)

KEYPLAN

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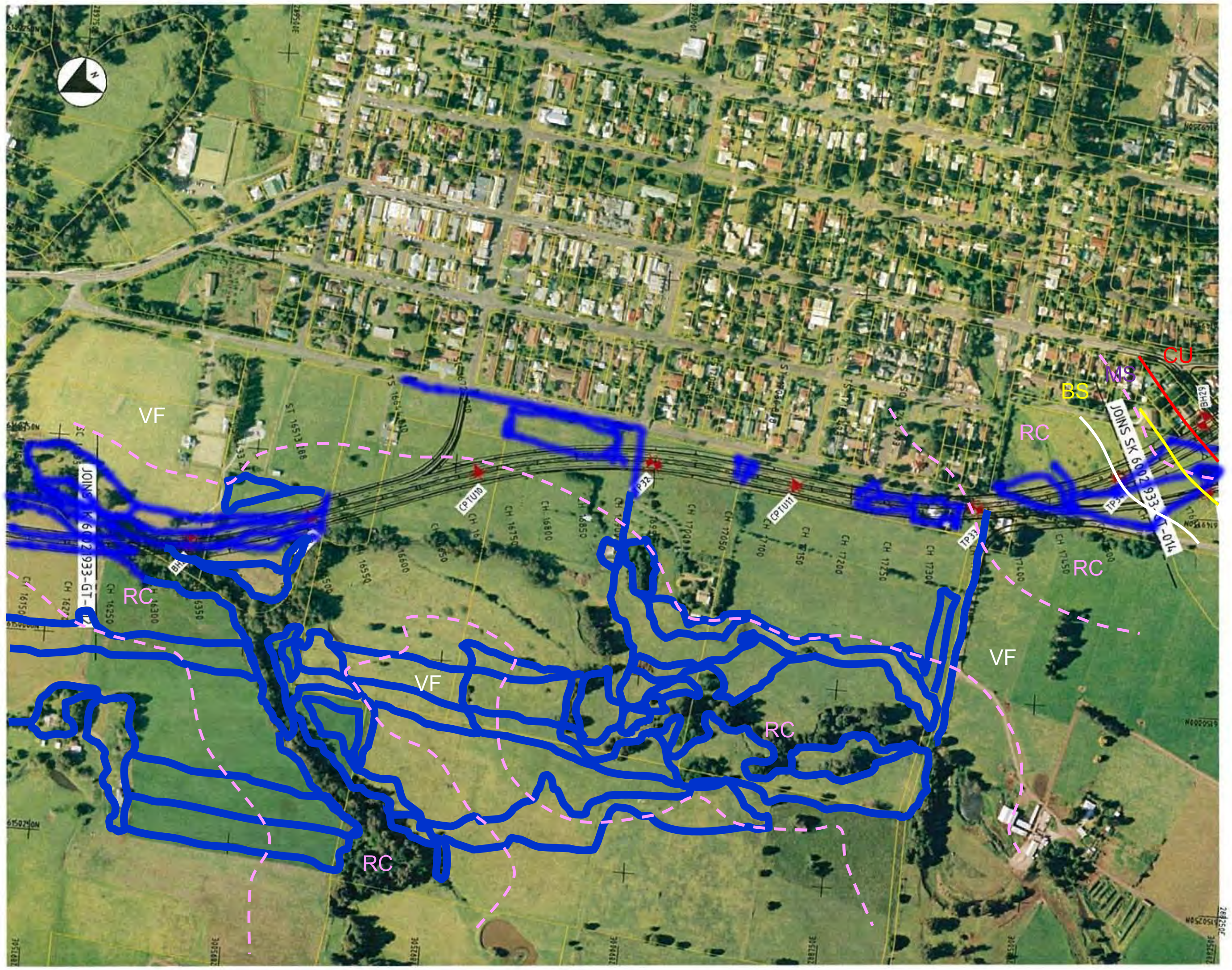


LEGEND

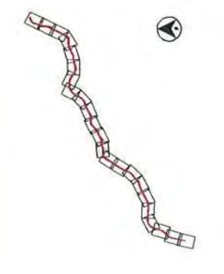
PROPOSED INVESTIGATION

- BOREHOLE (BH)
- TEST PIT (TP)
- CONE PENETRATION TEST WITH PIEZO CONE (CPTU)

PREVIOUS INVESTIGATION

- PREVIOUS BOREHOLE BY COFFEY (CBH)
- PREVIOUS TEST PIT BY COFFEY (CTP)
- PREVIOUS CPT BY COFFEY (CPT)
- PREVIOUS BOREHOLE BY GOLDER (GT)

KEYPLAN



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GERRINGONG TO BOMADERRY PRINCES HIGHWAY UPGRADE

PROPOSED GEOTECHNICAL INVESTIGATION SITES

SHEET 13

STATUS:	DRAWING NO:	REV:
SKETCH	60021933-GT-013	01

LEGEND

PROPOSED INVESTIGATION

- BOREHOLE (BH)
- TEST PIT (TP)
- CONE PENETRATION TEST WITH PIEZO CONE (CPTU)

PREVIOUS INVESTIGATION

- PREVIOUS BOREHOLE BY COFFEY (CBH)
- PREVIOUS TEST PIT BY COFFEY (CTP)
- PREVIOUS CPT BY COFFEY (CPT)
- PREVIOUS BOREHOLE BY GOLDER (GT)

KEYPLAN

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GERRINGONG TO BOMADERRY PRINCES HIGHWAY UPGRADE

PROPOSED GEOTECHNICAL INVESTIGATION SITES

SHEET 14

STATUS	DRAWING NO.	REV.
SKETCH	60021933-GT-014	01


MS
BS
CU
BS
RC
VF

Appendix L

Southeastern Australian sites used in (lithic analysis) richness comparison

Project name	Site name(s)	Map coordinates (GDA)	N° of excavated areas	N° of excavated pits	Total area excavated (m²)	Assemblage size	Assemblage diversity	Raw material diversity	Broken: complete artefacts
Sandon Point Sub-Surface Testing and Salvage Program, NSW south coast	Lot 235	308786.6199550	3	5	3000	2731	52	14	1.00
Coila Lake Salvage, NSW south coast	CPL1	240967.6007904	1	14	8	4081	47	13	1.47
Boardwalk, Newcastle, NSW south coast	NPWS Site #38-4-0559	384608.6356255	Not available	Not available	154	568	14	8	1.82
McCue Midden, Kurnell, NSW Central Coast	NPWS Site # 52-3-1110	331562.6233443	1	12	120	554	23	12	1.47
Banora Pt, NSW Far North Coast (SE Qld)	04-2-0017/166	554162.6878347	1	22	150	134	14	6	1.25
Dolphin Pt, NSW south coast	Stage 1 (Dolphin Point 2)	267638.6080637	1	36	90	1338	37	11	2.12
Lagoon Restaurant, Wollongong, NSW south coast	NPWS Site # 52-2-2189	306982.6109044 6	Not available	3	Not available	116	10	5	1.27
Conjola Regional Sewerage Scheme, NSW south coast	CS3; CS4; CS6; CS9; CS20; CS25; CS26; 58-2-241	267817.6098684	1	8	2	895	32	13	1.27
Gerroa Sand Mine, NSW South Coast	Conservation area B	298198.6149469	1	51	8	35	8	6	1.47
Wombeyan Caves Open Site, NSW south coast Hinterland	Wombeyan 1	773461.6200013	1	3	16	244	11	9	2.64
Tuross Pipeline, NSW south coast	TGPAD	242035.6006787	1	16	6	211	14	10	2.64

Project name	Site name(s)	Map coordinates (GDA)	N° of excavated areas	N° of excavated pits	Total area excavated (m²)	Assemblage size	Assemblage diversity	Raw material diversity	Broken: complete artefacts
Tugun Bypass, SE QLD Coast	Tugun stages 1-3, Tugun Piers	549435.6883930	1	28	5600	1564	34	10	1.04
Coombabah Creek, SE Qld Coast	CC1	536480.6914558	1	29	81	456	31	11	0.6
Tidbinbilla, ACT	TDC1; TDC2; TDC4 (PAD)	672758.6073553 GDA	3	NA	NA	256	24	8	1.60
Gerroa STP, NSW south coast	STP; SPS682	298604.6149693	2	66	216	1961	19	9	1.6
Manyana, NSW south coast	MS1; MS2; MS3; MS4; MS5	273704.6095421	1	27	5	479	20	3	1.20
Bungendore Gas Pipeline, Eastern NSW	GMF1; GMF2; GMF4; GMF PAD1	717300.6085260	1	5	4000	728	26	10	0.60
Blacktown Olympic Park, NSW Central Coast	BOP PAD	301685.6261360	1	39	39	958	19	9	0.99
Bannaby, NSW south coast Hinterland	BA1; BA2; BA3; BA4; BA6; BA7; BA8; BA9, PAD BA7	775193.6182827	1	19	28	229	20	9	1.46
Eastern Creek, ACT	PAD1	301283.6258599	1	16	40	66	4	3	2.80
Barton Highway, ACT	BHDS1; BHDS2	693807.6100481	3	2	2	24	3	Not available	1.64
West Macgregor 1&2, ACT	MW3; MW4; MW5/PAD; MW6	682326.6101307	3	63	63	1799	34	13	9.39
Cotter Dam, ACT	UF330, UF332, ECRAs 6, 15, 17, 30 and 65	675420.6089946	15	305	50	2131	61	11	

Project name	Site name(s)	Map coordinates (GDA)	N° of excavated areas	N° of excavated pits	Total area excavated (m²)	Assemblage size	Assemblage diversity	Raw material diversity	Broken: complete artefacts
Tintenbar to Ewingsdale, NSW North Coast	PADs 2, 6, 7, 23, 24 and 25	551890.6822512	6	42	7	26	3	1	11.00
Bulahdelah Pacific Hwy, NSW south coast	BPAD2; BPAD3; B8; B10; B15	425868.6414333	4	25	25	10	5	3	2.92
East Lake, ACT	E4	695206.6090351	1	7	7	11	2	1	
Bellambi STP, NSW south coast	Zone A; Zone D	309514.6195028	2	NA	200	444	38	3	2.77
G2B Gerringong Upgrade, Eastern NSW	PASA32; 33;37;38;39; G2B A5; G2B A6; G2B A7	300933.6153204	8	42	7	146	20	10	1.40
Stage 1 and 2 (NSW) Murrumbidgee to Googong Pipeline, ACT and NSW	M2G8, 15, 16, 17, 18, 24, 25, 26, 28, 31, 32, 33, 37, 55, 56, 57, 58, 59, 60, 61, 71	351635.6150908	22	99	16	570	17	6	1.13
C2B, Cootamundra, Eastern NSW	CB2, CB5, CB9, CB15 and at PAD CBPAD1	593871.6166475	5	125	20	381	22	7	1.92

Project name	Site name(s)	Map coordinates (GDA)	N° of excavated areas	N° of excavated pits	Total area excavated (m²)	Assemblage size	Assemblage diversity	Raw material diversity	Broken: complete artefacts
Bacchus Marsh, Southern VIC	WV028, WV092, WV094, WV095, WV108, WV116, WV123, WV138, WV139, WV140, WV141, WV142, WV143, WV144, WV145, WV146, WV147, WV149, WV150, WV151, WV152, WV153, WV154, WV155, WV157, WV85, WV86	271861.826036	27	Not available	Not available	340	24	4	1.60
Mt Gellibrand, Southern VIC	Not available	Not available	Not available	Not available	Not available	2227	29	7	9.00
G2B FBB	PASA12;13; 14;15;16;18; 20;21;23;24; 25;26;27;28; 29;40;41;43 & 44	290049.6149878	3	298	240	236	27	12	1.79
Mean						***791.09***	***23.38***	***8.32***	***2.69***

Appendix M

Unexpected finds procedure

STANDARD MANAGEMENT PROCEDURE

Unexpected Archaeological Finds

July 2012

About this release

RMS/ISBN numbers	RMS 12.003 | ISBN 9781922040305
Title	Unexpected Archaeological Finds Procedure

Approval and authorisation		Name
Prepared by	Environmental Officer (Heritage)	Gretta Logue
Revised by	Environmental Officer (Heritage)	Daniel Percival
Approved by	Manager Environmental Policy	Michael Crowley

Location	File name
G:\ENVIRNMNT\Policy\Heritage\Cultural Heritage (Non-Aboriginal)\Unexpected Finds Procedure\Procedure\Final July 2012	Unexpected Archaeological Finds Procedure.doc

Document status	Date
Final	23 July 2012

Version	Date	Revision Description
Final	1 November 2011	First Draft
Revised	23 July 2012	Amended to reflect that (a) unexpected finds do not include items covered by a relevant approval; (b) Aboriginal people must be consulted where an unexpected find is likely to be an Aboriginal object; (c) the Department of Planning and Infrastructure must be notified in accordance with Step 5 of this procedure for Part 3A and Part 5.1 projects.

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Please note

This procedure applies to all development and activities concerning roads, road infrastructure and road related assets undertaken by Roads and Maritime Services.

For advice on how to manage unexpected archaeological finds as a result of activities related to maritime infrastructure or projects, please contact the Senior Environmental Specialist (Heritage).

Contents

Unexpected Archaeological Finds Procedure

1. Purpose

The unexpected archaeological finds procedure has been developed to provide a consistent approach on how to proceed in the event of uncovering an unexpected archaeological find (both Aboriginal and non-Aboriginal) during Roads and Maritime Services' (RMS) activities. This includes RMS' heritage notification obligations under the following legislation: *Heritage Act 1977* (NSW), *National Parks and Wildlife Act 1974* (NSW), *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth) and the *Coroner's Act 2009* (NSW).

This document provides relevant background information in Section 3, followed by the technical procedure in Sections 6 and 7. Associated guidance referred to in the procedure can be found in Appendices A-H.

2. Scope

This procedure assumes that an appropriate level of Aboriginal and non-Aboriginal cultural heritage assessment has been undertaken prior to project approval or determination. Such assessment would have identified all heritage items, including areas of archaeological potential, likely to be present within the project area.

However, in some cases, despite appropriate and adequate investigation, unexpected archaeological finds may be encountered during the project construction phase. When this happens, this procedure must be followed. This procedure provides direction on when to stop work, where to seek technical advice and how to notify the regulator, if required.

This procedure applies to all RMS construction and maintenance activities

This procedure **applies to**:

- The discovery of any unexpected archaeological find (usually during construction), where RMS does not have specific approval to disturb that find.
- All RMS projects that are approved or determined under Part 3A (including Transitional Part 3A Projects), Part 4, Part 5 or Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), or any development that is exempt under the Act.

This procedure must be followed by all RMS staff, RMS alliance partners (including Local Council staff working under Road Maintenance Council Contracts, [RMCC]), developers under works authorisation deeds or any person undertaking Part 5 assessment for the purposes of RMS.

This procedure **does not apply** to:

- The legal discovery and disturbance of archaeological finds as a result of investigations being undertaken in accordance with OEH's *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (2010); an Aboriginal Heritage Impact Permit (AHIP) issued under the *National Parks and Wildlife Act*

1974; or an approval issued under the *Heritage Act 1977*[1].

- The legal discovery and disturbance of archaeological finds as a result of investigations (or other activities) that are required to be carried out for the purpose of complying with any environmental assessment requirements under Part 3A (including Transitional Part 3A Projects) or Part 5.1 of the EP&A Act.
- The legal discovery and disturbance of archaeological finds as a result of construction related activities, where the disturbance is permissible in accordance with an AHIP[2]; an approval issued under the *Heritage Act 1977*; or the Minister for Planning's conditions of project approval.

All new Construction Environment Management Plans (CEMPs) must make reference to and/or include this procedure (often included as a heritage sub-plan). Where approved CEMPs exist they must be followed in the first instance. Where there is a difference between approved CEMPs and this procedure, the approved CEMP must be followed. Where approved CEMPs do not provide sufficient detail on particular issues, this procedure should be used as additional guidance. When in doubt always seek environment and legal advice on varying approved CEMPs.

3. Types of unexpected archaeological finds and their legal protection

Project, field and environment staff will be critical to the early identification and protection of unexpected archaeological finds. Appendix A illustrates the wide range of archaeological discoveries found on RMS projects and provides a useful photographic guide to this early identification. Subsequent confirmation of archaeological discoveries must then be identified and assessed by technical specialists (usually an archaeologist).

An 'unexpected find' is any unanticipated archaeological discovery, for which RMS does not have existing approval to disturb[3].

These discoveries are categorised as either:

(a) Aboriginal objects

(b) 'Non-Aboriginal' unexpected finds

(c) Human skeletal remains.

The relevant legislation that applies to each of these categories is described below.

3.1 Aboriginal objects

Unexpected archaeological finds may include 'Aboriginal objects'. The *National Park and Wildlife Act 1974* protects *Aboriginal objects* which are defined as:

[1] RMS' heritage obligations are incorporated into either the conditions of heritage approval or within the RMS standard consultant's brief for undertaking archaeological investigations.
[2] RMS *Procedure for Aboriginal cultural heritage consultation and investigation* (2011) recommends that Part 4 and Part 5 projects that are likely to impact Aboriginal objects during construction seek a whole-of-project AHIP. This type of AHIP generally allows a project to impact known and potential Aboriginal objects within the entire project area, without the need to stop works. It should be noted that an AHIP may exclude impact to certain objects and areas, such as burials or ceremonial sites. In such cases, the project must follow this procedure.
[3] This is considered to be any physical interference with the find such as manually picking it up and putting it back, moving it to another location near by, removing it from site, crushing or excavation it, or any other type of physical action that results in it being destroyed, defaced, damaged, harmed, impacted or altered in any way (this includes archaeological investigation activities).

> "*any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non Aboriginal extraction, and includes Aboriginal remains*"[4].

Examples of Aboriginal objects include stone tool artefacts, shell middens, axe grinding grooves, pigment or engraved rock art, burials and scarred trees.

IMPORTANT!

All *Aboriginal objects* are subject to statutory controls and protections.

If any impact is expected to an Aboriginal object, an Aboriginal Heritage Impact Permit (AHIP) is usually required from the Office of Environment and Heritage (OEH)[5]. Also, when a person becomes aware of an Aboriginal object they must notify the Director-General of OEH about its location[6]. Assistance on how to do this is provided in Section 7 (Step 5).

3.2 Non-Aboriginal unexpected finds

Non-Aboriginal unexpected finds may include statutory 'relics' or other non-statutory archaeological features (ie works).

The *Heritage Act 1977* protects *relics* which are defined as:

> "*any deposit, artefact, object or material evidence that relates to the settlement of the area that comprises NSW, not being Aboriginal settlement; and is of State or local heritage significance*"[7].

Relics may relate to past domestic, industrial or agricultural activities in NSW, and can include items such as bottles, items of clothing, pottery, building materials and general refuse.

IMPORTANT!

All *relics* are subject to statutory controls and protections.

If any impact is expected to a relic, a heritage approval is usually required from the NSW Heritage Council[8]. Also, when a person discovers a relic they must notify the NSW Heritage Council of its location[9]. Advice on how to do this is provided in Section 7 (Step 5).

Some non-Aboriginal archaeological features such as historic utilities and infrastructure are not considered to be 'relics'; instead they are considered to be 'works'. Examples

[4] Section 5(1) *National Park and Wildlife Act 1974*.
[5] Except when Part 3A, Division 4.1 of Part 4 or Part 5.1 of the *EP&A Act* applies.
[6] This is required under s89(A) of the *National Park and Wildlife Act 1974* and applies to **all projects** assessed under Part 3A, Part 4, Part 5 *and Part 5.1* of the *EP&A Act*, including exempt development.
[7] Section 4(1) *Heritage Act 1977*.
[8] Except when Part 3A, Division 4.1 of Part 4 or Part 5.1 of the *EP&A Act* applies.
[9] This is required under s146 of the *Heritage Act 1977* and applies to **all projects** assessed under Part 3A, Part 4, Part 5 and Part 5.1 of the *EP&A Act*, including exempt development.

of works that the RMS may encounter include former road infrastructure features and services, culverts, previous historic road formation, historic pavement, buried road retaining walls, tramlines, cisterns and conduits. Although an approval under the *Heritage Act 1977* may not be required, the discovery of works must also be managed in accordance with this procedure.

3.3 Human skeletal remains

Human skeletal remains can be identified as either an Aboriginal object or non-Aboriginal relic depending on ancestry of the individual (Aboriginal or non-Aboriginal) and burial context (archaeological or non-archaeological). Remains are considered to be archaeological when the time elapsed since death is suspected of being 100 years or more. Depending on ancestry and context, different legislation applies.

As a simple example, a pre-contact archaeological Aboriginal burial would be protected under the *National Park and Wildlife Act 1974*, while a historic (non-Aboriginal) archaeological burial within a cemetery would be protected under the *Heritage Act 1977*. For these cases, the relevant heritage approval and notification requirements described in the above sections 3.1 and 3.2 would apply. In addition to the *National Park and Wildlife Act 1974*, finding Aboriginal human remains also triggers notification requirements to the Commonwealth Minister for Sustainability, Environment, Water, Populations and Communities (SEWPC) under s20(1) of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth).

IMPORTANT!

All human skeletal remains are subject to statutory controls and protections.

All bones must be treated as potential human skeletal remains and work around them must stop while they are protected and investigated urgently.

However, where it is suspected that less than 100 years has elapsed since death, the human skeletal remains come under the jurisdiction of the State Coroner and the *Coroners Act 2009* (NSW). Such a case would be considered a 'reportable death' and under legal notification obligations set out in s35(2); a person must report the death to a police officer, a coroner or an assistant coroner as soon as possible. This applies to all human remains less than 100 years old[10] regardless of ancestry (ie both Aboriginal and non-Aboriginal remains). Public health controls may also apply.

Guidance on what to do when suspected human remains are found is provided in Appendix F.

[10] Under s19 of the *Coroners Act 2009*, the coroner has no jurisdiction to conduct an inquest into reportable death unless it appears to the coroner that (or that there is reasonable cause to suspect that) the death or suspected death occurred within the last 100 years.

4. Responsibilities

The following roles and responsibilities are relevant to this procedure.

Role	Definition/responsibility
Aboriginal Cultural Heritage Advisor (ACHA)	Provides Aboriginal cultural heritage advice to project teams. Acts as Aboriginal community liaison for projects on cultural heritage matters. Engages and consults with the Aboriginal community as per the RMS *Procedure for Aboriginal Cultural Heritage Consultation and Investigation*.
Aboriginal Sites Officer	Is an appropriately trained and skilled Aboriginal person whose role is to identify and assess Aboriginal objects and cultural values. For details on engaging Aboriginal sites officers, refer to RMS *Procedure for Aboriginal Cultural Heritage Consultation and Investigation*.
Archaeologist (A)	Professional consultant, contracted on a case-by-case basis to provide heritage and archaeological advice and technical services (such as reports, heritage approval documentation etc).
Project (*on-call*) Archaeologist	Professional consultant contracted for the implementation phase of a construction project to provide heritage and archaeological advice and technical services when required. Major projects with complex heritage issues often have a Project archaeologist.
Project Manager (PM)	Ensuring all aspects of this procedure are implemented. The PM can delegate specific site tasks to a construction environment manager, RMS site representatives or regional environment staff, where appropriate.
Regional Environment Staff (RES)	Providing advice on this procedure to project teams. Ensuring this procedure is implemented consistently by supporting the PM. Supporting project teams during the uncovering of unexpected finds. Reviewing archaeological management plans and liaising with heritage staff and archaeological consultants as needed.
Registered Aboriginal parties (RAPs)	RAPs are Aboriginal people who have registered with the RMS to be consulted about a proposed RMS project or activity in accordance with OEH's Aboriginal cultural heritage consultation requirements for proponents (2010).
RFS Environment Manager	Ensuring RFS field staff are aware of the RFS Escalation Protocol and RFS Unexpected Find Recording Form 418. Supporting the RFS Section Manager, where required, during the implementation of this procedure and ensuring reporting of unexpected finds through environment management systems.
RFS Section Manager	Responding to escalated unexpected finds that have been uncovered during RFS maintenance works.

	Liaising with the RES and RFS Environment Manager and heritage staff, where required, during the uncovering of unexpected finds and the implementation of this procedure.
RFS Team Leader	Ensuring RFS field crew stop works in vicinity of the find. Completing RFS Unexpected Find Recording Form 418 and escalating issues to RFS Section Manager, as per RFS Escalation Protocol.
Senior Environmental Specialist (Heritage) (SES(H))	Provides technical assistance on this procedure and archaeological technical matters, as required. Reviewing the archaeological management plans and facilitating heritage approval applications, where required. Assists with regulator engagement, where required.
Technical Specialist	Professional consultant contracted to provide specific technical advice that relates to the specific type of unexpected find (eg a forensic or physical anthropologist who can identify and analyse human skeletal remains).

5. Acronyms

The following acronyms are relevant to this procedure.

Acronym	Meaning
AHIP	Aboriginal Heritage Impact Permit
ASO	Aboriginal Site Officer
CEMP	Construction Environment Management Plan
DSEWPC	Commonwealth Department of Sustainability, Environment, Water, Populations and Communities
EPRG	Environmental Planning and Regulatory Group. *Please note at the time of finalisation EPRG became part of Environment Protection Authority.*
OEH	Office of Environment and Heritage
PACHCI	Procedure for Aboriginal Cultural Heritage Consultation and Investigation
RAP	Registered Aboriginal Party/ies
RFS	Road and Fleet Services
RMCC	Road Maintenance Council Contracts
RMS	Roads and Maritime Services

6. Overview of the procedure

On discovering something that could be an unexpected archaeological find ('the find'), the project manager must implement the following procedure with the assistance of the regional environment staff and RMS heritage staff, where required.

There are eight steps in the procedure. These steps are shown briefly in Figure 1 below and explained in detail in Section 7.

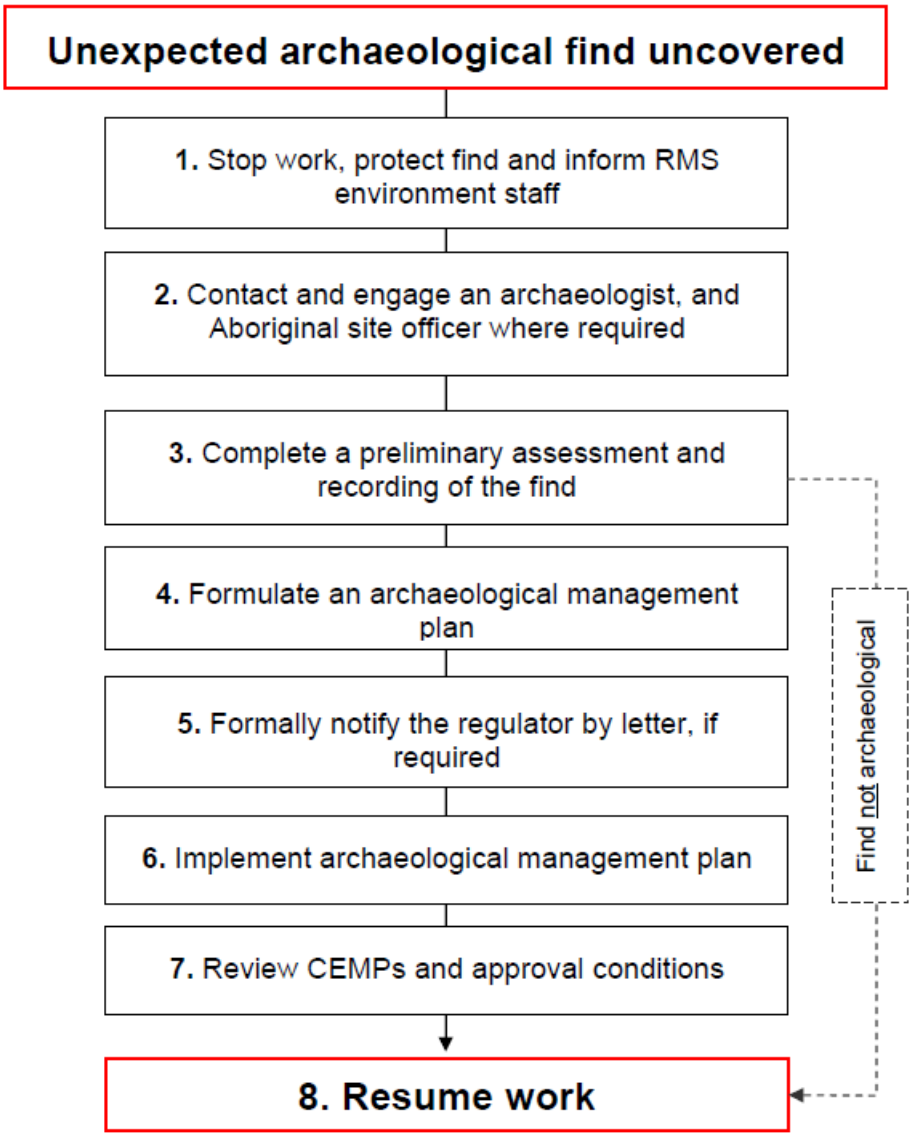


Figure 1: Overview of steps to be undertaken on the discovery of an unexpected archaeological find.

7. Unexpected Archaeological Finds Procedure

Table 1: Specific tasks to be implemented following the discovery of an unexpected find.

Aboriginal Cultural Heritage Advisor (ACHA); Aboriginal Sites Officer (ASO); Archaeologist (A); Project Manager (PM); Regional Environment Staff (RES); Registered Aboriginal Parties (RAPs); Senior Environmental Specialist (Heritage) (SES(H)).

Step	Task	Responsibility	Guidance & Tools
1	**Stop work, protect find and inform RMS environment staff**		
1.1	Stop all work in the immediate area of the find and notify the PM.	All	**Appendix A** (Identifying Unexpected Archaeological Finds)
1.2	RFS routine maintenance crews are required to follow the escalation protocol outlined in Appendix B and return to this procedure when directed by that protocol.	RFS Team Leader	**Appendix B** (RFS Escalation Protocol) **Appendix C** (RFS Find Recording Form 418)
1.3	Take a number of photographs that captures the general context and specific detail of the find.	PM	**Appendix D** (Photographing Unexpected Archaeological Finds)
1.4	Inform relevant RMS regional environment staff, Senior Environmental Specialist (Heritage) and Regional Aboriginal Cultural Heritage Advisor (where the find is thought to be an Aboriginal object).	PM	**Appendix E** (Key Environmental Contacts)
1.5	Delineate and protect the find with appropriate (high visibility) fencing, where practical.	PM	
1.6	No further interference, including works, ground disturbance, touching or moving the find of any kind, must occur to the find or within the protected area.	PM	
1.7	Inform all site personnel of the protected area (a new environmentally sensitive zone).	PM	

Step	Task	Responsibility	Guidance & Tools
1.8	Where, at this stage, the find is reasonably suspected to be human remains proceed directly to notifying the local police who may take command of all or part of the site. Where the find does not involve human remains, continue progressing through this procedure.	PM	**Appendix F** (Uncovering Bones)
1.9	Report the find as a '*Notifiable Event*' in accordance with the RTA *Incident Classification and Reporting Procedure*. Also implement any additional reporting requirements related to the project's approval and CEMP.	PM/RES	**RTA Incident Classification and Reporting Procedure**
2	**Contact and engage an archaeologist, and Aboriginal site officer where required**		
2.1	Contact the project (*on-call*) archaeologist to discuss the location and extent of the find and to arrange a site inspection, if required. The project CEMP contains contact details of the project archaeologist.	PM/RES	Also see **Appendix E** (Key Environmental Contacts)
2.2	Where there is no project archaeologist engaged for the project, engage a suitably qualified and experienced archaeological consultant to undertake a site inspection, conduct a preliminary assessment and prepare an archaeological management plan. Lists of consultants are available from online sources, including the yellow pages. Regional environment staff and RMS heritage staff can also advise on appropriate consultants.	PM/RES	Online lists of heritage consultants: • OEH List • AACAI List
2.3	Where the find is likely to be an Aboriginal object, arrange for an Aboriginal sites officer to inspect the find. Generally, this person would be a sites officer from the relevant local Aboriginal land council. If an alternative contact person (ie a RAP) has been nominated as a result of previous consultation, then that person is to be contacted.	PM/ACHA	
2.4	If requested, provide photographs of the find taken at Step 1.3 to the archaeologist, and Aboriginal sites officer if relevant.	PM/RES	**Appendix D** (Photographing Unexpected Archaeological Finds)
3	**Preliminary assessment and recording of the find**		
3.1	In a minority of cases, the archaeologist (and Aboriginal sites officer, if relevant) may	A/PM/ASO	Proceed to Step 8

Step	Task	Responsibility	Guidance & Tools
	determine from the photographs that no site inspection is required because no archaeological constraint exists for the project (*eg the find is not a 'relic', a heritage 'work' or an 'Aboriginal object'*). Any such advice should be provided in writing by the archaeologist (eg via email) and confirmed by the project manager.		
3.2	Arrange site access for the archaeologist (and Aboriginal sites officer, if relevant) to inspect the find as soon as practicable. In the majority of cases a site inspection is required to conduct a preliminary assessment.	PM	
3.3	Subject to the archaeologist's assessment (and the Aboriginal sites officer's assessment, if relevant), work may recommence at a set distance from the find. This is to protect any other archaeological material that may exist in the vicinity, which has not yet been uncovered. Existing protective fencing established in Step 1.5 may need to be adjusted to reflect the extent of the newly assessed protective area. No works are to take place within this area once established.	A/PM/ASO	
3.4	The archaeologist (and Aboriginal sites officer, if relevant) may provide advice after the site inspection and preliminary assessment that no archaeological constraint exists for the project (*eg the find is not a 'relic', a heritage 'work' or an 'Aboriginal object'*). Any such advice should be provided in writing by the archaeologist, (and Aboriginal sites officer if relevant) (eg via email) and confirmed by the project manager.	A/PM/ASO	Proceed to Step 8
3.5	Where required, seek additional specialist technical advice (such as a forensic or physical anthropologist to identify skeletal remains). Regional environment staff and/or RMS heritage staff can provide contacts for such specialist consultants.	PM/RES	**Appendix E** (Key Environmental Contacts)
3.6	Where the find has been identified as a 'relic', 'work' or an 'Aboriginal object' the archaeologist should record the find on a proforma recording form.	A	• Aboriginal site recording form • Non-Aboriginal site recording form
3.7	The regulator can be notified informally by telephone at this stage by the archaeologist or project manager (or delegate). Any verbal conversations with regulators must be noted on the project file for future reference.	PM/A	

Step	Task	Responsibility	Guidance & Tools
4	**Prepare an archaeological management plan**		
4.1	The archaeologist must prepare an archaeological management plan (with input from the Aboriginal sites officer, where relevant) shortly after the site inspection. This plan is a brief overview of the following: (a) description of the feature, (b) historic context, if data is easily accessible, (c) likely significance, (d) heritage approval and regulatory notification requirements, (e) heritage reporting requirements, (f) stakeholder consultation requirements, (g) relevance to other project approvals and management plans etc.	A/ASO	**Appendix G** (Archaeological Advice Checklist)
4.2	In preparing the plan, the archaeologist with the assistance of regional environment staff must review the CEMP, any heritage sub-plans, any conditions of heritage approvals, any conditions of project approval (and or Minister's Conditions of Approval) and heritage assessment documentation (eg Aboriginal Cultural Heritage Assessment Report). This will outline if the unexpected find is consistent with previous heritage/project approval(s) and/or previously agreed management strategies. The project manager and regional environment staff must provide all relevant documents to the archaeologist to assist with this. Discussions should occur with design engineers to consider if re-design options exist and are appropriate.	A/RES/PM	**Appendix G** (Archaeological Advice Checklist)
4.3	The archaeologist must submit this plan as a letter, brief report or email to the project manager outlining all relevant archaeological issues. This plan should be submitted to the project manager as soon as practicable. Given that the archaeological management plan is an overview of all the necessary requirements (and the urgency of the situation), it should take no longer than two working days to submit to the project manager.	A	
4.4	The project manager must review the archaeological management plan to ensure all requirements can reasonably be implemented. Seek additional advice from regional environment staff and RMS heritage staff, if required.	PM/RES/SES (H)	
5	**Notify the regulator, if required.**		
5.1	Review the archaeological management plan to confirm if regulator notification is required. It may state notification is not required.	PM/RES/SES (H)	Proceed to Step 6

Step	Task	Responsibility	Guidance & Tools
5.2	If notification is required, complete the template notification letter.	PM	**Appendix H** (Template Notification Letter)
5.3	Forward the draft notification letter, archaeological management plan and the site recording form to regional environment staff and Senior Environmental Specialist (Heritage) for review, and consider any suggested amendments.	PM/RES/SES (H)	
5.4	Forward the signed notification letter to the relevant regulator (ie notification of non-Aboriginal relics must be given to the Heritage Branch of OEH, while notification for Aboriginal objects must be given to the Environmental Protection and Regulation Group of OEH). Informal notification (via a phone call or email) to the regulator prior to sending the letter is appropriate. The archaeological management plan and the completed site recording form must be submitted with the notification letter. For Part 3A and Part 5.1 projects, the Department of Planning and Infrastructure must also be notified.	PM	**Appendix E** (Key Environmental Contacts)
5.5	A copy of the final signed notification letter, archaeological management plan and the site recording form should be kept on file by the project manager and a copy sent to the Senior Environmental Specialist (Heritage).	PM	
5.6	If requested by the regulator, arrange a site inspection of the find for them.	PM	
6	**Implement archaeological management plan**		
6.1	Modify the archaeological management plan to take into account any additional advice resulting from notification and discussions with the regulator.	A/PM	
6.2	Implement the archaeological management plan. Where impact is expected, this would include such things as a formal assessment of significance and heritage impact assessment, preparation of excavation or recording methodologies, consultation with registered Aboriginal parties, obtaining heritage approvals etc, if required.	PM/RAPs	PACHCI Stage 3
6.3	Where heritage approval is required contact regional environment staff for further advice and support material. Please note time constraints associated with heritage approval preparation and processing. Project scheduling may need to be revised where extensive delays are expected.	PM/RES	

Step	Task	Responsibility	Guidance & Tools
6.4	For Part 3A/Part 5.1 projects, assess whether heritage impact is consistent with the project approval or if project approval modification is required from the Department of Planning and Infrastructure. Seek advice from regional environment staff and Environment Branch specialist staff if unsure.	PM/RES	
6.5	Where statutory approvals (or project approval modification) are required, impact upon relics and/or Aboriginal objects must not occur until heritage approvals are issued by the appropriate regulator.	PM	
6.6	Where statutory approval (or Part 3A/Part 5.1 project modification) is not required and where archaeological recording is recommended by the archaeologist, sufficient time must be allowed for this to occur.	PM	
6.7	Ensure short term and permanent storage locations are identified for archaeological material removed from site, where required. Interested third parties (eg museums or local councils) should be consulted on this issue. Contact regional environment staff and Senior Environmental Specialist (Heritage) for advice on this matter, if required.	PM	
6.8	Ensure all archaeological excavation and heritage recording are completed prior to RMS project work resuming.	PM	
7	**Review CEMPs and approval conditions**		
7.1	Clarify regulator expectations around written authorisation to commence project work. This may relate to situations where human remains are found or when they request to review preliminary archaeological excavation reports or assessments prior to the resumption of RMS project work. Where this is not explicit in heritage approval conditions, expectations should be clarified directly with the regulator.	PM	
7.2	Update the CEMP, site mapping and project delivery program as appropriate with any project changes resulting from final heritage management (eg retention of heritage item, salvage of item). Updated CEMPs must incorporate additional conditions arising from any heritage approvals, and Aboriginal community consultation if relevant. Include any changes to CEMP in site induction material and update site workers during toolbox talks.	PM	

Step	Task	Responsibility	Guidance & Tools
8	**Resume work**		
8.1	Seek written clearance to resume project work from regional environment staff and the archaeologist (and regulator, if required). Clearance would only be given once all archaeological excavation and heritage recording (where required) are complete. Resumption of project work must be in accordance with the all relevant project/heritage approvals/determinations.	RES/A/PM	
8.2	If required, ensure archaeological excavation reporting and other heritage approval conditions are completed in the required timeframes. This includes artefact retention repositories and/or disposal strategies.	PM/A	
8.3	Forward all heritage/archaeological assessments, heritage location data and its RMS ownership status to the Senior Environmental Specialist (Heritage). They will ensure all heritage items in RMS ownership and/or control are considered for the RMS S170 Heritage Register.	PM/SES(H)	
8.4	If additional unexpected finds are uncovered this procedure must begin again from Step 1.	PM	

8. Seeking advice

Advice regarding this procedure should be directed to regional environment staff in the first instance, and then RMS heritage staff, where required. RMS staff can contact RMS regional environment staff for advice on this procedure at any time. Contractors and alliance partners should ensure their own project environment managers are aware of and understand this procedure. Regional environment staff can assist non-RMS project environment managers with enquires concerning this procedure.

IMPORTANT!

RMS staff and contractors are not to seek advice on this procedure directly from OEH without first seeking advice from regional environment and heritage staff.

Technical archaeological advice regarding the unexpected find should be sought from the contracted archaeologist. Technical specialist advice can also be sought from heritage staff within Environment Branch to assist with the preliminary archaeological identification and technical reviews of heritage/archaeological reports.

9. Related information

Contact details: Manager, Environmental Policy, Environment Branch, 02 8588 5740

Effective date: 1 November 2011

Review date: Final + 12 months

This procedure should be read in conjunction with:

- RTA *Incident Classification and Reporting Procedure*.
- RMS *Procedure for Aboriginal Cultural Heritage Consultation and Investigation*.
- RTA *Heritage Guidelines 2004*.
- RTA *Environmental Impact Assessment Guidelines*.

This procedure replaces:

- Procedure 5.5 ("*unexpected discovery of an archaeological relic or Aboriginal object*") outlined in the RTA's *Heritage Guidelines* 2004.

Other relevant reading material:

- NSW Heritage Office (1998), *Skeletal remains: guidelines for the management of human skeletal remains*.
- Department of Environment and Conservation NSW (2006), *Manual for the identification of Aboriginal remains*.
- Department of Health (April 2008), *Policy Directive: Burials - exhumation of human remains*[11].

[11] http://www.health.nsw.gov.au/policies/pd/2008/pdf/PD2008_022.pdf

10. List of appendices

The following appendices are included to support this procedure.

Appendix A	Identifying Unexpected Archaeological Finds
Appendix B	Road and Fleet Services Escalation Protocol
Appendix C	RFS Unexpected Find Recording Form 418
Appendix D	Photographing Unexpected Archaeological Finds
Appendix E	Key Environment Contacts
Appendix F	Uncovering Bones
Appendix G	Archaeological Advice Checklist
Appendix H	Template Notification Letter

Appendix A

Identifying Unexpected Archaeological Finds

The following images can be used to assist in the preliminary identification of a potential unexpected find (both Aboriginal and non-Aboriginal) during construction and maintenance works. Please note this is not a comprehensive typology.

Top left hand picture continuing clockwise: Stock camp remnants (Hume Highway Bypass at Tarcutta); Linear archaeological feature with post holes (Hume Highway Duplication), Animal bones (Hume Highway Bypass at Woomargama); Cut wooden stake; Glass jars, bottles, spoon and fork recovered from refuse pit associated with a Newcastle Hotel (Pacific Highway, Adamstown Heights, Newcastle area).

Top left hand picture continuing clockwise: Woodstave water pipe with tar and wire sealing (Horsley Drive); Tram tracks (Sydney); Brick lined cistern (Clyde); Retaining wall (Great Western Highway, Leura).

Top left hand picture continuing clockwise: Road pavement (Great Western Highway, Lawson); Sandstone kerbing and guttering (Parramatta Road, Mays Hill); Telford road (sandstone road base, Great Western Highway, Leura); Ceramic conduit and sandstone culvert headwall (Blue Mountains, NSW); Corduroy road (timber road base, Entrance Road, Wamberai).

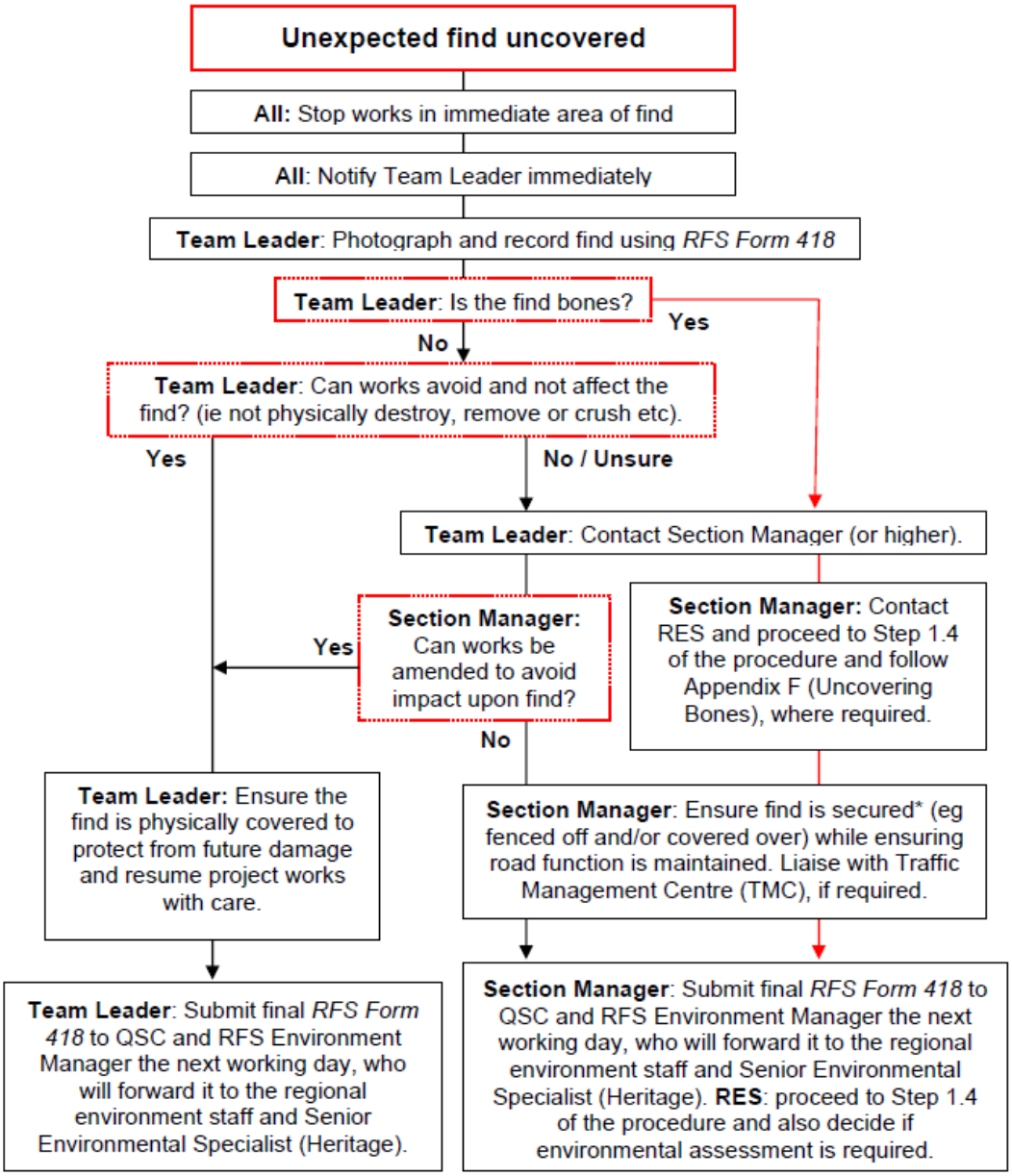
Top left hand corner continuing clockwise: Alignment Pin (Great Western Highway, Wentworth Falls); Survey tree (MR7, Albury); Survey tree (Kidman Way, Darlington Point, Murrumbidgee); Survey tree (Cobb Highway, Deniliquin); Milestone (Great Western Highway, Kingswood, Penrith); Alignment Stone (near Guntawong Road, Riverstone). Please note survey marks may have additional statutory protection under the *Surveying and Spatial Information Act 2002*.

Top left hand corner: Culturally modified stone discovered on Main Road 92, about two kilometres west of Sassafras. The rest of the images show a selection of stone artefacts retrieved from test and salvage archaeological excavations during the Hume Highway Duplication and Bypass projects from 2006-2010.

Appendix B

Road and Fleet Services Escalation Protocol

Road crews in RMS Road and Fleet Services (RFS) undertake routine maintenance works such as patching, cleaning, line marking and milling within the road reserve. In addition, these works are often undertaken at night on urban thoroughfares. A specific escalation protocol has been developed to ensure that disruption to traffic is minimised if an unexpected find is encountered when carrying out such maintenance works.



*Appropriate temporary covering of the find is something that protects it from further damage and that can be removed quickly the next day without damage from re-excavation. For example geofabric and loose, dry asphalt, or a metal plate. Certain unexpected finds (such as human remains) should not be covered with loose material as the re-excavation process is likely to cause further damage to the find. Fencing and immediate action is appropriate in these rare cases.

Appendix C

RFS Unexpected Find Recording Form 418

Transport NSW Roads & Maritime Services	RFS Unexpected Find Recording Form	418

Date:		**Recorded by**	
Project Name:			

Description of works being undertaken (eg Removal of failed pavement by excavation and pouring concrete slabs in 1m x 1m replacement sections).	
Description of exact location of find (eg Within the road formation on Parramatta Road, east bound lane, at the corner of Johnston Street, Annandale, Sydney).	
Description of item found (eg Metal tram tracks running parallel to road alignment. Good condition. Tracks set in concrete, approximately 10cms (100 mm) below the current ground surface).	

Sketch
(Provide a sketch of the find's general location in relation to other road features so its approximate location can be mapped without having to re-excavate it. Also annotate this sketch with the location and direction of any photographs of the item taken).

Action Taken (Tick either A *or* B)

A.	Unexpected find **will not** be affected by maintenance works	☐	**B.**	Unexpected find **will be** affected by maintenance works	☐

A. Describe if and how works were amended to avoid impact to the find and the action taken to cover the item.

B. Describe how works will affect the find. (eg Milling is required to be continued to 200 mm depth to ensure road pavement requirements are met. Milling to required depth would affect the top 50 mm of potential heritage pavement).

Transport Roads & Maritime Services	RFS Unexpected Find Recording Form	418

Attach Photographs. (Take a number of close up and general photographs so anyone off site can understand the location of the find, the material it is made from and any distinguishing features).

Team Leader Signature	

Action: Refer issue to Section Manager (or higher) immediately where 'B' has been ticked.

To be completed by Section Manager

Describe any further considerations to amend project works to avoid unexpected find and if impact is still anticipated.	
Describe action taken to secure site temporarily	
Section Manager Signature	

Action: Escalate to environment and heritage staff where impact to item cannot be avoided.

Appendix D

Photographing Unexpected Archaeological Finds

Removal of the find from its context (eg excavating from the ground) for photographic purposes is not permitted.

Photographs of unexpected finds, in their original placement (*in situ*), assists heritage staff and archaeologists to identify 'finds' soon after being uncovered. Emailing good quality photographs to specialists can allow for better quality and faster heritage advice. The key elements that must be captured in photographs of the find include its position, the general find itself and any distinguishing features. All photographs must have a scale (ruler, scale bar, mobile phone, coin) and a note describing the direction of the photograph.

Context and detailed photographs

It is important to take a general photograph (Figure 1) to convey the location and setting of the find. This will add much value to the subsequent detailed photographs also required (Figure 2).

Figure 2: Close up detail of the sandstone surface showing material type, formation and construction detail. This is essential for establishing date of the feature.

Figure 1: Telford road uncovered on the Great Western Highway (Leura) in 2008.

Photographing distinguishing features

Where unexpected finds (eg artefacts) have a distinguishing feature, close up detailed photographs must be taken of this, where practicable. See Figures 3 and 4 for examples.

Figure 3: Ceramic bottle artefact with stamp.

Figure 4: Detail of the stamp allows '*Tooth & Co Limited*' to be made out. This is helpful to a specialist in gauging the artefact's origin, manufacturing date and likely significance.

Photographing bones

The majority of bones found on site will those of be recently deceased animal bones often requiring no further assessment (unless they are in archaeological context). However, if bones are human RMS must contact the police immediately (see Appendix F for detailed guidance). Taking quality photographs of the bones can often resolve this issue quickly. Heritage staff in Environment Branch can confirm if bones are human or non-human if provided with appropriate photographs. Ensure that photographs of bones are not concealed by foliage (Figure 5) as this makes it difficult to identify. Minor hand removal of foliage can be undertaken as long as disturbance of the bone does not occur. Excavation of the ground to remove bone(s) should not occur, nor should they be pulled out of the ground if partially exposed. Where sediment (adhering to a bone found on the ground surface) conceals portions of a bone (Figure 6) ensure the photograph is taken of the bone (if any) that is not concealed by sediment.

Figure 5: Bone concealed by foliage.

Figure 6: Bone covered in sediment

Ensure that all close up photographs include the whole bone and then specific details of the bone (especially the ends of long bones, the *epiphysis*, which is critical for species identification). Figures 7 and 8 are examples of good photographs of bones that can easily be identified from the photograph alone. They show sufficient detail of the complete bone and the epiphysis.

Figure 7: Photograph showing complete bone.

Figure 8: Close up of a long bone's epiphysis.

Appendix E

Key Environmental Contacts

Hunter region	Senior Environmental Officer	4924 0281
	Aboriginal Cultural Heritage Advisor	4924 0383
Northern region	Senior Environmental Officer	6640 1072
	Aboriginal Cultural Heritage Advisor	6604 9305
Southern region	Senior Environmental Officer	4221 2765
	Aboriginal Cultural Heritage Advisor	4221 2767
South West region	Senior Environmental Officer	6938 1143
	Aboriginal Cultural Heritage Advisor	6937 1647
Sydney region	Senior Environmental Officer	8814 2516
	Aboriginal Cultural Heritage Advisor	8849 2006
Western region	Senior Environmental Officer	6861 1628
	Aboriginal Cultural Heritage Advisor	6861 1658
Pacific Highway Office	Environmental Services Manager	6640 1375
Hume Highway Office	Senior Environmental Officer	6923 3419
Road and Fleet Services	Environment Manager	9598 7721
Environment Branch	Senior Environmental Specialist, Heritage	8588 5754

Heritage Regulators

Heritage Branch Office of Environment and Heritage Locked Bag 5020 Parramatta NSW 2124 Phone: (02) 9873 8500	Minister for Sustainability, Environment, Water, Populations and Communities GPO Box 787 Canberra ACT 2601 Phone: (02) 6274 1111
Planning and Aboriginal Heritage Section Environment Protection and Regulation Group* (Metropolitan) Office of Environment and Heritage PO Box 668 Parramatta NSW 2124 Phone: (02) 9995 5000	Planning and Aboriginal Heritage Section Environment Protection and Regulation Group* (North East) Office of Environment and Heritage Locked Bag 914 Coffs Harbour NSW 2450 Phone: (02) 6651 5946
Environment and Conservation Programs Environment Protection and Regulation Group* (North West) Office of Environment and Heritage PO Box 2111 Dubbo NSW 2830 Phone: (02) 6883 5330	Aboriginal Heritage Protection Section Environment Protection and Regulation Group* (South) Office of Environment and Heritage PO Box 733 Queanbeyan NSW 2620 Phone: (02) 6229 7000

Project-Specific Contacts (*complete as needed*)

Position	Name	Phone Number
Project Manager		
Site/Alliance Environment Manager		
Regional Environmental Officer		
Aboriginal Cultural Heritage Advisor		
Consultant Archaeologist		
Local Police Station		
OEH: Environment Line		131 555

* **Please note:** at the time of finalising this procedure EPRG became part to the Environment Protection Authority (EPA); full title block was yet to be finalised.

Appendix F

Uncovering Bones

All matters relating to uncovering bones and RMS' human remains notification obligations should involve RMS regional environment and heritage staff. They will guide project managers through occurrences of uncovering bones.

This appendix provides project managers with advice (1) on what to do on first uncovering bones (2) the range of human skeletal notification pathways and (3) additional considerations and requirements when managing the discovery of human remains.

1. First uncovering bones

Stop all work in the vicinity of the find. All bones uncovered during project works should be **treated with care and urgency** as they have the potential to be human remains. Therefore they must be identified as either human or non-human as soon as possible by a qualified forensic or physical anthropologist. These specialist consultants can be sought by contacting regional environment staff and/or heritage staff at Environment Branch.

On the very rare occasion where it is *instantly obvious* from the remains that they are human, the project manager (or a delegate) should **inform the police by telephone** prior to seeking specialist advice. It will be '*obvious*' that it is human skeletal remains where there is *no doubt*, as demonstrated by the example in Figure 1. Often skeletal elements in isolation (such as a skull) can also clearly be identified as human. Note it may also be obvious that human remains have been uncovered when soft tissue and clothing are present.

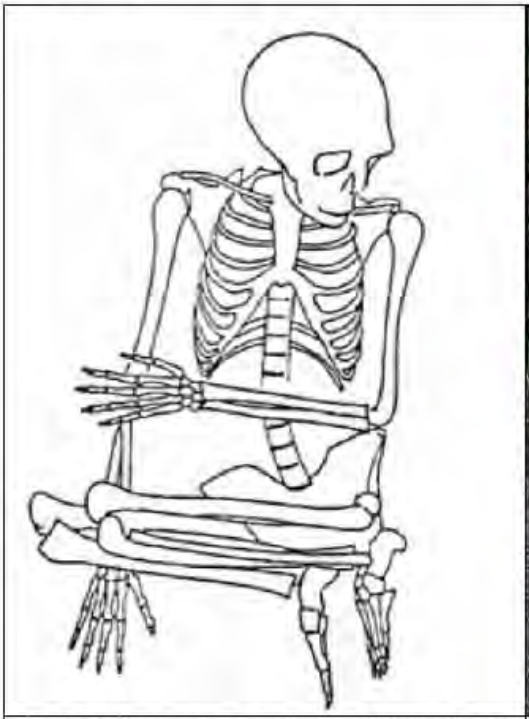


Figure 1: Schematic of a complete skeleton that is 'obviously' human[12].

Figure 2: Disarticulated bones that require assessment to determine species.

[12] After Department of Environment and Conservation NSW (2006), *Manual for the identification of Aboriginal Remains*: 17.

This preliminary phone call is to let the police know that the RMS is undertaking a specialist skeletal assessment to determine the approximate date of death which will inform legal jurisdiction. The police may wish to take control of the site at this stage. If not, a forensic or physical anthropologist must be requested to make an on-site assessment of the skeletal remains.

Where it is not 'obvious' that the bones are human (in the majority of cases, illustrated by Figure 2), specialist assessment is required to establish the species of the bones. Photographs of the bones can assist this assessment if they are clear and taken in accordance with guidance provided in Appendix D. Good photographs often result in the bones being identified by a specialist without requiring a site visit; noting they are nearly always non-human. In these cases, non-human skeletal remains must be treated like any other unexpected archaeological find.

If the bones are identified as human (either by photographs or an on-site inspection) a technical specialist must determine the likely ancestry (Aboriginal or non-Aboriginal) and burial context (archaeological or forensic). This assessment is required to identify the legal regulator of the human remains so **urgent notification** (as below) can occur. Preliminary telephone or verbal notification by the project manager or regional environment staff is considered appropriate. This must be followed up later by RMS formal letter notification as per Appendix H when a management plan has been developed and agreed to by the relevant parties.

2. Range of human skeletal notification pathways

The following is a summary of the different notification pathways required for human skeletal remains depending on the preliminary skeletal assessment of ancestry and burial context.

A. Human bones are from a recently deceased person (*less than* 100 years old).

> **☑ Action**
> A police officer must be notified immediately as per the obligations to report a death or suspected death under s35 of the *Coroners Act 2009* (NSW). It should be assumed the police will then take command of the site until otherwise directed.

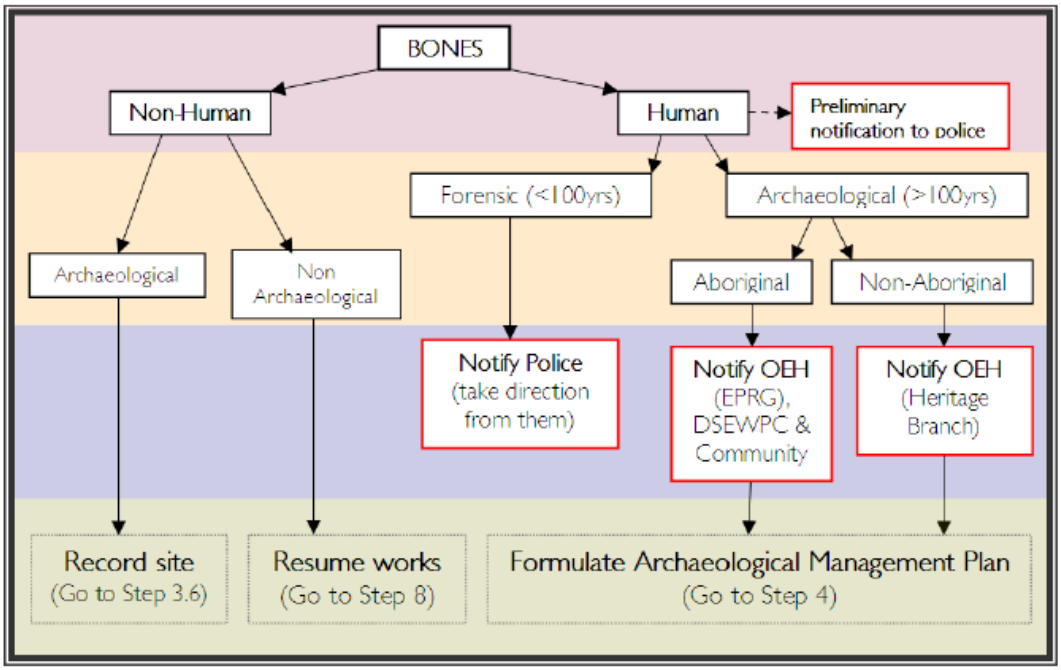
B. Human bones are archaeological in nature (*more than* 100 years old) and are likely to be *Aboriginal* remains.

> **☑ Action**
> The OEH (*EPRG*) and the RMS Aboriginal Cultural Heritage Advisor (ACHA) must be notified immediately. The ACHA must contact and inform the relevant Aboriginal community stakeholders who may request to be present on site. Relevant stakeholders are determined by the RTA's *Procedure for Aboriginal Cultural Heritage Consultation and Investigation*.

C. Human bones are archaeological in nature (*more than* 100 years old) and likely to be *non-Aboriginal* remains.

> **☑ Action**
> The OEH (Heritage Branch, Conservation Team) must be notified immediately.

The simple diagram below summarises the notification pathways on finding bones.



After the appropriate verbal notifications (as described in B and C), the project manager must proceed through the *Unexpected Archaeological Finds Procedure* to formulate an archaeological management plan (Step 4). Note *no* archaeological management plan is required for forensic cases (A), as all future management is a police matter. Non-human skeletal remains must be treated like any other unexpected archaeological find and so must proceed to recording the find as per Step 3.6.

3. Additional considerations and requirements

Uncovering archaeological human remains must be managed intensively and needs to consider a number of additional specific issues. These issues might include facilitating culturally appropriate processes when dealing with Aboriginal remains (such as repatriation and cultural ceremonies). RMS ACHA can provide advice on this and how to engage with the relevant Aboriginal community. Project managers, more generally, may also need to consider overnight site security of any exposed remains and may need to manage the onsite attendance of a number of different external stakeholders during assessment and/or investigation of remains. Project managers may also be advised to liaise with local church/religious groups and the media to manage community issues arising from the find. Additional investigations may be required to identify living descendants, particularly if the remains are to be removed and relocated.

If exhumation of the remains (from a formal burial or a vault) is required, project managers should also be aware of additional approval requirements under the *Public Health Act 1991* (NSW). Specifically, RMS is required to apply to the Director General of NSW Department of Health for approval to exhume human remains as per Clause 26 of the *Public Health (Disposal of Bodies) Regulation 2002* (NSW)[13]. Further, the exhumation of such remains needs to consider health risks such as infectious disease control, exhumation procedures and reburial approval and registration. Further guidance on this matter can be found at the NSW Department of Health website.

In addition, due to the potential significant statutory and common law controls and prohibitions associated with interfering with a public cemetery, project teams are advised, when works uncover human remains adjacent to cemeteries, to confirm the cemetery's exact boundaries.

[13] This requirement is in addition to heritage approvals under the *Heritage Act 1977*.

Appendix G

Archaeological Advice Checklist

The archaeologist must advise the project manager of an appropriate archaeological management plan as soon as possible after site inspection (see Step 4). An archaeological management plan can include a range of activities and processes, which differ depending on the find and its significance. In discussions with the archaeologist the following checklist can be used by the project manager and the archaeologist as a prompt to ensure all relevant archaeological issues are considered when developing this plan. This will allow the project team to receive clear and full advice to move forward quickly and in the right direction. Archaeological advice on how to proceed can be received in a letter or email outlining all relevant archaeological issues.

	Required	Outcome/notes
Assessment and investigation		
• Assessment of significance	Yes/No	
• Assessment of heritage impact	Yes/No	
• Archaeological excavation	Yes/No	
• Archival photographic recording	Yes/No	
Heritage approvals and notifications		
• AHIPs, Section 140, S139 exceptions etc	Yes/No	
• Regulator relics/objects notification	Yes/No	
• RMS' S170 Heritage Register listing requirements	Yes/No	
• Compliance with CEMP or other project heritage approvals	Yes/No	
Stakeholder consultation		
• Aboriginal stakeholder consultation requirements and how it relates to RTA *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI).	Yes/No	
• Advice from regional environmental staff, Aboriginal Cultural Heritage Advisor, RMS heritage team.	Yes/No	
Artefact management		
• Disposal strategy for non-Aboriginal relics or heritage material (eg former road pavement): short term and permanent storage locations (interested third parties should be consulted on this issue).	Yes/No	
• Control Agreement for Aboriginal objects.	Yes/No	
Program and budget		
• Time estimate associated with archaeological work.		
• Total cost of archaeological work.		

Appendix H

Template Notification Letter

[Select and type date]

[Select and type reference number]

[Select and type file number]

[Insert recipient's name and address, see **Appendix E**]

[Select and type salutation and name],

Re: Unexpected archaeological find uncovered during Roads and Maritime Services project works.

I write to inform you of an unexpected archaeological [select: relic and/or Aboriginal object] found during Roads and Maritime Services construction works at [insert location] on [insert date]. [Where the regulator has been informally notified at an earlier date by telephone, this should be referred to here].

This letter is in accordance with the notification requirement under [select: Section 146 of the *Heritage Act 1977* (NSW) or Section 89(A) of the *National Parks and Wildlife Act 1974* (NSW)].

NB: On finding Aboriginal human skeletal remains this letter must also be sent to the Commonwealth Minister for Sustainability, Environment, Water, Populations and Communities (SEWPC) in accordance with notification requirements under Section 20(1) of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth).

[Provide a brief overview of the project background and project area. Provide a summary of the description and location of the find, including a map and image where possible. Also include how the project was assessed under the *Environmental Planning and Assessment Act 1979* (NSW) (eg Part 5). Also include any project approval number, if available].

Roads and Maritime Services [*or contractor*] has sought professional archaeological advice regarding the find. A preliminary assessment indicates [provide a summary description and likely significance of the find]. Please find additional information on the site recording form attached.

Resulting from these preliminary findings, Roads and Maritime Services *[or contractor]* is proposing [provide a summary of the proposed archaeological approach (eg develop archaeological research design, seek heritage approvals and undertake archaeological investigation). Also include preliminary justification of such archaeological impact with regard to project design constraints and delivery program].

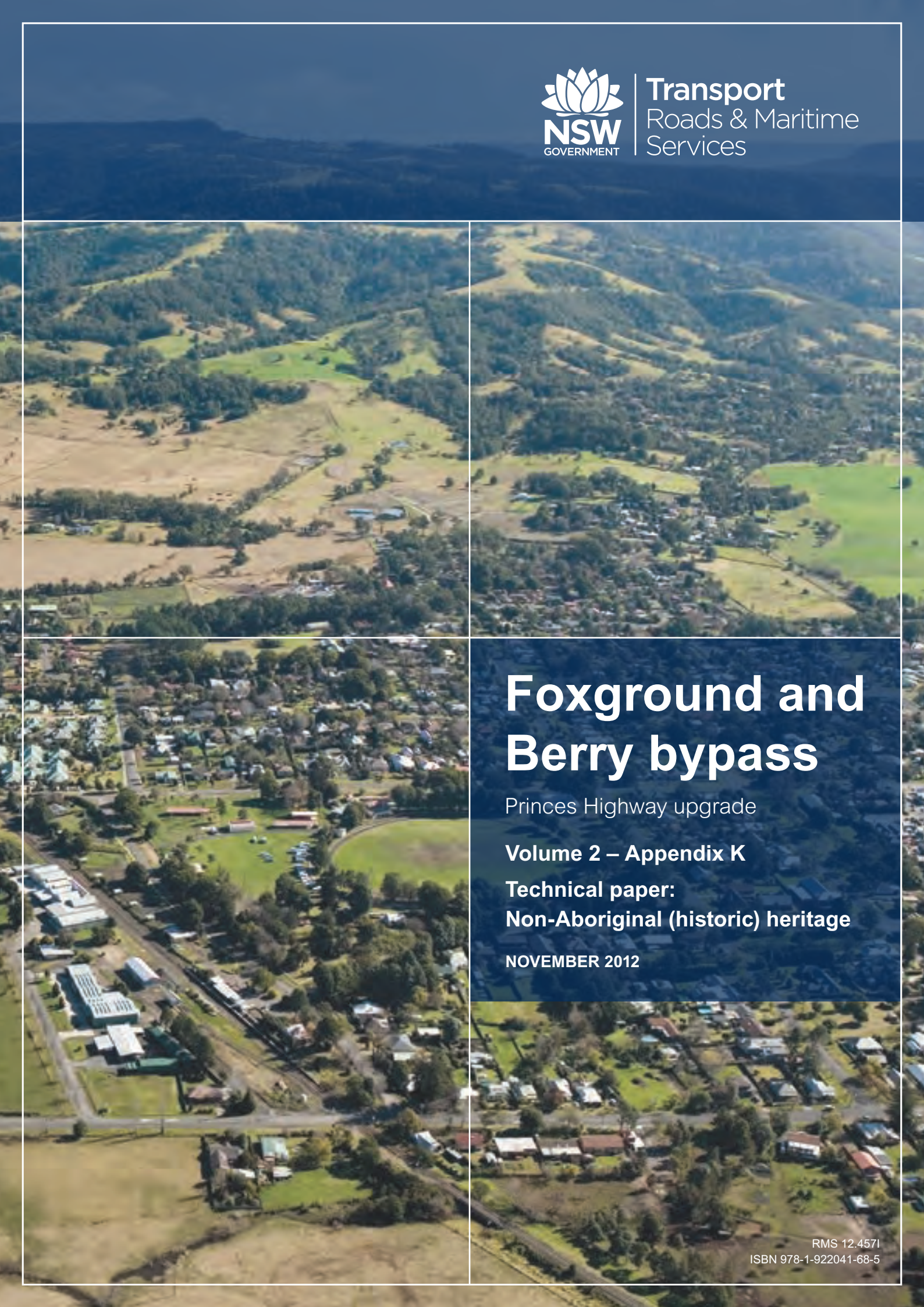
The proposed archaeological approach will be further developed in consultation with a nominated Office of Environment and Heritage [select either EPRG/Heritage Branch, Conservation Team] staff member.

Please contact me if you have any input on this approach or if you require any further information.

Yours sincerely

[Sender name and position]

[Attach the archaeological management plan and site recording form].



Transport
Roads & Maritime
Services

NSW GOVERNMENT

Foxground and Berry bypass

Princes Highway upgrade

Volume 2 – Appendix K

Technical paper:
Non-Aboriginal (historic) heritage

NOVEMBER 2012

RMS 12.457I
ISBN 978-1-922041-68-5

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Foxground and Berry bypass

Prepared for

Roads and Maritime Services

Prepared by

Navin Officer Heritage Consultants Pty Ltd
4/71 Leichhardt Street, Kingston ACT 2604, Australia

On behalf of

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, Australia

November 2012

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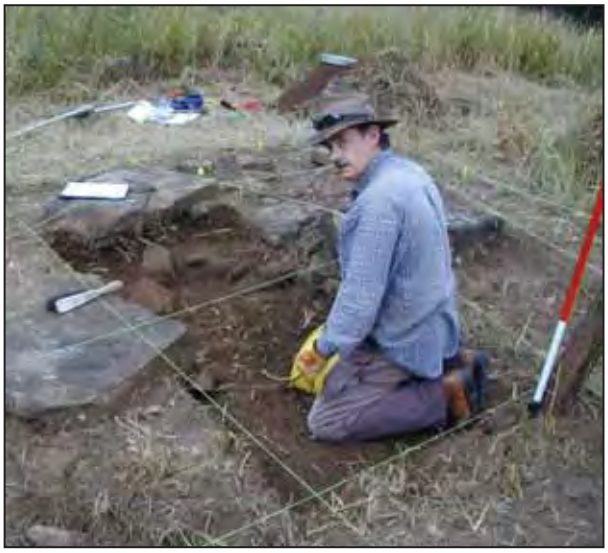
Cotter Dam, ACT, Feb 2008

This report is dedicated to the memory of Dr Lindsay Maxwell Smith (1950 – 2011), Archaeologist.

Lindsay was a valued member of the NOHC team from 2002 onwards. He conducted much of the research, (including a specific oral history program (NOHC 2009b & c)) on which this assessment is based



Shannon Ck, NSW, June 2002

Executive summary

The project

The Roads and Maritime Services (RMS) is seeking approval under Part 3A of the *Environmental Planning and Assessment Act 1979* for the upgrade of 11.6 kilometres of the Princes Highway, to achieve a four lane divided highway (two lanes in each direction) highway with median separation between Toolijooa Road north of Foxground and Schofields Lane, south of Berry (the project). The project would include bypasses of Foxground and Berry.

The project is one of a series of upgrades to sections of the Princes Highway which aims to provide a four lane divided highway between Waterfall and Jervis Bay Road, Falls Creek. This would improve road safety and traffic efficiency, including for freight, on the NSW south coast.

Methodology

The methodology for this assessment included:

- A literature and database review including former heritage studies and current statutory and non-statutory registers.
- Compilation of an historical overview.
- Archaeological survey and field inspection of the project area.
- Archaeological test excavation at one location (G2B H14).
- Documentation of survey and excavation results.
- Assessment of Significance and Impact according to NSW Heritage Branch guidelines.

Field inspection results

Forty field recordings occur within or near (within 200 metres) the project (G2B H10-30, 45, 47-63 and the Southern Illawarra Coastal Plain and Hinterland Cultural Landscape (SICPH CL).

Six of these recordings were not found to have heritage significance against the assessment criteria. These recordings consist of two cottages (G2B H10 and G2B H50), and four twentieth century highway remnants (G2B H12, G2B H18, G2B H24 and G2B H57).

The remaining 34 recordings were found to have heritage significance and are classed as heritage items. These consist of:

- Ten road sections or remnants (G2B H15, G2B H19, G2B H20, G2B H21, G2B H22, G2B H23 G2B H26 G2B H27, G2B H30 and G2B H55).
- One highway bridge (G2B H29).
- Twelve standing buildings or building groups (G2B H11, G2B H13, G2B H16, G2B H17, G2B H25, G2B H28, G2B H45, G2B H47, G2B H49, G2B H51, G2B H56 and G2B H58).
- Five confirmed or potential archaeological deposits comprising former building sites (G2B H14, G2B H48, G2B H52 G2B H53 and G2B H59).
- One quarried rock outcrop (G2B H61).
- One remnant dry stone wall (G2B H54).
- One tree avenue (G2B H62).

One public park (G2B H63).

- One item of movable heritage, a skid mounted work-site shed (G2B H60).
- One cultural landscape, the Southern Illawarra Coastal Plain and Hinterland (SICPH CL).

Eight of these heritage items are included on existing statutory heritage listings (G2B H16, G2B H29, G2B H45, G2B H47, G2B H54, G2B H58, G2B H62 and G2B H63).

The SICPH CL item defines the cultural heritage values of the landscape traversed by the project, and in particular the landscape context of the Berry township. This item relates to two previously defined landscape and conservation areas, the Berry Bolong Pastoral Landscape (from the Shoalhaven Heritage Study (Peter Freeman Pty Ltd 1998)) and the Berry District Landscape Conservation Area (from a recent National Trust Register citation).

Test excavation program

One of five potential archaeological deposits identified during the survey required further archaeological investigation in order to draft appropriate management strategies relative to assessed significance. This site was G2B H14, the location of former buildings at the northern end of the Broughton Creek village (now Berry).

Fifteen areas of test excavation were conducted across G2B H14. Excavation was undertaken using a by-hand methodology. The excavations demonstrated the presence of limited areas of relatively intact archaeological deposit from the turn of the nineteenth-twentieth century. Examples include a cobbled floor, a post hole, and burnt layers with associated artefacts. The northernmost portion of the site appears to be largely sterile below a cap of modern fill. Two hundred and ninety-four items, totalling almost five kilograms in weight, were recovered from the excavation. Material types comprised glass, ceramic, metal and miscellaneous (brick, shell, wood, plastic). The assemblage is broadly characterised by late nineteenth-century or early twentieth-century material culture, with some more recent roadside debris.

The test excavation program demonstrated the need to conduct salvage excavation across that portion of the deposit which would be subject to development impact.

Significance assessment

Of the forty field recordings:

- Six are considered to fall below the significance assessment thresholds inherent within the specified significance criteria (G2B H10, G2B H12, G2B H18, G2B H24, G2B H50 and G2B H57).
- Three cannot be given definitive assessments until the nature of predicted archaeological deposits are confirmed through test excavation. These items have been given indicative assessments of local context significance, subject to confirmation (G2B H48, G2B H52 and G2B H53).
- One is assessed as having State significance (Graham Park – former agricultural research institution).
- The remaining thirty items are assessed as having heritage significance within a local context, according to one or more of the specified significance criteria.

Summary of project impact

Of the 34 heritage items:

- Nineteen would not be directly impacted.
- Six would be partially impacted, and nine wholly impacted.
- Of those not directly impacted:
  - Thirteen occur within 50 metres of the construction footprint.
  - Eleven would be subject to indirect impacts relating to their landscape contexts.

The project would impact upon the heritage values of the SICPH CL by the imposition of a modern structural component onto the landscape. The scale and curvilinear nature of the bypass would contrast with the existing, and broadly nineteenth century character and features of the landscape.

In the general proximity of Berry, the bypass would:

- Impact upon the short and mid-distance view-sheds from the town streetscapes.
- Impose a contrasting and modern road form relative to those parts of the town structured on a grid pattern.
- Impact upon some remnant pastoral open space along the northern margin of the town grid. This margin provides a visually appealing contrast between the urban and rural and contributes towards a general pastoral character for the town.

A number of project aspects respect the heritage values of the surrounding landscape:

- Apart from substantial deviations across the Broughton Creek valley and around Berry, the project would generally follow the original corridor of the first European road constructed for vehicles between Berry and Gerringong – the 1856 Berry Estate Road. This provides a degree of historical and functional integrity to the bypass. It would remain a modern manifestation of an original mid nineteenth century access and transport corridor.
- The visual impact of the bypass from the northern margins of Berry would be mitigated by the construction of a four metre high reinforced soil noise barrier with a landscaped south-facing slope creating a ‘Ha-ha’ effect.
- The construction of a bypass of Berry avoids the need to widen and transform one of the town grid streets to accommodate the highway traffic. If the latter option was adopted it would irrevocably change the amenity and heritage character of the town, and require the full or partial demolition of many properties with heritage value.

Impact mitigation and management

All heritage items subject to direct impact are of an assessed local scale of significance. One site of State significance, the former Graham Park agricultural research station (G2B H51), occurs in close proximity to the project, and action would be taken to ensure that incidental or accidental direct impact does not occur.

The project would directly impact a large proportion of the remaining traces of the 1856 Berry Estate Road (G2B H19, G2B H22, G2B H23, G2B H30 and G2B H55). In most instances, the remains of this roadway consist of low ground-surface relief indicating the presence of a road platform, side ditches, and in some cases cutting and benching. In order to compensate for the loss of these remains, it is proposed to combine a program of archival recording and selective archaeological salvage, with the conservation and public interpretation of a high value and representative portion of the road situated away from the development zone at "Bink's Corner", Broughton Village (incorporating G2B H25, G2B H26, G2B H27 and G2B H52). In combination with an adjacent portion of the existing highway, and the proposed bypass, this location would showcase 150 years of highway construction and engineering. The impact mitigation and management actions proposed for heritage items affected by the project fall into five broad categories:

- No further action (one item).
- Avoid or minimise impact (five items).
- Manage indirect impacts (visual and contextual) only (nine items).
- Conduct archival recordings and/or archaeological excavations prior to impact (14 items).
- Conserve and manage as specified (five items).
- Manage cultural landscape values (one landscape item).

Recommendations

Indirect and accidental impact

1. It is recommended that measures be instigated to protect the following heritage items, or their remaining portions, from accidental impact during construction: G2B H13, G2B H14, G2B H15, G2B H16, G2B H17, G2B H25, G2B H28, G2B H29, G2B H45, G2B H47, G2B H49, G2B H51, G2B H54, G2B H56, G2B H59, G2B H62 and G2B H63. This may involve, but not be limited to, the erection of temporary fencing to define 'no-go' areas.
2. Where there would be impact to the visual and landscape context values of heritage places/items (this is classified as an indirect impact to the place or item), it is recommended that the design, construction and finishing of the project, in the vicinity of the place/item should be realised with the aim of minimising the visual impact to those values. Possible means to achieve this aim include: minimising the height of the road formation and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping. This strategy applies to: G2B H13, G2B H16, G2B H17, G2B H25, G2B H28, G2B H45, G2B H47, G2B H49, G2B H54, G2B H56 and G2B H62.

Nineteenth century road remnants

3. All heritage items comprising nineteenth century road remnants that would be directly impacted by construction, should be the subject of a co-ordinated archival recording program prior to any impact (G2B H19, G2B H22, G2B H23, G2B H30 and G2B H55). This program should include archaeological salvage excavation at selected and representative locations within sites G2B H19, G2B H23 G2B H30 and G2B H55, to record any ditch profiles, subsurface foundations or former surface treatments. The archival recording program should aim to present a researched and documented archival record of the road remnants and the transport systems they formed a part of. The degree and detail of recording required at each remnant will vary according to the nature and preservation of each item.

4. In order to compensate for the loss of a significant proportion of the remaining probable remnants of the former Berry Estate Road, it is recommended that the complex of road related remnants, G2B H26, G2B H27 and G2B H52, situated at 'Bink's Corner' Broughton Village, be permanently conserved, managed and interpreted as a site which illustrates the history of local road construction, function and economics. As part of this management strategy, a detailed recording of these items should be made with the aim of identifying the conservation and management requirements of the complex. Together with the completed project and the existing adjacent highway (known locally as 'the Big Dipper'), this grouping of highway platforms would present, within a limited area, 160 years of road and highway construction history, beginning with the original Berry Estate Road.

   The optimal format(s), location(s) and strategies for the public interpretation of this complex of roads and road remnants should be defined in a Heritage Interpretation Plan (HIP) to be developed as part of the project (refer recommendation 37).

   None of these heritage items would be subject to direct impact from the project. The recommended conservation management of these items is necessary to:

   a. Compensate for the loss of all remaining remnants of the Berry Estate Road within the project area, and
   b. Conserve the best of the remaining sections of the Berry Estate Road.

Twentieth century road remnants

5. A co-ordinated archival recording program should be conducted at heritage items, G2B H15 and G2B H21, prior to any impact. The scope of the recording at each item should be relative to the type and quality of information which can be recovered. This program may include excavation at selected locations, if and where necessary. These recordings should be incorporated into the archival recording report specified in recommendation three, with the aim of creating an integrated record of former highway construction and alignments for the local area.
6. Impact to G2B H15 (adjacent to *Mananga* homestead) should be limited to essential works. This remnant is an important element in the heritage context of the *Mananga* homestead. Direct impact to that portion of the road adjacent to the Mananga homestead should be minimised.
7. No further action is required at field recordings G2B H12, G2B H18 and G2B H24.

Potential archaeological deposits

8. In the event that construction related impacts would occur at the G2B H48 potential archaeological deposit (current location of *Greystanes Lodge*), it is recommended that an archaeological program of monitoring and/or salvage excavation, as appropriate, be conducted with the aim of recording and recovering any artefacts or other information which relates to the former Berry Estate tenant farm at this location.
9. In the event that demolition of the modern farmhouse (previously known as *Greystanes Lodge*), situated on site G2B H48 would be required, it is recommended that a program of archaeological monitoring by an archaeologist be conducted with the aim of recording and recovering any artefacts or information which relate to the former Berry Estate tenant farm.
10. The remnant tree plantings at G2B H48, which predate the modern farmhouse, should be conserved and protected from damage.

11. The potential archaeological site G2B H52, should be conserved and managed as part of the complex of road related sites outlined in recommendation 4.

12. Prior to the commencement of construction impact, a program of archival recording and archaeological salvage excavation, should be conducted at G2B H53, as appropriate, and as required by the nature and significance of the relics encountered.

Archaeological deposits

13. A program of salvage excavation should be conducted within the construction footprint at G2B H14, south of test pit C110. Where the vertical alignment of the existing highway carriageway within the G2B H14 area is to be lowered, the potential for impact to potential archaeological deposits below the current road platform should also be assessed, and salvage excavation conducted according to the determination of that assessment.

    The aim of the salvage excavations would be to recover as much information as possible regarding the history of site use, including the sequence of occupation, property boundaries and activity areas/site functions.

Standing buildings and structures

14. The concrete Broughton Creek bridge (G2B H29), should be conserved, protected from construction impact, and continue to function as a road bridge for the highway when it is converted to a service road following the opening of the project.

15. Subject to the findings of a Heritage Interpretation Plan (refer recommendation no.37), it is recommended that interpretive signage and visitor access, off the existing highway (when it becomes a service road) be installed at heritage item G2B H29 Together with this 1930s bridge and the new bridge proposed as part of the project, the interpretation of this site could include the original early nineteenth century ford crossing at this location, and the sequence of wooden bridges on the original Broughton Village road alignment 620 metres upstream.

16. Where and as feasible, direct development impact to the *Brookside* homestead (G2B H28) should be minimised. The standing structures with heritage value should be protected from construction impact as much as possible and continue to be used as a farmhouse complex or adaptively reused in such a way that heritage values can be maintained.

17. The natural character of Broughton Creek and its banks in the vicinity of the bridge immediately south of the *Brookside* homestead (G2B H28) should be maintained and enhanced as much as feasible. The aim of this strategy is to ameliorate impact to the landscape context by maintaining and reinforcing the visual quality of the creek corridor. This can be achieved by maintaining and augmenting native bank side vegetation, and maximising the distance between the banks and bridge abutments.

18. Prior to impact, an archival recording should be conducted at the *Brookside* homestead (G2B H28), inclusive of those features subject to direct impact, and the homestead building which incorporates structures previously moved from site G2B H59.

19. An archival recording should be conducted of *GlenDevan* (G2B H11) and its grounds prior to any development impact. This record should include documentation of construction methods and materials exposed during any demolition works. Ground disturbance in the area of G2B H11 should be monitored by an archaeologist with the aim of recording any features relevant to the archival recording, and recovering any significant relics.

20. The RMS should remain open to the possibility of a third party proposing to conserve all or part of the G2B H11 structure by moving it to a new location within or near Berry, at that party's expense. In the event of simple demolition, suitable materials (such as bricks and stone masonry) should be recovered and reused (with commemorative identification) in appropriate local infrastructure such as interpretive or entrance features, way-side stop facilities, landscaping or artwork.
21. Direct impact to the existing *Graham Park* (G2B H51) entrance structures (gates, pillars and sculpture of a bull) should be avoided. During construction, temporary fencing should be erected around the feature to identify a 'no-go' area.
22. It is recommended that the design of any access roadworks in the vicinity of the *Graham Park* entrance (G2B H51), should not exclude the capacity for visitors to pull over and safely inspect the entrance feature. If necessary, allowance should be made in the design for the potential future installation of interpretive signage.
23. No further action is required at sites G2B H10 and G2B H58.

Miscellaneous site types

24. Where feasible, direct impact to the remnant dry stone wall G2B H54 should be avoided, and the wall actively conserved and managed. In the event that direct impact to all or part of this site is anticipated then an archival recording of the wall should be conducted prior to any construction impact occurring. Any rock material displaced from the wall as a result of construction works should be retained for use in the repair and conservation management of the original wall.
25. An archival record should be compiled of the quarried rock outcrop, G2B H61, prior to impact.
26. The most northern Poplar tree in the tree avenue G2B H62, should be conserved in situ and would be situated within 10 metres of a proposed water quality pond. Temporary protective fencing should be erected around the root zone of the tree during the period of construction to define a no-go area. Any post-construction planting of the bypass easement in the area of Woodhill Mountain Road should aim to reinforce and replicate the existing landscape character created by the existing planted avenues of poplar trees.
27. Where feasible, the existing front yard plantings at G2B H17 (Hillview homestead) which would fall within the bypass easement (and particularly the Oak tree) should be retained. This may require a minor deviation of the proposed service road.
28. Construction impact to Mark Radium Park (G2B H63) should be minimised wherever feasible.
29. Direct impact to the Shed on skids, G2B H60, should be avoided. It is recommended that the structure be donated and relocated to an appropriate museum, where and if the capability to conserve and store the structure can be demonstrated.

The Southern Illawarra Coastal Plain and Hinterland (SICPH CL)

30. Where feasible, the construction and finishing of the project corridor, embankments and cutting faces should be conducted in such a way to minimise and ameliorate adverse visual impacts, and facilitate the re-establishment of vegetation.
31. The establishment of appropriate forms of vegetation along the project corridor and adjacent areas should be an important strategy in mitigating the broad scale landscape and visual impacts of the project corridor. This should be conducted with an awareness of maintaining important vistas from the project corridor, and the use of vegetation boundaries and alignments that conform to the rectangular patchwork of the surrounding landscape and serve to breakup or scatter the dominant curvilinear of the project corridor.

32. Where there is an opportunity to incorporate artistic elements in structures adjacent to the carriageway, (such as bridgework and retaining and noise abatement walls), it is recommended that designs derived from local cultural heritage themes be considered, especially at locations in close association to places of significance.

33. The design, construction and finishing of the project in the general vicinity of the Berry township should be realised with the dual aims of:

    a) Minimising and mitigating the visual obstruction caused by the project to views of the surrounding pastoral landscape and the Illawarra Range from the streetscape of the town. The construction of a landscaped noise barrier on the southern and eastern side of the bypass adjacent to Berry should form one strategy to realise this aim (refer details in Appendix I of the Environmental Assessment).

    b) Being sympathetic to the heritage values and character of the town and its streetscapes. The use of heritage related design elements and materials should be considered in the design of the town interchanges and adjacent noise barriers.

Ancillary facilities

34. The positioning of ancillary facilities and the conduct of ancillary functions should avoid direct impact to the following features: G2B H54 (dry stone wall on Toolijooa Ridge); significant fabric within G2B H49 (*Oakleigh* farmhouse); the mature tree plantings and potential archaeological deposits at G2B H48 (current location of *Greystanes Lodge*); and the skid mounted work-site shed at *Greystanes Lodge*, G2B H60.

General

35. All heritage items that would remain in whole, or in part, within the project corridor following the end of project construction, should be entered on the Section 170 Heritage and Conservation Register(s) compiled by RMS, and any conservation or management requirements determined and adopted.

36. In the event that unexpected cultural heritage finds are encountered during project construction then the Unexpected Finds Procedure or an RMS approved revised version, should be adopted and followed. The procedure should be included within a Construction Environmental Management Plan or equivalent document.

37. The cultural values of the project area should be promoted, interpreted and presented to current and future public audiences using formats, locations and strategies developed by, and defined in a Heritage Interpretation Plan (HIP). The HIP should be drafted with the involvement of relevant stakeholders, landowners and local Councils. Options to be considered should include interpretive signage, onsite public access and/or viewing points, educational materials, and supporting local museum displays. In particular, the HIP should address how best to provide for the public interpretation of the former Berry Estate road (and the surviving remnant G2B H27), and the Broughton Creek bridge (G2B H29).

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1 Introduction

1.1 Background

The Roads and Maritime Services (RMS) is seeking approval under Part 3A of the *Environmental Planning and Assessment Act 1979* to upgrade 11.6 kilometres of the Princes Highway between Toolijooa Road north of Foxground and Schofields Lane south of Berry, in New South Wales (NSW) (the project), to achieve a four lane divided highway (two lanes in each direction) with median separation. The project includes bypasses of Foxground and Berry.

The project is one of a series of upgrades to sections of the Princes Highway which aims to provide a four lane divided highway between Waterfall and Jervis Bay Road, Falls Creek. This would improve road safety and traffic efficiency, including for freight, on the NSW south coast.

This technical paper was commissioned by AECOM and presents an assessment of the potential environmental impacts on non-Aboriginal cultural heritage (historic heritage). It supplements the environmental assessment for the project as required under Part 3A of the *Environmental Planning and Assessment Act 1979*.

1.2 Project description

The project is located west of Gerringong, between the junction of the Princes Highway and Toolijooa Road, and the junction of the Princes Highway and Schofields Lane. The project traverses Toolijooa Ridge, Foxground, crosses Broughton Creek in three locations and bypasses the town of Berry. The project lies partly within the Kiama local government area (LGA) and partly within the Shoalhaven LGA.

The project comprises the following key features:

- Construction of a four lane divided highway (two lanes in each direction) with median separation (wire rope barriers or concrete barriers where space is constrained, such as at bridge locations).
- Bypasses of the Foxground bends and the Berry township.
- Construction of around 6.6 kilometres of new highway where the project deviates from the existing highway alignment at Toolijooa Ridge, the Foxground bends and the Berry township.
- Provision for the possible widening of the highway (if required in the future) to six lanes within the road corridor and, in some areas, construction of the road formation to accommodate future additional lanes where safety considerations, traffic disruption and sub-optimal construction practices are to be avoided.
- Grade-separated interchanges at:
  - Toolijooa Road.
  - Austral Park Road.
  - Tindalls Lane.
  - East of Berry at the existing Princes Highway, referred to as the northern interchange for Berry.
  - West of Berry at Kangaroo Valley Road, referred to as the southern interchange for Berry.
- A major cutting at Toolijooa Ridge (around 900 metres long and up to 26 metres deep).

- Six lanes (two lanes plus a climbing lane in each direction) through the cutting at Toolijooa Ridge for a distance of 1.5 kilometres.
- Four new highway bridges:
  - Broughton Creek bridge 1, a four span concrete structure around 170 metres in length and nine metres in height.
  - Broughton Creek bridge 2, a three span concrete structure around 75 metres in length and eight metres in height.
  - Broughton Creek bridge 3, a six span concrete structure around190 metres long and 13 metres in height.
  - A bridge at Berry, an 18 span concrete structure around 600 metres long and up to 12 metres in height.
- Three highway overbridges:
  - Austral Park Road interchange, providing southbound access to the highway.
  - Tindalls Lane interchange, providing southbound access to and from the highway.
  - Southern interchange for Berry, providing connectivity over the highway for Kangaroo Valley Road along its existing alignment.
- Eight underpasses including roads, drainage structures and fauna underpasses:
  - Toolijooa Road interchange, linking Toolijooa Road to the existing highway and providing northbound access to the upgrade.
  - Property access and fauna underpass in the vicinity of Toolijooa Ridge at chainage 8400.
  - Dedicated fauna underpass in the vicinity of Toolijooa Ridge at chainage 8450.
  - Property access underpass between Toolijooa Ridge and Broughton Creek at chainage 9475.
  - Combined drainage and fauna underpass in the vicinity of Austral Park Road at chainage 12770.
  - Combined drainage and fauna underpass in the vicinity of Tindalls Lane at chainage 13320.
  - Dedicated fauna underpass in the vicinity of Tindalls Lane at chainage 13700.
  - Property access underpass between the Tindalls Lane interchange and the northern interchange for Berry in the vicinity of at chainage 15100.
- Modifications to local roads, including Toolijooa Road, Austral Park Road, Gembrook Road, Tindalls Lane, North Street, Queen Street, Kangaroo Valley Road, Hitchcocks Lane and Schofields Lane.
- Diversion of Town Creek into Bundewallah Creek upstream of its confluence with Connollys Creek and to the north of the project at Berry.
- Modification to about 47 existing property accesses.
- Provision of a bus stop at Toolijooa Road and retention of the existing bus stop at Tindalls Lane.
- Dedicated u-turn facilities at Mullers Lane, the existing highway at the Austral Park Road interchange, the extension to Austral Park Road and Rawlings Lane.
- Roundabouts at the southern interchange for Berry and the Woodhill Mountain Road junction with the exiting Princes Highway.
- Two culs-de-sac on North Street and the western end of Victoria Street in Berry.

- Tie-in with the existing highway about 75 metres north of Toolijooa Road and about 440 metres south of Schofields Lane.
- Left in/left out only provisions for direct property accesses to the upgraded highway.
- Dedicated public space with shared pedestrian/cycle facilities along the southern side of the upgraded highway from the playing fields on North Street to Kangaroo Valley Road.
- Ancillary operational facilities, including permanent detention basins, stormwater treatment facilities and a permanent ancillary facility site for general road maintenance.

Construction activities as part of the project would include the following:

- Site preparation and establishment works.
- Temporary construction facilities, including construction compounds, stockpile sites, creek crossings, sediment control basins and haulage roads.
- Temporary works, including relocation/protection of services, tie-ins, traffic facilities and side tracks.
- Earthworks and bridge construction.
- Pavement construction.
- Drainage construction.
- Street furniture installation.
- Site restoration.

The project and the key features of the project are shown in **Figure 1.1**.

During detailed design, refinements could be made to the design features and construction methods (refer to Chapter 4 of the environmental assessment).

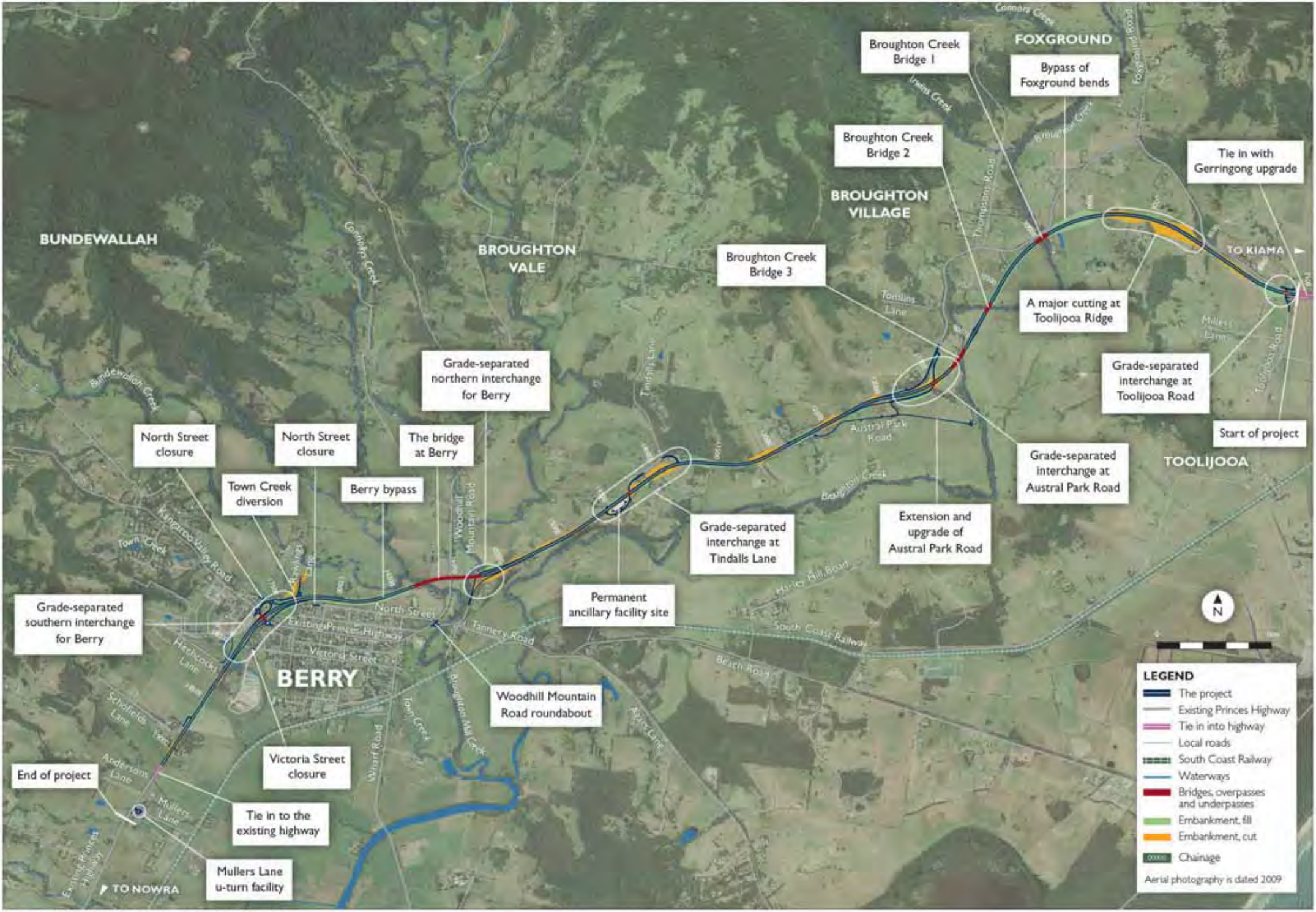


Figure 1.1: Concept design and key features of the project

1.3 Previous related heritage assessments

AECOM was engaged by RMS in December 2006 to carry out an Options and Route Selection Study, Concept Development and Environmental Assessment for the upgrade of the Princes Highway between Gerringong and Bomaderry on the South Coast of New South Wales. Following the Route Selection Study, the upgrade program was divided into three separate projects, of which the current project comprises the middle section of the original program.

The following non-Aboriginal cultural heritage assessments and studies were conducted as part of the Gerringong to Bomaderry assessment prior to the assessment outlined in this report:

- A preliminary Non-Aboriginal heritage assessment, conducted at the route options assessment stage. This study involved:
  - Literature and heritage database reviews.
  - Mapping of known sites.
  - Provision of a predictive model for Non-Aboriginal heritage sites (Navin Officer Heritage Consultants 2007b).
  - An oral history recording program (AECOM Australia 2009)

- A field survey and inspection of the project. The survey comprised:
  - Archaeological survey of surface features and structures.
  - Archaeological survey of the limited extent of ground surface exposures (most of which have occurred within the existing road reserve).
  - A predictive assessment of subsurface archaeological potential (Navin Officer Heritage Consultants 2011).

The concept design upon which the current assessment is based, was developed and refined with consistent reference to known and potential cultural heritage constraints. As a consequence, the design now avoids many items which would have been impacted in earlier versions. The following is a summary of these design revisions:

- The proposed location of the bridge over Broughton Mill Creek at Berry has been moved upstream to avoid direct impact to the Mananga homestead property (G2B H16), and to avoid close proximity and visual impact to buildings belonging to the Pulman Street Conservation Area, notably ‘Constables Cottage’ or “Wyndree” situated at the northern boundary of the conservation area.
- A proposed round about at the intersection of the (current) Princes Highway with Tannery Road has been replaced with a roundabout at the intersection with Woodhill Mountain Road. The Tannery Road option was situated within the Pulman Street conservation area and would have impacted upon the contextual landscape values of this area.
- The intersection of Schofields Lane and the upgraded highway has been revised to avoid impact to the entrance feature and remaining driveway at Graham Park, a former agricultural research institution with State significance (G2B H51).
- The proposed alignment of the Foxground bypass in the area of Broughton Village was moved to the east to avoid direct impact to the Sedgeford homestead (G2B H25), and a potential archaeological deposit at (former) ‘Greystanes Lodge’ (G2B H48), and to minimise impact to the outbuildings and property at Brookside (G2B H28).
- The concept design allows the retention of the current highway bridge over Broughton Creek (G2B H29) as part of a future service road. This bridge is listed on the RMS Section 170 Heritage and Conservation Register.

1.4 Legislative approval and requirements

The project is being assessed under the *Environmental Planning and Assessment Act 1979.* The Director-General's requirements (DGRs) for the project were issued on 11 February 2011 by the Department of Planning and Infrastructure and are addressed in the environmental assessment. The DGRs relevant to non-Aboriginal heritage are provided in **Table 1.1** and are addressed in this report.

Table 1.1: DGRs for non-Aboriginal heritage

Director-General's requirements
Aboriginal and historic heritage – including but not limited to:
An assessment of the impact of the project on historic heritage values, in particular impacts on the historic township of Berry.

1.5 Report outline

This report:

- Describes the environmental setting of the study area.
- Provides a background of local and regional archaeology and history for the study area.
- Describes previously recorded or registered heritage items within or near the project.
- Describes the results of the field survey.
- Provides heritage significance assessments and statements of significance for all heritage items.
- Identifies the potential and anticipated impact of the project on heritage items.
- Provides impact mitigation and management recommendations for all potentially affected heritage items.

2 Study methodology

2.1 Literature and database review

A range of archaeological and historical data relevant to the project was reviewed. This literature and data review was used to determine if known historical sites were located within the area under investigation, to facilitate site prediction on the basis of known regional and local site patterns, and to place the project within an archaeological and heritage management context. The review of documentary sources included heritage registers and schedules, local histories and archaeological reports.

Sources of historical information included regional and local histories, heritage studies and theses; parish maps; newspaper articles, local museum displays and websites, and where available, other historical maps, such as Crown survey plans.

Navin Officer Heritage Consultants (NOHC) greatly appreciate the assistance in local historical research provided by members of the Berry and District Historical Society Inc.

Searches were undertaken of the following statutory and non-statutory heritage registers and schedules (updated July 2012):

2.1.1 Statutory lists

World Heritage List

- The National Heritage List (Australian Heritage Council).
- The Commonwealth Heritage List (Australian Heritage Council).
- The State Heritage Register (NSW Heritage Branch, Office of Environment and Heritage).
- Section 170 Heritage and Conservation Register compiled by the Roads and Maritime Services.
- Section 170 Heritage and Conservation Register compiled by Rail Corp.
- Existing and draft Heritage Schedule(s) from the Shoalhaven and Kiama Local Environmental Plans.

2.1.2 Non-statutory lists

- Australian Heritage Database (Department of Sustainability, Environment, Water, Population and Communities).
- The State Heritage Inventory (NSW Heritage Branch, Office of Environment and Heritage).
- Australian National Shipwreck Database (Department of Sustainability, Environment, Water, Population and Communities).
- The Register of the National Estate (Australian Heritage Council).
- Register of the National Trust of Australia (NSW).
- Australian Institute of Architects, Heritage Buildings List.
- Royal Australian Institute of Architects Twentieth Century Register of Significant Buildings.
- Engineers Australia (Engineering Heritage Recognition Program).

2.2 Consultation with statutory authorities

Consultation with the Heritage Branch (OEH) undertaken to date includes:

- Formal notification of the project by RMS.
- A meeting with the Heritage branch of OEH on 2 August 2012 to present the project and discuss the assessment and its outcomes.

Additionally, information has been accessed from the State Heritage Inventory, State Heritage Register and Minutes of the State Heritage Register Committee.

Commensurate with the local level of significance of all the heritage items subject to potential impact from the project, the majority of consultation with government authorities has occurred with heritage staff of the Shoalhaven City and Kiama Municipal Councils. This has included the provision of heritage schedule and heritage inventory information, discussions regarding the status of unlisted items, and the provision of information updates on fieldwork and findings.

2.3 Archaeological survey

An archaeological field survey and inspection was conducted over a period of three months (February to April) in 2009 in multiple survey events according to property access availability and local weather conditions. This program was conducted as part of a wider survey extending between Bomaderry and Gerringong. Isolated and supplementary inspections, specific to the project, have also occurred in 2010 and 2011.

The survey involved inspection both on foot and via vehicle, depending on property access and ground visibility constraints. The intensity of the survey varied according to an appreciation of ground surface visibility, archaeological potential, historical research, and the interpretation of historical mapping and aerial photography.

The field assessment involved the inspection of standing structures, surface and above ground archaeological remains, and an assessment of the potential for subsurface archaeological material.

The area subject to archaeological survey and cultural heritage assessment consisted of the corridor of the preferred route for the project, defined as 200 metre either side of the alignment centreline (**Figure 1.1**).

General location mapping of all recordings is presented in Appendix A.

2.4 Recording codes and heritage item definition

All items recorded in the field (field recordings) have been given a recording code with the prefix G2B H (standing for Gerringong to Bomaderry – Historical), and a consecutive number based on all recordings made across the three Princes Highway upgrade projects between Gerringong and Bomaderry. As a consequence, the numbering sequence in any of the separate projects may be discontinuous. This system originates from the commencement of these projects as a single project.

For this assessment, a distinction has been made between *field recordings* and *heritage items*. A *field recording* refers to any recorded item or site, regardless of its assessed heritage significance. A *heritage item* refers to an item or site which is assessed to have heritage significance which satisfies or exceeds the threshold for significance within a local context (as defined in the NSW *Heritage Act 1977,* refer Section 7.1). Field recordings which were not found to be heritage items have not been considered further in impact identification and mitigation analysis.

The terms *site, item*, and *recording* when used in isolation, may refer to both heritage recordings and heritage items.

2.5 Archaeological test excavation

Five potential archaeological deposits were identified as a result of the archaeological survey (G2B H14, G2B H48, G2B H52, G2B H53 and G2B H59 (see Appendix A)). It was determined that only one of these locations required further archaeological investigation in order to draft appropriate management strategies relative to assessed significance. This site was G2B H14, the location of former buildings at the northern end of the Broughton Creek village (now Berry). Of the remaining four potential archaeological deposits, two would not be subject to direct impact and the others would not require further investigation in order to determine an appropriate management strategy.

Excavation of test pits at site G2B H14, Berry, was conducted by hand, and carried out over a period of two weeks during May and July 2011.

A detailed account of the excavation procedure and artefact treatment employed is at Appendix C.

A 120 metre x six metre section of the site was pegged out along the western margin of G2B H14. An alphanumeric grid of one metre x one metre squares was established across this area (aligned to a bearing of 16 degrees) with each grid square allocated a number between '1' and '120' from south to north, and 'A' to 'F' from west to east (**Figure 2.1** and **Figure 5.1**). Each of these one x one metre grid squares was further divided into 50 centimetre x 50 centimetre quadrats identified by roman numerals (northwest: I, northeast: II, southwest: III and southeast: IV).

The site was recorded using an automatic level in conjunction with a tape and compass survey and detailed photographic recording.

The test excavation was undertaken using shovels (including a lightweight pneumatic jack hammer fitted with a shovel-head), trowels and handpicks. Soil recovered from the excavation was 'dry-sieved' through metal sieves with four millimetre meshed apertures (**Figure 2.2**). The excavated area was backfilled with soil recovered from the excavations, and the whole area was re-covered with grass, soil and stones removed from the surface of the site before excavation.

Excavation proceeded in two primary ways:

- Careful excavation following stratigraphic contexts in order to determine the nature of fine scale relationships between artefacts, features and individual contexts.
- Sectioning through stratigraphic contexts in order to obtain an appreciation of broader site formation sequences.

Through these combined techniques, once the presence of layers such as modern introduced fill had been identified, removal of overburden was undertaken utilising tools such as a jack hammer. The archaeological deposits below were then excavated in finer detail by trowel and brush, in keeping with the nature of the questions being tackled in any given excavation area.

Figure 2.1: Layout of excavation grid at G2B H14 (Base image - Google Earth 2011)

Figure 2.2 Sieve station at G2B H14

2.6 Project personnel

The archaeological survey was conducted by archaeologists Kelvin Officer, Kerry Navin and Deirdre Lewis-Cook. Background and historical research was conducted by Lindsay Smith, Kelvin Officer and Caroline Plim.

The test excavation program was directed by Rebecca Parkes. Archaeologists Kelvin Officer, Sam Harper, Damian Tybussek, Emily Cobbald, Mirani Litster and Tom Knight undertook the excavation, with assistance from field assistants Jo Dibden, Glenda Hyde, Phil Price and Alexis Schlegel.

The report was written by Kelvin Officer and Rebecca Parkes.

2.7 Recording parameters

Historical archaeology refers to the 'post-contact' period (at and following the start of the written record) and includes: domestic, commercial and industrial sites as well as most maritime sites. It is the study of the past using physical evidence in conjunction with historical sources. The primary types of places or items that may form part of the historical archaeology context include:

1. Below ground evidence, including building foundations, occupation deposits, features and artefacts.
2. Above ground evidence, including buildings, works, industrial structures and relics that are intact or ruined.
3. Areas of land that display evidence of human activity or occupation.
4. Shipwrecks, deposits and structures associated with maritime activities.

Within these broad parameters, an historical archaeological site may include:

- Topographical features and evidence of past environments (ie resident in pollens and diatoms).
- Evidence of site formation, evolution, redundancy and abandonment (ie features and materials associated with land reclamation, sequences of structural development, demolition/deconstruction, and renewal).
- Evidence of function and activities according to historical theme(s) represented (eg an industrial site may contain diagnostic evidence of process, products and by-products).
- Evidence associated with domestic occupation including household items and consumables, ornaments, personal effects and toys.
- Evidence of diet including animal and fish bones, and plant residues.
- Evidence of pastimes and occupations including tools of trade and the often fragmentary signatures of these activities and processes.
- Methods of waste disposal and sanitation, including the waste itself which may contain discarded elements from all classes of artifact as well as indicators of diet and pathology.
- Any surviving physical evidence of the interplay between site environment and people.

The information found in historical archaeological sites is often part of a bigger picture which offers opportunities to compare and contrast results between sites. The most common comparisons are made at the local level, however, due to advances in research and the increasing sophistication and standardisation of methods of data collection, the capacity for wider reference (nationally and occasionally, internationally) exists and places added emphasis on identification and conservation of historical archaeological resources.

3 Environmental context

3.1 Broad scale context

The project consists of an 11.6 kilometre traverse across the valley floors and fringing spurs and slopes of the Southern Illawarra Coastal plain.

The coastal plain consists of the rolling hills, littoral zone and valley floor topography situated downslope and downstream of the basal ranges and spurs of the Cambewarra Range (a southern extension of the Illawarra Escarpment). The boundary between the foothills and the coastal plain is not distinct and an approximate cut-off would be the 100 metre to 140 metre contour (Above Height Datum (AHD)).

The basal slopes bordering the coastal plain have formed from the Berry Formation (siltstone, shale and sandstones), the Broughton Tuff (tuff and tuffaceous sandstone), and the Bombo Latite. The former two are metamorphic sedimentary formations, the latter a series of igneous lava flows. The Bombo Latite has formed the watershed ridges and higher ground that subdivide the various catchments and valley floors in the Kiama and Gerringong region. It dominates the higher relief of the eastern portion of the project, notably the crest and upper slopes of Toolijooa Ridge and the mid-range of the western slopes of the Broughton Creek valley adjacent to Broughton Village. The lower slopes of Toolijooa Ridge are comprised of the Kiama Tuff (trachytic tuff). Elsewhere across the western half of the project, basal slopes and watershed ridges have formed from the Berry formation.

The valley floor of the coastal plain presents a low relief topography of quaternary fluvial sedimentary deposits which typically includes a suite of depositional landforms such as colluvial fans, flood plain, terrace sequences, current and former streambeds (including palaeochannels), wetland basins and old delta deposits. Quaternary fluvial deposits are encountered on the floor of the Broughton and Broughton Mill Creek valleys.

The majority of the fluvial valley deposits were laid down some 20,000 to 30,000 years ago and the high terrace levels probably date to around 29,000 years ago (Walker 1962). There has been a marked increase in water runoff and the rate of sediment discharged from major Illawarra streamlines in the last 100 years (Wollongong City Council 1976). The increase in sedimentation is attributable to the great disruption of vegetative cover, and the consequent erosion caused by European clearing and agriculture. A consequence has been the deposition of sediment layers across the surface of the plain's basins and fans, causing pre-historic land surfaces to be buried and obscured. Another impact is increased rates of erosion and bank failure.

The town of Berry is situated at a point where the fluvial deposits of the Broughton Mill Creek valley (including Bundewallah Creek) interface with the former estuary embayment of the lower Shoalhaven. Upon entering the estuary, these streams would have dumped their sediments, and formed a small delta which extended progressively from north south into the embayment, prior to its infilling by about 4000 years ago (Wearne 1984:Fig 6.1, Woodroffe et al. 2000).

The sedimentary facies of the coastal margin are dominated by marine and aeolian sediments deposited as a result of prograding coastlines after high sea levels. These consist of estuarine deposits, as well as former sand barriers, dune and beach ridges. Around 8000 years ago, the sea was more than 10 metres below the present level, and reached its present level between 6000 to 6500 years ago. This is known as the post glacial marine transgression (Roy 1994, Thom and Roy 1985, Woodroffe et al. 2000).

Following stabilisation of the former, and the current sea level, sand barriers formed across drowned valley embayments, creating a series of estuarine environments along the eastern seaboard, which subsequently and variously filled with sediment (Roy 1994). The plains of the lower Shoalhaven River are a large scale example of this process. They demonstrate an evolution from a brackish water estuarine environment to freshwater alluvial plains. When the sea reached its present level, most of the plains were flooded to form a large coastal embayment. Following the incipient formation of a sand barrier (of which Comerong Island is an evolved remnant), a coastal lagoon and estuary, similar in extent to Lake Illawarra must have been formed. This lagoon received fluvial input from Broughton Creek to the north and the Shoalhaven River to the west. The gradual infilling of the estuary then proceeded, with a pattern characterised by sedimentation around the periphery and gradual infill in the centre of the flood basin. Most of the plains adjacent to Broughton Creek were infilled between 5000 and 4000 years ago. Infill of the estuary basin was largely complete by 3000 years ago (Woodroffe et al. 2000).

During the last 2000 to 3000 years, the Shoalhaven River appears to have been channelized within levee deposits for most of its course across the plain. Isolated flood basins have persisted to the north and south (Woodroffe et al. 2000).

3.2 Small scale context

The project traverses a series of ridge and spurline slopes, interspersed by valley floor flats and fringing toe slopes. The far eastern end consists of a traverse of the east facing slopes of the Toolijooa Ridge. This forms the watershed between the Crooked River and Broughton Creek catchments, and is the highest point of the project reaching approximately 100 metres AHD. The ridge is a locally dominant, bedrock based, topographic feature which bisects the coastal plain. It extends from Currys Mountain (about 320 metres AHD), two kilometres to the north of the project, to within one kilometre of Seven Mile Beach, four kilometres to the southeast.

West of Toolijooa Ridge, the project traverses obliquely across the basal slopes and floor of the Broughton Creek valley. Broughton Creek is a major drainage line and the largest catchment of the southern Illawarra coastal plain north of the Shoalhaven. The project crosses the creek three times. The localities of Broughton Village and Broughton are situated within this valley, along the historical corridor of the highway. Broughton Village remains a loose concentration of residential buildings and small lot farm holdings, which boasts a history with a higher population and former public and community buildings.

From Tindalls Lane, the project follows the crest of a low spurline which forms the watershed between Broughton Creek to the east, and Broughton Mill Creek to the west. The project traverse of this spurline descends from around 50 metres, to less than 10 metres AHD, at the crossing of Broughton Mill Creek.

The project then traverses the fluvial sedimentary deposits, flats and palaeochannels of the Broughton Mill Creek, and Bundewallah Creek (a tributary of the former), to the north of the Berry township, before crossing a low bedrock formed spurline at the western end of the town (Berry Mountain Road). From this point the project turns southwest, paralleling the current highway corridor and traversing a series of unnamed minor tributary drainage lines and low interfluve spurs, which drain 800 metres downslope (southeast) to a former wetland basin which form part of the lower flood plain of Broughton Creek.

4 Historical context

4.1 Historical overview

4.1.1 Municipalities

The project study area lies within the administrative boundaries of the Kiama and Shoalhaven municipalities.

The Kiama jurisdiction was determined in the recent past on 11 June 1954. This area originated from the aggregation of smaller town and village-based municipalities, which in turn began as a result of European pastoral activities centred on a number of sizeable land grants in the region as early as the 1820s. By 1850, Alexander Berry had consolidated his estate, which extended close to the southern and western limits of Gerringong. Before the 1820s, except for a few intrepid cedar cutters, the district was mostly unknown to Europeans.

Local Government in the Shoalhaven began on 26th October 1868 with the incorporation of two new Municipal Councils north of the river, Broughton's Creek and Bomaderry and Numbaa on the south side. This achievement by local petitioners for the privilege of establishing their local Councils followed the abortive attempt of James Graham to set up the Municipal Council of Shoalhaven. This Council was proclaimed on 22nd September 1859, but Alexander Berry objected to his lands being included in the Municipality and applied to the Supreme Court for an injunction. Mayor James Graham appealed to the Privy Council, which delivered its findings, in favour of Berry in 1865. The Council became defunct.

Over the next few years the demand for Local Government by residents of the widely scattered settlements saw other Municipal areas declared. These smaller Councils amalgamated into one council, the Shoalhaven Shire Council in 1948. The Shire of Shoalhaven was proclaimed the City of Shoalhaven on 1st August 1979 (Robyn Florance n.d.).

4.1.2 Early exploration

In April 1770, Captain James Cook was the first European to sight the eastern shores of the region while sailing north towards Botany Bay. Cook named Pigeon House Mountain, Cape St George and noted the entrance of what seemed to be a bay (Jervis Bay), the inner north head of which he named Longnose Point, before passing Kiama's shore and on to further exploration.

Nothing more of the area was recorded until after the settlement of Sydney in 1788. On 27 July 1791, Captain Weatherhead of the Matilda discovered Jervis Bay, which he named Matilda Bay after his ship, but the name was not retained. Following his visit to the bay on 18 August 1791, Naval Lieutenant Bowen provided the name 'Port Jervis' in honour of Sir John Jervis. Whaling ships immediately began calling there for shelter and water.

The district was first crossed overland by Europeans when Clarke and the remaining surviving sailors of the Sydney Cove, which was wrecked in Bass Strait and again at Point Hicks in May 1797, passed through it in April of that year. Later in 1797, The Cumberland was wrecked south of Jervis Bay in 1879 and the survivors also made their way overland to Sydney.

In December 1797, George Bass, during his voyage of coastal exploration in a whaleboat with a crew of six seamen, landed in a sheltered bay, later named Kiama Harbour, and followed around the bight of Seven Mile Beach to discover the mouth of a river, which he named Shoals Haven. He spent three days examining the river, noting the fertile banks that he thought would not be subject to flooding (Bayley 1975:15-16, 1976:15).

Knowledge of the area was advanced when on 10 March 1805, Lieutenant Kent of HMS Buffalo returned to Sydney after examining the district overland 18 miles north from Jervis Bay with James Meehan, the assistant Surveyor-General. Information from that expedition confirmed that the area was originally covered with rainforest, brush cedar, soft and hardwoods and a variety of bushes, palms, vines and ferns.

Independent cedar getters were in the Shoalhaven from at least 1811. After grounding on the shoals, the Speedwell managed to bring the first recorded cargo of cedar from the Shoalhaven River to Sydney in December 1812. The timber industry then grew in scale, exploiting the patches of cedar on the rivers and creeks, but the main concentration was in the Long Brush, which stretched from Kiama to Jamberoo (Peter Freeman Pty Ltd 1998:11).

A cedar party comprising George Wood, Jones and Dawson was lost in early 1815 and a search located one body, said to be that of Wood, all having been killed by Aborigines. Following that episode, Governor Macquarie forbade the cedar cutters from visiting the district.

Exploration from landward began in February 1818 when Dr Charles Throsby and James Meehan set out from Sydney to find an overland route to Jervis Bay. The party reached Kangaroo Valley, crossed the Shoalhaven and reached Jervis Bay but found the route to be impractical. To find a better route in 1819, two surveyors, John Oxley and James Meehan, explored Jervis Bay, Currambene Creek and the site of Nowra. From there Meehan went due north; however, that inland section did not offer a feasible route for wheeled vehicles.

The need for a better route from the Southern Highlands was met, to an extent, in 1821 by a new route pioneered by Hamilton Hume and Charles Throsby through Tallaganda Shire, which Hume reported could be made along a line of where he marked the trees. However, the route was not developed until the 1840s when The Wool Road from Braidwood via Nerriga, Sassafras and Wandandian was created.

No sooner had Hume returned from that expedition when, in January 1822, he left Sydney in the Snapper with Lieutenant Johnston and Alexander Berry to explore the coastal rivers, sailing up the Clyde and trudging inland to the Pigeon House. Although it was a government sponsored voyage it appears that Berry's purpose was to seek out land on which he could make a settlement after an adventurous life of roving in his early days (Bayley 1975:20).

4.1.3 Nineteenth-century estates in the Foxground and Berry bypass study area

The Berry Estate

After a brief stay in Sydney in 1808 during his early career as an international merchant, Alexander Berry returned to London in 1812 by way of Cadiz. In Cadiz Berry met Edward Wollstonecraft, who subsequently became Berry's London agent, and later his partner when they decided to start a business in Sydney. Berry returned to Sydney in July 1819, and Wollstonecraft arrived in September. While Wollstonecraft supervised their George Street business, Berry visited England in March 1820, carrying Governor Macquarie's dispatches, one of which described him as 'an eminent merchant of this place'. In 1827, Berry married Wollstonecraft's sister Elizabeth.

Like other merchants Berry and Wollstonecraft often had to accept stock in payment of debts, and Berry sought a grant of land on which to accommodate the stock. Macquarie refused, as Berry was about to leave for England, but promised him a grant when he took up permanent residence. While he was away Wollstonecraft obtained a grant and located part of it on the North Shore where he built a cottage, 'Crow's Nest'.

On Berry's return he sought a site for the grants made to him and Wollstonecraft, travelling widely even in unsettled districts because 'Everybody was flocking to the Hunter River, Bathurst, and other places and all were elbowing one another. But we neither wished to elbow any one nor to be elbowed'. Berry first visited the Shoalhaven in January 1822, taking the cutter *Snapper* into Crook Haven (formerly Shoals Haven) from which he proceeded overland to examine the country on either side of the river. The rich alluvial soils and natural grassy 'meadows' led him to choose the Shoalhaven as the site for an estate and he returned in June 1822 to occupy it.

In February 1822, Berry and Wollstonecraft had jointly applied for a grant of 10,000 acres under the regulation introduced by the Governor that those accepting grants should maintain, free of expense to the crown, one convict for each 100 acres of the grant. This grant was approved by Governor Brisbane, though the deed was not issued until 1830. It was located on the southern side of the river between the Shoalhaven and Crookhaven Rivers, but Berry established his headquarters at the foot of Mount Coolangatta on the northern side of the river.

The grant to 'Messrs Berry and Wollstonecraft', "Coolloomagatta", was between Broughton Creek and the government reserve along the beach to Black Head and Crooked River, to which was added a 2,000 acre grant on the south side at "Numbaa".

In July 1822, Berry decided that his station would be built at the southeastern foot of Mount Coolangatta. He called it "Cullengatty Farm". A store and huts were erected on the lower slope of Mount Coolangatta and the flat at Numba was prepared for cultivation, becoming the first farm on the Shoalhaven. His residence was begun in 1823 and completed in 1824, by which time he had 120 acres under wheat, 40 under maize, three acres under barley and three as a garden with an orchard planted at Numba, where 250 acres were already cleared. He had 600 cattle, 14 horses and 235 pigs on his estate. A barn was completed in 1830 at Upper Numba or Jindiandy where it may still be seen.

The development of the estate to 1827 is shown on a pencil map, probably drawn by Berry himself. It shows the country north of and including the Shoalhaven River to the head of Broughton Creek. It marks Pig Island, Broughton Creek, 'Bombadara' Creek and shows the western side of Broughton Creek as a 'Large Swamp'. It shows 'Muroo Hut', New Stock Yard' west of and beside the swamp, 'Bangley Creek' with 'Bangley' as its source, 'Good Dog' and a high peak 'Broughton's Rump'. **Figure 4.1** shows a map of Berry's holdings in 1837.

Berry secured additional grants of two lots each of 4000 acres north of the first grant and one lot of 4000 acres west of Broughton Creek. West of the latter, John Berry (one of Alexander's younger brothers) later secured 3225 acres at Bunberra north of Pig Island and several grants surrounding it. On his death in 1848, John Berry's grants passed to Alexander.

Other grants in the area were:

- 1920 acres at Tooliia (Toolijooa) called "Richardson's Farm" promised to J. G. Richardson 23 March 1830 (granted to A. Berry 11 February 1837).
- 1000 acres called "Hyndeston" near Gerringong promised to Thomas Hyndes 24 July 1824 (granted to A. Berry 18 Oct 1839).
- 4000 acres called "Broughton Head Farm" promised to Aspinall and Brown 27 May 1829 (granted to A. Berry 29 May 1838).
- 1280 acres called "Cumbewarra Farm", promised to Charles Staples 27 January 1830 (granted to A. Berry 20 May 1837).
- 1280 acres called "Meroo Farm" promised to Richard Mutton 22 June 1829 (granted to A.Berry 28 November 1837).

By 1840, all had passed to Alexander Berry in whose name the grants were issued. In 1842, Berry also secured 2560 acres called “Burke’s Farm” promised to John Burke (granted to A, Berry 15 February 1842) along Seven Mile Beach (Bayley 1975:24-26, Organ and Doyle 1994).

By the early 1840s, purchases of land from the crown and private individuals increased the size of the estate to about 32,000 acres, and to more than 40,000 acres by 1863. **Figure 4.2** shows a map of Berry’s holdings around 1844.

The total holdings of the Berry Estate, from grants and purchases, north and south of the Shoalhaven River, amounted to 57,000 acres. This included 14,480 acres from nine grants to others which were “bought out”, by Mr Berry. Some or all of these may have already been occupied by their original grantees (Organ and Doyle 1994).

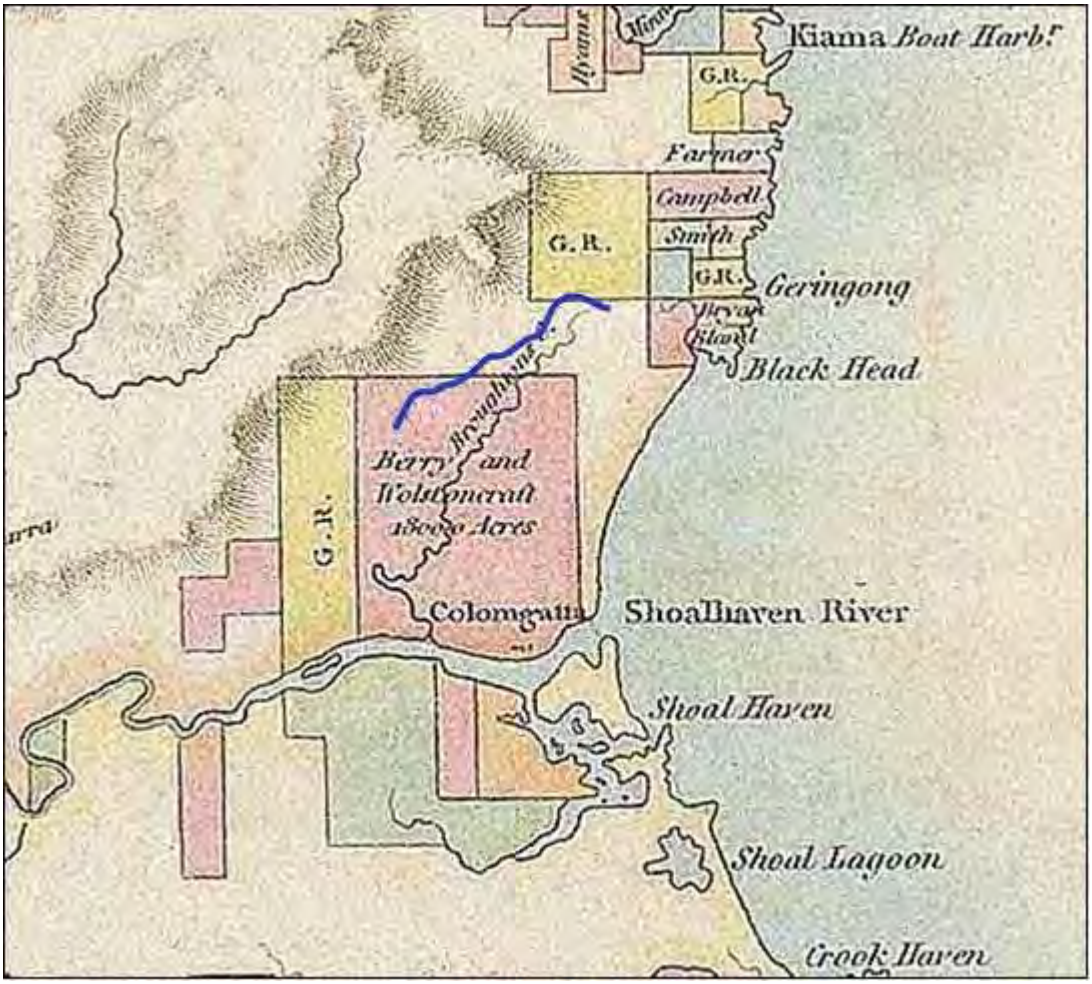


Figure 4.1: Extract from Robert Dixon’s 1837 map of the Colony of NSW showing early land grants and the approximate location of the project – solid blue line (State Library of NSW).

Figure 4.2: Extract from Baker's Australian County Atlas (County of Camden) 1843 - 1846 showing early land grants and the approximate location of the project – solid blue line (NLA)

Unlike other Sydney merchants who took up land but seem to have kept their mercantile and pastoral activities separate, Berry and Wollstonecraft set out to integrate the two, and during its early years the Shoalhaven estate was the source of much produce sold in the George Street store. When the Blanch returned to Sydney after establishing the settlement at Coolangatta she carried a cargo of hay and cedar from the Shoalhaven.

The partners' effort to enlarge their estate at every opportunity was probably to secure the cedar growing in the district, for by the 1820s the supply of cedar from the Illawarra and the Hunter River valley was nearing exhaustion. Maize, tobacco, wheat, barley and potatoes were planted and marketed in Sydney; pigs were also reared and cattle were brought to Shoalhaven from the Illawarra over a road made for the purpose. Besides buying a ship to provide transport between Sydney and Shoalhaven the partners built a sloop and began to drain the extensive swamps included in their grants. Barron Field feared that 'these grants will hardly ever repay Messrs. Berry and Wollstonecraft for their outlay upon them', but they did, and handsomely, if only because of the profit on the cedar cut on them. None the less the partners had difficulty.

The estate was a cause for considerable criticism of Berry he was publicly accused of negligence in his care of convict servants and of ill-treating them; it was said that a government tax on cedar cut on crown land was engineered to give Berry and Wollstonecraft a virtual monopoly, and that a tax on imported tobacco was introduced for their benefit. By 1846, Berry wrote that he had lost interest in the estate and 'would gladly part with it upon any terms'; this feeling grew as labour became scarcer after the abolition of transportation and the discovery of gold. In the 1850s, Berry began to let farms on clearing leases, and with this occupation by tenant farmers the real development of the Shoalhaven district commenced.

After his wife's death in 1845, Alexander Berry (**Figure 4.1**) became a recluse in his Crow's Nest House. After his brother David took charge of the Shoalhaven estate in 1836 he appears to have rarely visited it. He died at 'Crow's Nest' on 17 September 1873.

Berry had no children and his property passed to his brother David (Perry 1965:92-95).

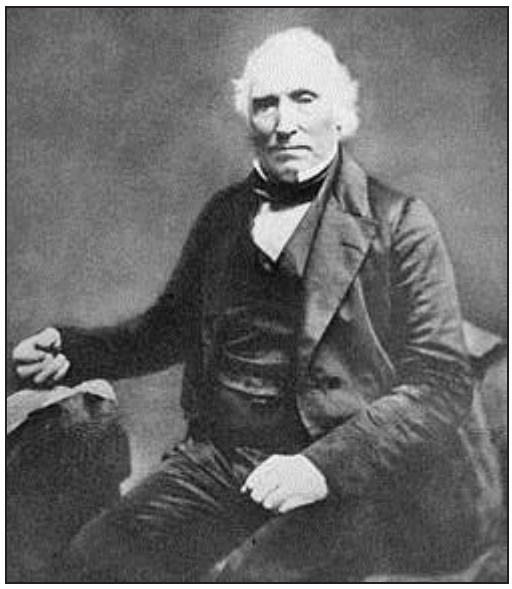


Figure 4.3: Alexander Berry (1781–1873) (Source: State Library of NSW).

David Berry, with his brothers John and William and his sisters Janet and Agnes, put into effect a long-held idea to join their eldest brother Alexander in NSW. They arrived at Sydney in July 1836 went at once to Coolangatta, the Shoalhaven property which, at Wollstonecraft's death in 1832, had passed entirely to Alexander.

Until John Berry died in 1848 he and David jointly managed the property. The greater part of the land was undeveloped and most of the work force was convict. The number of their assigned servants appears to have increased from an original 100 to some 300 in the 1840s. The main source of income was the breeding of cattle and horses, which were scientifically improved by imported blood. After John's death David began leasing some of the land. By 1850, he had 36 tenants, who paid 20 shillings an acre for cleared ground and were allowed five years without rent in order to clear timbered land. When convict labour ceased, David Berry decided to trial Chinese labourers and of German families hired in Hamburg. The Chinese did well as dairymen and house servants but in general Berry considered their usefulness was limited. Leasing was continued and by 1863 he had almost 300 tenants, who occupied some 8650 acres (3500 ha) or about a sixth of Coolangatta and paid an aggregate rent of about £6,000.

Figure 4.4 presents an extract from a map of the County of Camden, NSW, 1866, showing land tenure around that time.

Figure 4.4: Extract from map of County of Camden, NSW, 1866, showing land tenure and the approximate location of the project – solid blue line (NLA)

When David Berry inherited the estate from Alexander, it was valued at £400,000 and consisted of 60,000 acres at Shoalhaven and 500 acres at North Sydney. William Berry died in October 1875, also leaving a will in David's favour. He continued to lease the Shoalhaven land on terms considered more than lenient. Berry also introduced the practice of share farming with land, implements and materials provided by the estate and labour by the farmer, the profits to be shared on an agreed basis.

After 1883, the management of the Shoalhaven estate passed increasingly to Berry's cousin, (Sir) John Hay. When David Berry died unmarried at Coolangatta in 1889 he left an estate valued at £1,250,000. Hay was the principal beneficiary of his will (Stephen 1969:149-151). Hay died without issue at Rose Bay in 1892. Most of his estate of almost £59,000 was left to the children of his brother James (Martin 1972:361-362).

The enormous bequests by David Berry to the University of St. Andrews (Scotland) and to the Endowment of a hospital at Berry, amounting to a quarter of a million pounds, made it necessary for the Trustees to sell the Estate. They immediately set about a comprehensive plan of improvements before selling. Among these the reclamation of the swamp areas took a prominent place.

The entire area of the estate at that time amounted to around 100 square miles. Of that area 40 square miles consisted of alluvial flat land. In its natural state that land consisted of a series of freshwater marshes with surfaces in their lowest, some three or four feet below the flood level of the district in which they lay. Therefore, this area of flat land had to be protected from the influx of possible tidal floods by a system of drains and sluices. Another leading feature of the marsh-reclamation scheme was the freedom of floods when they rose above the natural banks of the Shoalhaven River and Broughton Creek to flow freely into the reclaimed basins. Consequently, at all places where the river banks either from erosion or other causes had fallen below their normal crest-level, levees (or embankments) were employed to restore them (Antill 1982:354).

On 29 March 1892 the sale of the Berry (Shoalhaven) Estates began and continued for three days. The entity was divided into three for the purpose of the sale; first, the Gerringong farms of which there were four and totalled 175 acres; next came the sale of the whole township of Bomaderry followed on 30 March by the Numbaa estates, which consisted of between 5000 and 6000 acres. This was included in the Municipality of Numbaa, which had been incorporated in 1868.

The sale terms were all standardised at 25 per cent deposit, 15 per cent within two years and the balance over five years with an interest rate of five per cent per annum. In all cases preference was given to tenant farmers to secure the land they had formerly farmed many of the present family holdings date their freehold from that date. The disposal by sale of the estates in Shoalhaven and North Sydney began in 1892 and was not completed until 20 years later in 1912 (Sealy 2000: 120-121).

Figure 4.5 presents an extract from a map of the County of Camden, NSW, 1895, showing land tenure and the growth of settlement centres, including Berry, Bomaderry and Gerringong, at that time.

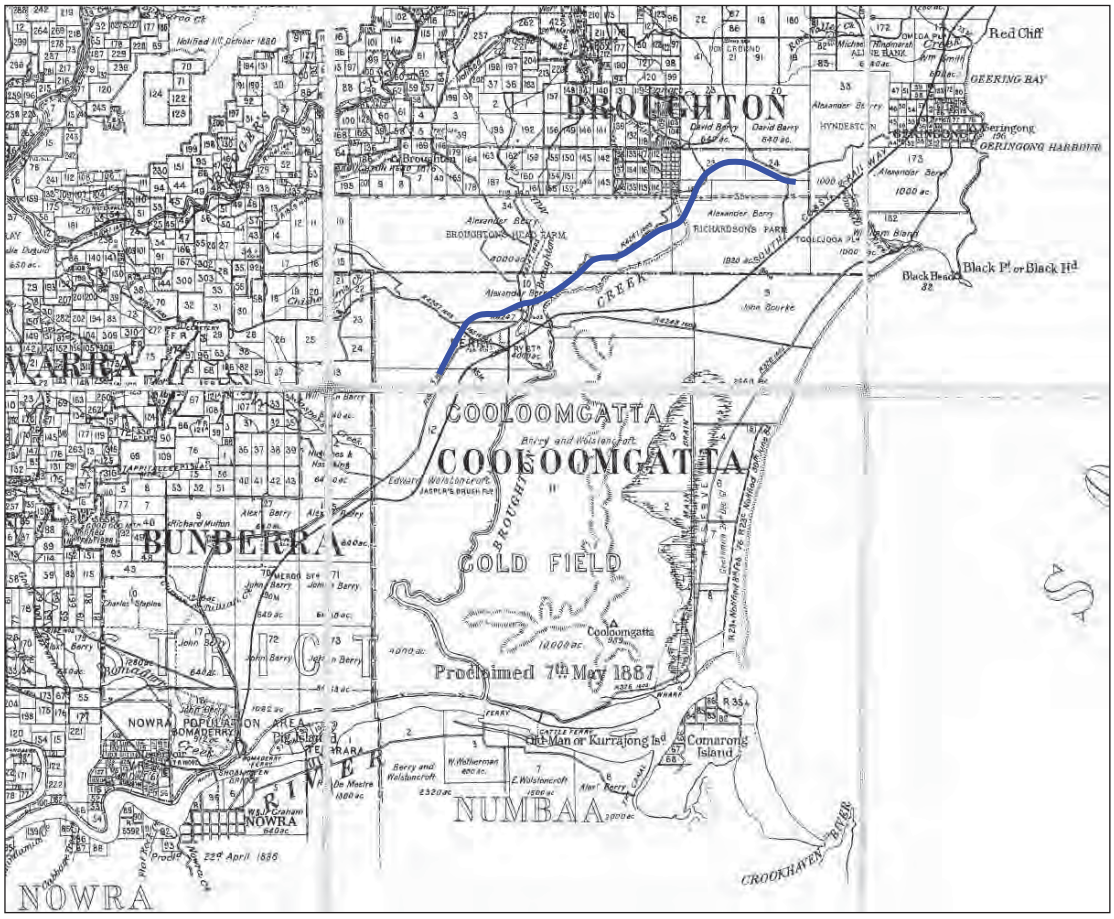


Figure 4.5: Extract from map of County of Camden, NSW, 1895, showing land tenure and the approximate location of the project – solid blue line (NLA)

4.1.4 Settlement and the development of townships

Broughton Creek (Berry)

Until 1899, the town of Berry was known as Broughton's Creek, Broughton Creek, or simply 'The Crick'. It was originally a station of the great Berry Estate.

The place was named after Broughton (c.1798-c.1850) an Aboriginal guide, tracker and constable, who was born at Boon-ga-ree, which became known from 1822-1888 as Broughton Creek and subsequently as Berry. Broughton, whose Aboriginal name was rendered as Toodwick, Toodood or Toodwit, accepted and strove to adapt to the new society introduced by the colonists. By 1818 he was working for Dr Charles Throsby of Liverpool, who probably named him after his friend William Broughton. The trusted Aboriginal served as a guide and translator on several of Throsby's explorations to the south and at least once for John Oxley.

In 1822, Broughton started work for Alexander Berry, whose grant incorporated Boon-ga-ree, setting up Berry's farm, Coolangatta, recruiting Aboriginal labour, keeping the peace, capturing bushrangers, droving cattle and providing his own labour. He became a favourite of Berry, who called him 'my Landsman' and later 'my oldest surviving Black friend' and who presented him with a rectangular breastplate inscribed 'Broughton Native Constable of Shoalhaven 1822'. The names of Broughton and his brother Broger (Brogher) survive in several physical features and localities in the Shoalhaven. Brogers Creek is named after the latter. After the former there is Broughton Creek, Broughton's Head, Broughton Vale, Broughton Village, and Broughton Mill Creek (Campbell 2005:48 -49). Contrary to this conventional allocation, a 1935 newspaper article notes some alternative possibilities: William Broughton, of the 1821 Hume expedition; and Minne Broughton a little girl who figured in a shipwreck (Sydney Morning Herald 25 June 1935 p12).

Broughton Creek was strategically sited on the northern part of Alexander Berry's Coolangatta Estate. With a double wharf on the junction of Broughton Creek and Broughton Mill Creek, a water powered sawmill and a tannery by 1860, the embryonic town proved a focal point for the farming hinterland.

The milling of timber on the estate appears to have begun as an open saw pit site in 1827. In late 1826, a number of 'free' sawyers signed an agreement to saw at Broughton Creek, and the following year, James Smith, described as the Overseer of the timber establishment at Broughton Creek, was measuring the timber on hand. In the early 1830s, a sawmill was erected on the site to replace the saw pits of earlier days (Antill 1982:350). It was in operation from at least 1836 as during a tour of Berry's estate James Backhouse noted in his journal on Saturday 1 October 1836, "*A Black came from a sawing establishment of Alexander Berry's where he has learned to work* …".

On 3 October 1836, when leaving 'Coolangatta' Backhouse further noted, "*A circuit of about six miles over grassy forest hills between two marshes brought us to Alexander Berry's sawing establishment at Broughton Creek, which is under the superintendence of Alexander Pattison [or Patterson], a respectable Scotchman, with a wife and numerous family*" (Beale et al 1991: 34-35). In January 1840, the Reverend W. B. Clarke also recorded visiting the sawmill noting, "*We came about 5 o'clock to a river, which we crossed, then to the saw-mill established by Mr Berry, which we visited. The machinery is simple and washed by water in the American plan,"* (Organ 1990:250-253). The sawmill was leased to a tenant to cut cedar and hardwood for use on the Estate between 1842 and 1850 (Antill 1982:350).

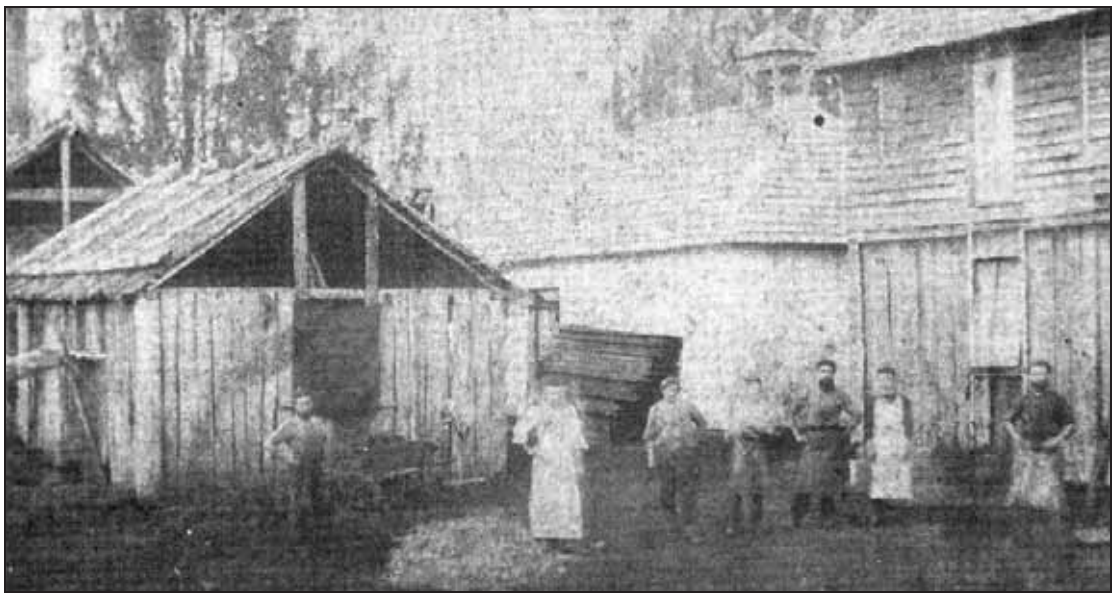


Figure 4.6: Photograph of the tannery, Berry, c.1875 (Mabbutt nd:6)

At the time of establishing the saw pit site in 1827, Alexander Berry devised a scheme for tanning all the leather required on his establishment (Antill 1982:350). The tannery was a natural adjunct to the sawmill, where the tannin-rich bark stripped from felled timber was used to prepare hides for shipping down Broughton Creek to the Sydney market (Mabbutt n.d.: 6). **Figure 4.6** shows a photograph of the tannery in c. 1875.

James Wilson was a ferryman at Back Forest who was later appointed manager of the tannery and ran a general store there. After the tannery buildings were badly damaged in the severe floods of the 1860s and 1870s, Wilson opened a new store on higher ground on the corner of Pulman Street in nearby Broughton Creek Village (Mabbutt n.d.: 9). **Figure 4.7** gives a photograph of Wilson's Store in Pulman Street, c. 1875.

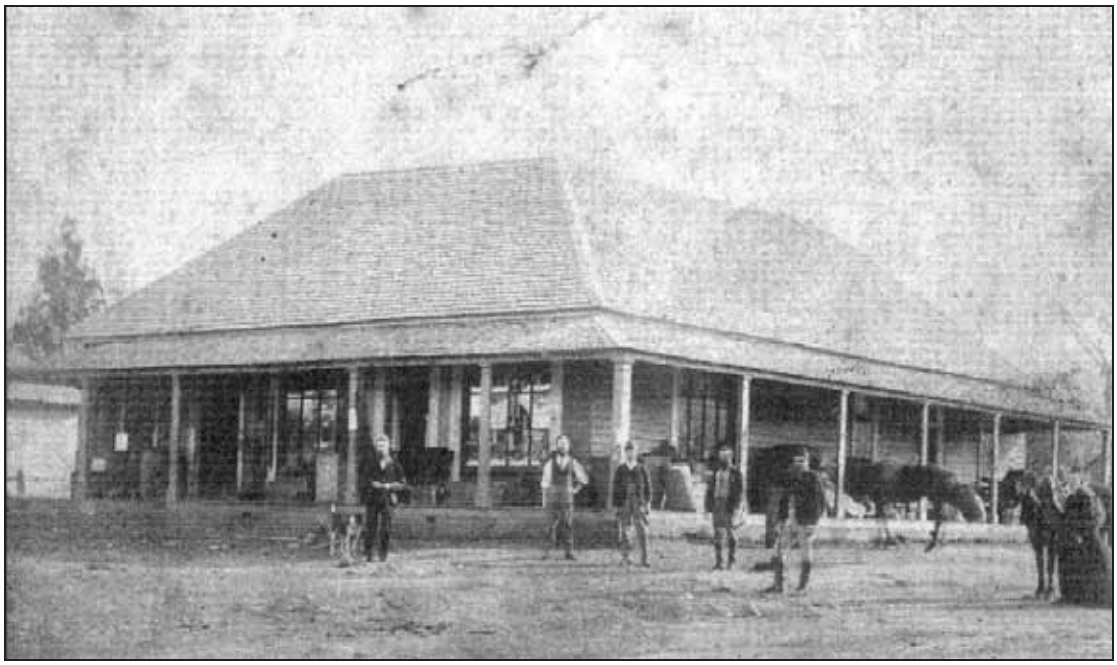


Figure 4.7: Photograph of James Wilson's store, Pulman Street, Berry, c.1875 (Photographer: Henry Toose, Mabbutt n.d.:9)

The village had a schoolhouse provided by Alexander Berry in 1861 and a postmaster from the same date. By 1866, there were 300 people in the immediate vicinity. Although the sawmill had closed, the tannery flourished. There were two stores, a smithy, a saddlery and a hotel (Bayley 1975).

Figure 4.8 gives a sketch of Broughton Creek Village in the 1870s, looking southwest towards modern day Pulman Street. When in 1868 the municipality of Broughton Creek and Bomaderry was created, contrary to Berry's wishes, it was administered by Broughton Creek.

As the land was opened up first by Berry estate tenant farmers, and in the 1860s, by settlers under the Robertson Land Act, Broughton Creek became the port of a very large area where dairy farms were established. **Figure 4.9** shows a photograph of the (second) wharf at Berry in 1896 – the first wharf was at the 'Crooked S', the junction of Broughton Creek and Broughton Mill Creek (Berry Museum n.d. 2). Farmers from Broughton Vale, Broughton Village, Jaspers Brush, Brothers Creek, Woodhill and even Kangaroo Valley, took their butter and other produce to the wharf at Broughton Creek. From the wharf it was taken to the ocean steamer at Greenwell Point or drogher, until 1871, when Alexander Berry provided a flat bottomed steamer, the *Coolangatta.*

Despite the Berry estate's insistence on yearly tenancies in the area, more stores and shops were built in the 1870s and in 1879, six years after Alexander Berry's death, Broughton Creek was surveyed and a plan for a town was made on the higher land on the right (west) bank of the creek.

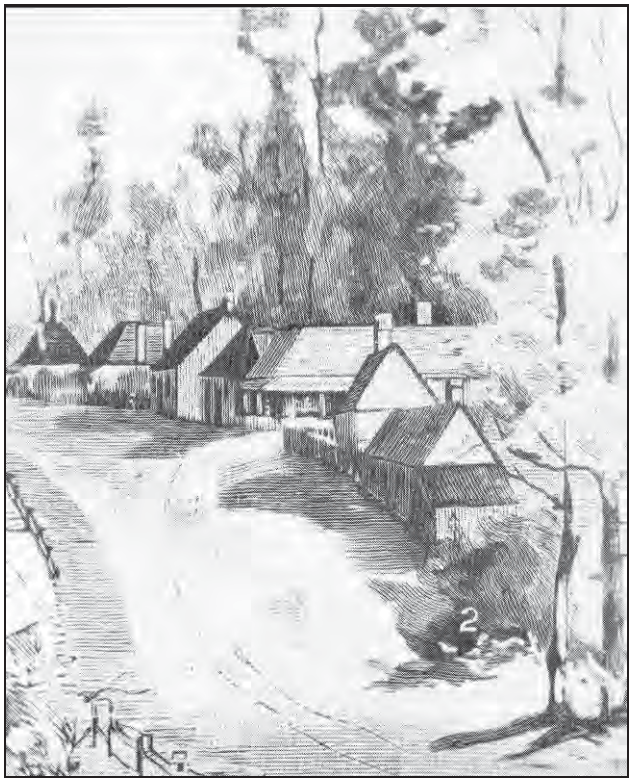


Figure 4.8: Broughton Creek Village along the ridge at Pullman Street in the 1870s (Bayley 1975: 74)

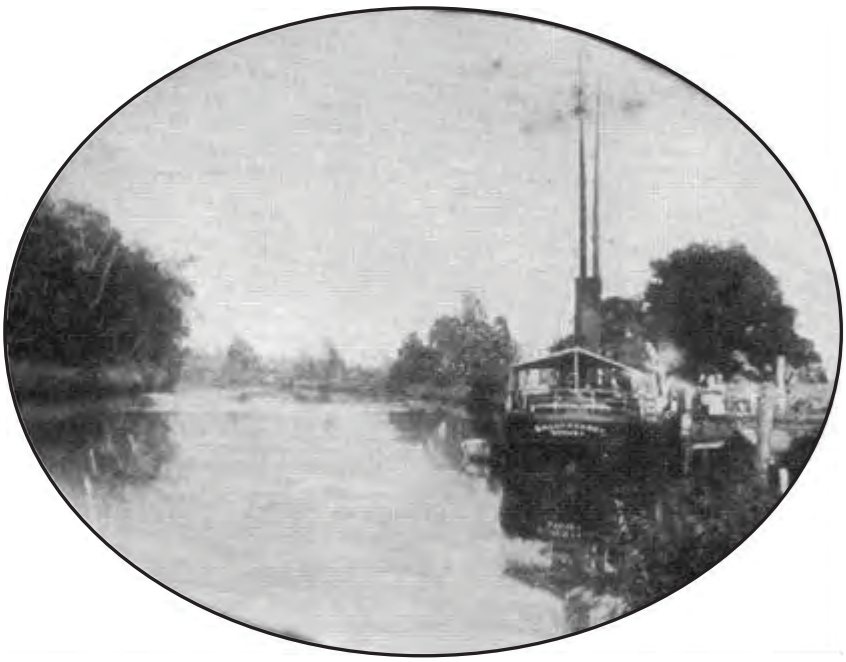


Figure 4.9: Photograph of the SS Coomonderry at the (second) Berry wharf, 1896 (Mabbutt n.d.: 58)

Figure 4.10 shows an extract of an old map (probably the 1870s) of Broughton Creek prior to the survey of the current town grid. The group of buildings shown in **Figure 4.8** are indicated in the middle of the map. When a new town survey established the modern street grid in the 1880s, most of the existing buildings were out of alignment with the new streets, and, in some cases new premises had to be erected in front of the old ones. However the tenants were given longer leases, up to 25 years, and later it was made possible to buy the land.

After David Berry's death in 1889, the name of the township was changed from Broughton Creek to Berry in his honour.

The Illawarra rail line (now the South Coast line) was opened as an isolated line as far as Bombo in 1887. The Bombo to Bomaderry section was opened in 1893 (www.nswrail.net).

The town of Berry continued to flourish as a service centre for a predominantly saw milling and dairying district. The population was 1,300 in 1884, with additional town blocks enlarging the town site from that laid out in 1883. **Figure 4.9** shows a sketch plan of Broughton Township in 1883. Today, Berry continues to provide basic service needs of the community, but the 1980s saw it transformed into a tourist town, with tea rooms, antique and gift shops (Clark 1993:5, Cousins 1994:260-263, Peter Freeman Pty Ltd 1998:20, Lidbetter 1993:4).

Figure 4.12 gives a map of present day Berry showing locations of historic sites, including Pulman Street, the tannery and the two wharf sites.

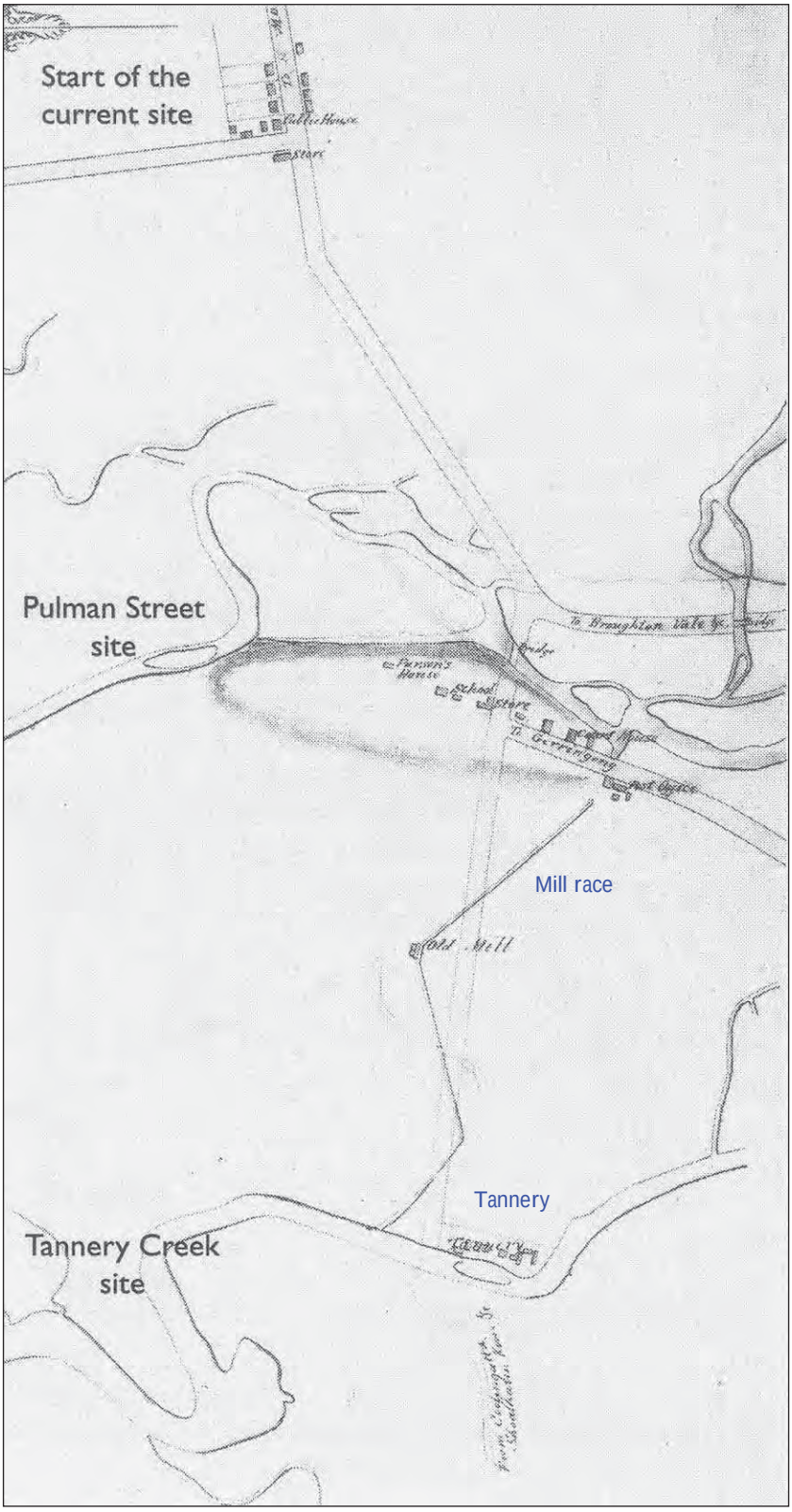


Figure 4.10: Early map of Broughton Creek Village area, probably 1870s (Berry Museum n.d.: 15)

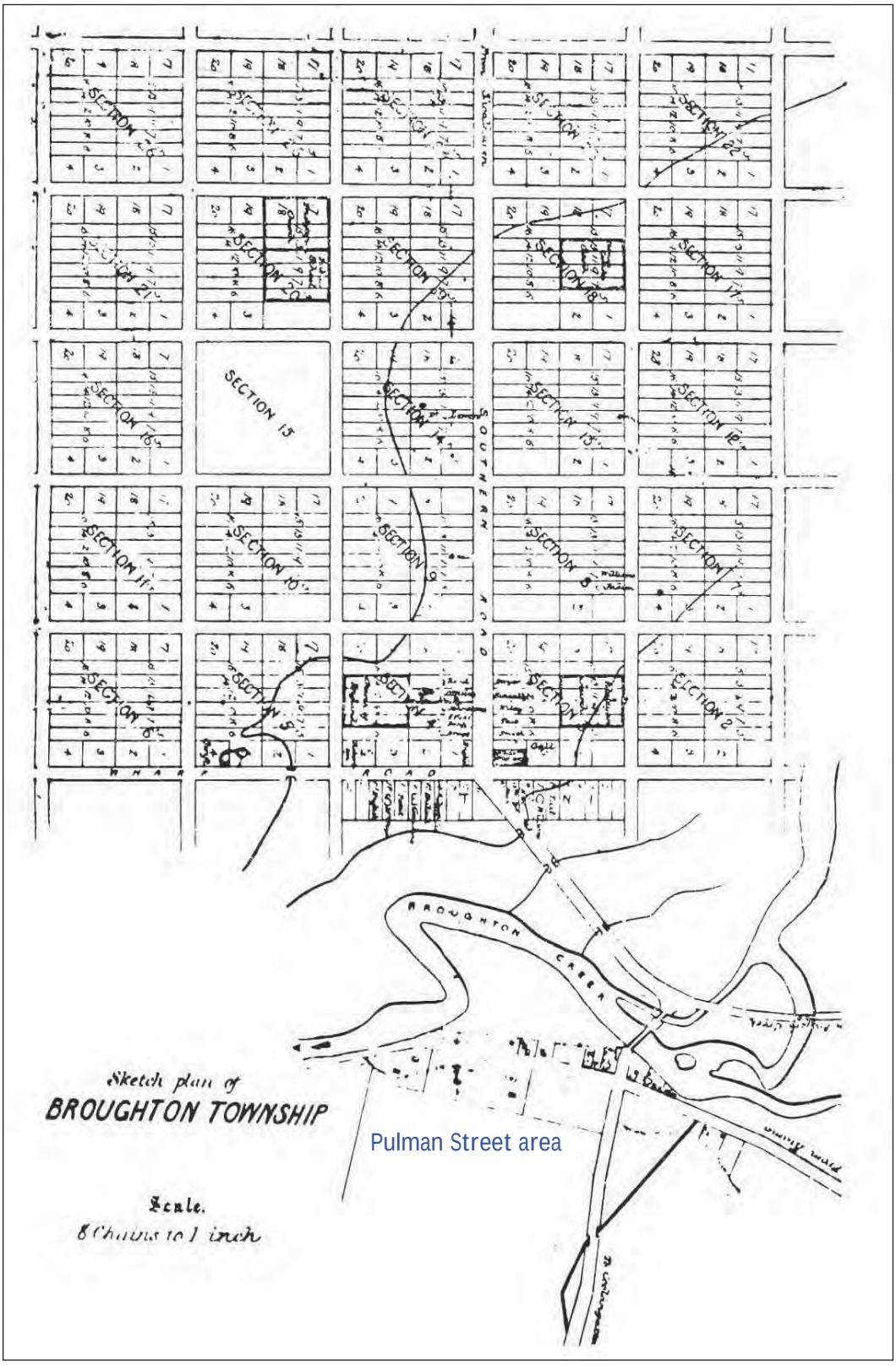


Figure 4.11: Sketch plan of Broughton Township 1883 (Lidbetter 1993:18)

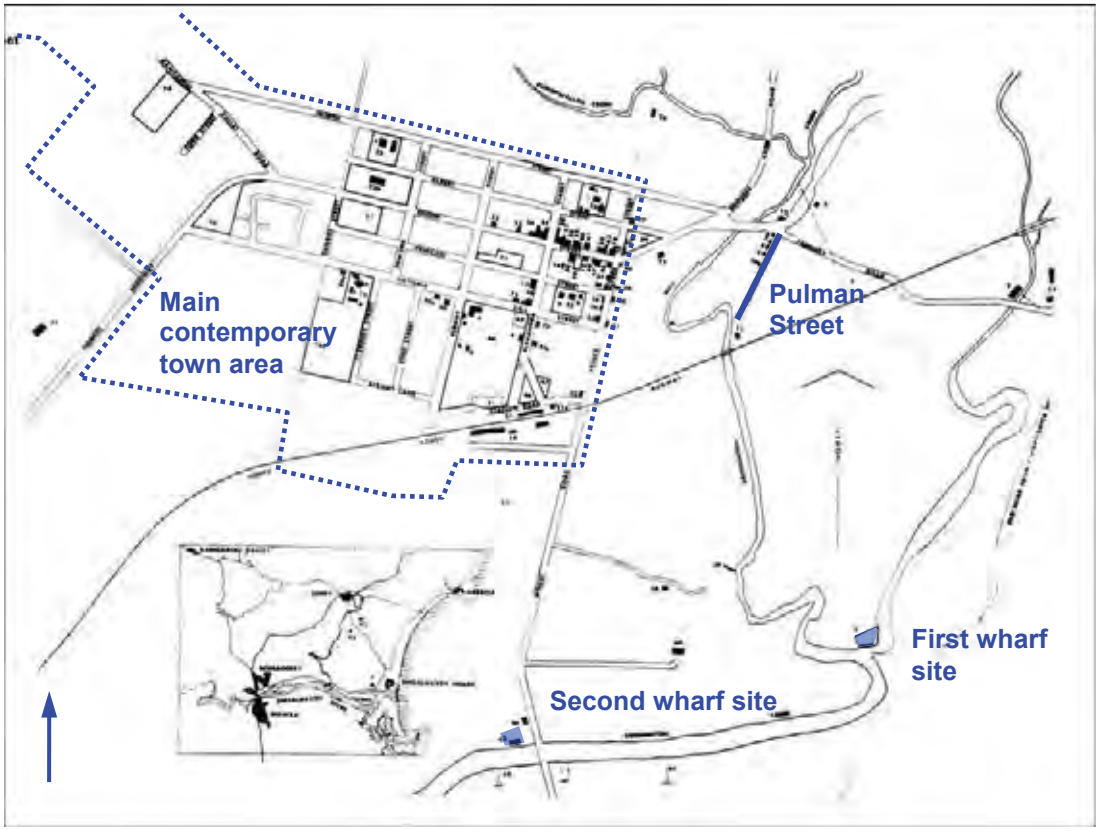


Figure 4.12 Map of present day Berry showing locations of historic sites, including Pulman Street, the tannery and the two wharf sites (after Lidbetter 1993:75)

Broughton Village

Broughton Village is situated on the floor and western basal slopes of the Broughton Creek valley half way between Gerringong and Berry. Today, it consists of a loose grouping of small and larger rural holdings and residences, with no obvious civic centre or buildings. In the past, however, this hamlet included two churches and a school (Elliott 2009).

Since the first land grants on the Shoalhaven, a large rectangular area of land to the west of David Berry's land grant on the upper Broughton Creek was set aside for a village (**Figure 4.13**). The village was surveyed as a government town in 1855 (**Figure 4.14** and **Figure 4.15** Bayley 1975). The surveyed village grid provided for 40 x 2.5 acre blocks and 12 x 25 acre blocks **(Figure 4.14**). Government land sales were held in Kiama in 1856 (Elliott 2009, The Empire 13 June 1856:p4).

A Mutual Improvement Society was established in 1868. A provisional school began in 1867 and became a full public school in 1871 (Fletcher and Burnswoods 1983). The Church of England building was erected in 1872 (Bayley 1975). The formation of the Broughton Village Dairy Company was reported in 1888 (Sydney Morning Herald 15 Sep 1888: p14), and a butter factory was opened in the following year (Bayley 1975:151).

The 1855 town allotment plan shows all but two of the 36 urban allotments owned by George Tate. Tate called his property *The Pines*. An 1873 description of Broughton Village is dominated by the farm of Mr G. Tate, which is described as "*200 acres of fine land, a homestead worthy of inspection and praise… all artificially grassed and cleared – at present devoted to the rearing and fattening of stock"* (Sydney Morning Herald 26 Aug 1873:p3). The 1855 village plan shows a Church situated 110 metres northwest of the current intersection of Thompson Road and the Princes Highway (GDA reference: 294234.6152832). By 1900, George Thompson is noted as the occupier of most of Tate's land holdings in the village (Crown Survey 6721-1603).

The school closed in 1901 (Fletcher and Burnswoods 1983) and the building used as a school of arts (Bayley 1975). Bayley notes that the passing years saw a gradual decline in the village (Bayley 1975:116). The highway bypassed the northern portion of the village grid in 1936.

Figure 4.13: Extract from Baker's Australian County Atlas (County of Camden) 1843 – 1846, showing Village Reserve (V.R.) in the area of the future Broughton Village (boundary shown in blue), situated on the edge of the Berry and Richardson land grants. Note the Finn land grant at southeastern end of Village reserve (NLA)

Figure 4.14: Extract from the Fourth edition (1893) of the Parish map for Broughton, County of Camden, showing the area of small land portions adjacent to the Berry land holdings which constituted the Broughton Village (Land and Property Management Authority, Parish Map Preservation Project Image no. 10353801, http://parishmaps.lands.nsw.gov.au/pmap.html)

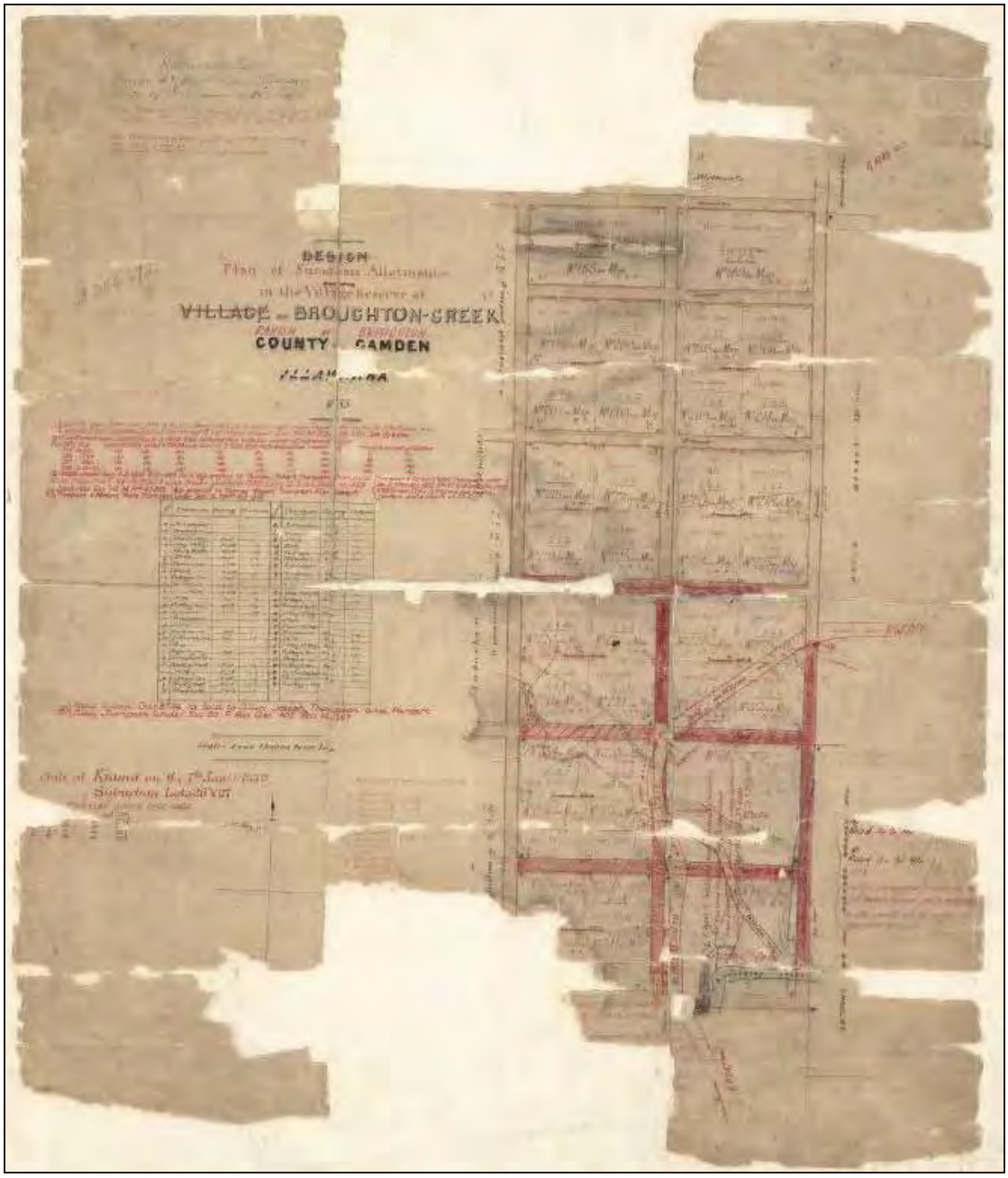


Figure 4.15: 1855 Plan of Subdivision Allotments in the Village Reserve at Village of Broughton Creek (Dept of Lands, Crown Survey 256-672)

4.1.5 The dairy industry

Alexander Berry, being the first in the area to create the concept of a farming village community, also became the first to set up a dairy on the South Coast. Within two years of his arrival, he recorded that, “a shipment of farm produce to Sydney … included in this shipment 78 lbs of butter and 20 cheeses”. So, by the end of 1824 his first dairying trade with Sydney Town has begun.

Within another 10 years or so the dairying herd at ‘Coolangatta’ had increased in quantity and quality. While the first dairy structures were hurriedly installed and crudely made from packed mud, as the brickfield production improved, later buildings were more substantial. A large dairy was developed on his grants south of the river at Jindiandy, close to Upper Numbaa and strategically placed three miles from the river bank so as to reduce the risk from flooding.

After his arrival in 1836, John Berry, who managed the Shoalhaven Estate, changed its emphasis from agriculture to stock breeding and the production of beef. He was said to have lived on horseback and was eventually thrown from his horse on April 15, 1848, dying from injuries four days later. With John Berry’s death and in 1849 the introduction of tenant farmers, the early days of the Shoalhaven being a breeding ground for young stock drew to a close.

Twenty acre plots were leased rent free on the condition that they were cleared and fenced by the end of two to five years. By 1850, the leasing of the Estate started and the tenant farmers began to establish dairying as the chief industry of the Shoalhaven district. By the 1870s most of the cedar had been cut out and the clearing leases had given way to farms - originally for wheat production. Eventually wheat growing was replaced by dairying (Bayley 1975:34-37, Sealy 2000:107).

Bayley (1976: 89) contends that Kiama was the birthplace of dairying in Australia; it was the centre that first tried to export butter to England and it pioneered the system of factory production. A Butter Export Co-operative Co. was formed in 1870 and efforts were made to export butter to London and India, with an initial measure of success. The Kiama Pioneer Co-operative Dairy Factory was officially opened on 18 June 1884 and was the first of its kind in Australia. It was situated near Spring Creek on the Jamberoo Road. A monument commemorating the Butter Factory now stands at that location.

Further south, other dairy factories were established between 1884 and 1894. These were the Kangaroo Dairy Co. (1888) on Sawyers Creek one kilometre south of the Berry Road along Factory Road; the Barrengarry Butter Factory (1888 to 1925); the Kangaroo River Dairy Co. (1890); and the Upper River Butter Factory on the eastern bank 16 km south of the Gerringong Creek junction (1894-1901).

When it was opened in September 1895, the Berry Central Creamery was described as the ‘largest and most complete butter factory in the colony’. At that time it was noted that 1,075 tons of butter were produced annually in the Berry district from 12,800 cattle, the product of which could be treated by the Berry Central Creamery. The registered trade mark was a bunch of berries (Lillipilli). In 1911, a group of dairymen purchased the Creamery from the Berry Estate and formed a co-operative, which subsequently became the Berry Rural Co-operative Society Ltd. The milk market continued to grow and in 1958 butter manufacture ceased. A peak annual milk intake was reached in 1976-77 but a downward trend developed in the 1980s. From 1991, milk was collected from farms in the Cooperative’s tankers and delivered direct to the Australian Co-operative Foods Limited Factory at Bomaderry (Lidbetter 1993:14-15).

The sub-division of the Berry estate over the 40 years following the death of David Berry created many small dairy farms on both sides of the Shoalhaven. Examples of the style of dairyman’s weatherboard house, bails and other outbuildings survive from the period around 1900, such as Knapp’s property at 680 Bolong Road, Bomaderry, conveniently close to a dairy factory and the railhead (Peter Freeman Pty Ltd 1998:23).

During the last decade of the nineteenth century, when Alexander Hay was the Manager of the late David Berry's 'Coolangatta Estate', a more scientific approach was adopted towards dairying in the Shoalhaven. Following an investigative trip to Europe by Alexander, the Trustees of the Estate erected the above mentioned Butter Factory at Berry and established a select herd of imported pure bred dairy cattle on a stud farm at Coolangatta.

At that time, two public institutions of importance to the dairy farmers of the district were established at Berry. At the urging of Alexander Hay, a Bill was passed through the NSW Parliament to vary the will of David Berry to the extent that a Stud Farm and an Experimental Farm should share in the endowment bequeathed by him for a Cottage Hospital established at Berry. That was agreed upon and a transfer of Port Jackson foreshores belonging to the Estate and judged to be equal in value to the endowment was satisfactorily arranged. The Crown then assumed the Trusteeship of all three institutions (the Hospital, Stud Farm and Experimental Farm) and established them at Berry (Antill 1982:355).

The Berry Experiment Farm opened near the river beside the road to Coolangatta in October 1899, being the first of its kind on the coast. It continued under the Department of Agriculture until in April 1934 it was taken over by the Child Welfare Department. It was remodelled with the provision of a dining room, dormitories and other facilities with cottages to house 40 boys to take farm training. In 1939, additional buildings were added, together with more modern farming facilities. In the 1970s the Child Welfare Training Farm closed and re-opened as a holiday home for the underprivileged and was later transferred to the Department of Sport and Recreation (Bayley 1975:206, Berry Museum 2006:2).

In 1903, the Government Stud Farm at Berry was described as, 'the most important institution on the coast from the dairymen's point of view. It is well situated, and is within two miles of the town. On one side it has a mile frontage to the deep, navigable waters of Broughton Creek, and the new Moeyan Bridge connects it with Berry and the railway' (Town and Country Journal, 11 February 1903). The Experiment and Stud Farms were co-located on the east side of the Berry - Coolangatta Road (Wharf Road), either side of Broughton Creek, between one and two kilometres south of the present town of Berry.

In the 1920s, a Pasture Research Unit was established off Wharf Road, Berry, by the Department of Agriculture. In the 1950s, the first Artificial Insemination Breeding Station (AIBS) in New South Wales was established at that location, and in 1958, it was moved to Graham Park, southwest of Berry on the Princes Highway. The AIBS, which was established by the NSW Milk Board, occupied a total area of approximately 75 hectares, including bull yards, buildings and a quarantine area from which the semen collection and processing occurred. In the 1990s, the Centre closed and the buildings were used by Wollongong University, until new premises were built for them in 2000 in Nowra (Berry Museum 2006:2).

4.1.6 The development of the main road between Kiama and Bomaderry

Although not supported by direct European historical observations, it is highly probable that the local Aboriginal people used and maintained trails across the southern Illawarra coastal plain. These are likely to have taken advantage of natural corridors, such as creeks and rivers, ridge and spurline crests, and the elevated ground between swamp basins. Other factors which may have influenced Aboriginal cross-country routes, were the incidence of thick 'brush' or lowland rainforest, and the location of saddles and passes providing passage across the Cambewarra Range (NOHC 2007, 2009a).

The purposes and destinations which would have governed an Aboriginal network of trails would not have corresponded with the differing economic and communication interests of the early European inhabitants. However, it is probable that where Aboriginal trails coincided with European interests, trails would have been used and quickly formalised into bridle trails and later into paths and tracks. There is some limited evidence for this process across the Illawarra Ranges where natural passes and interconnecting routes became important for inland communication, and the movement of stock and early diary produce (Officer 1991a, Griffith 1978).

The first European established roads were most probably sawyers' tracks, which allowed the hauling of felled red cedar logs from the hinterland forests to points of maritime access such as coastal ports and navigable streams. This activity would have commenced with the first cedar harvesting in 1812. Trails are likely to have followed terrain and gradients of least resistance, such as ridge and spur crests, as well as the level ground of the valley floors and associated meadows. Some examples of the informal trails which developed prior to the construction of formal roads are shown on the 1866 County map for Camden (**Figure 4.16** and **Figure 4.17)**.

The regular maritime transport of logs to Sydney provided as a secondary function, a means of transport and communication for European settlement, and the sea corridor dominated regional transport well into the late nineteenth century.

An alternative to inland trails was provided by a rough coastal track which developed informally to link the coastal settlements from Bulli, south to Kiama. The 'track' consisted of a series of headland traverses that allowed access onto the intervening beaches. Creek, river and estuary mouths were a hazard that could be crossed depending on local conditions and the depth of sand barriers.

European settlement followed the initial incursions of the cedar getters, and as this occupation extended beyond maritime access points, centres of habitation became linked by informal trails which developed into tracks with continued use. Following the steady alienation of crown lands via government grants and sales, the use of such early tracks became an increasing source of dispute, across the Illawarra, as the rights of private landholders began to be asserted. Amongst the complaints were those of Alexander Berry who stated that his property was being trespassed upon for want of a proper road (J.M.E. 1951:76). Increasing pressure from landholders to survey and establish public roads resulted in an expedition by Surveyor-General Mitchell which, by 1834, had formalised a road route between Appin and the northern Illawarra via Broughtons Pass and Mount Keira. In addition to a northerly extension to Bulli, the road was extended southwards '*as far as Saddleback Mountain to connect some miles inland with a line marked from Kiama to Bong Bong by Surveyor Hoddle in 1830' (J.M.E. 1951:77).*

Mitchell begged '*to observe that the continuance of a great road further south than the Nurrima Range [Saddleback Mountain] should be considered with reference to the passage of the Shoalhaven River and the best direction for a thoroughfare through the Coast Country of St Vincent'. Mitchell was 'of the opinion that the valley of Broughton's Creek would be the best direction for it to cross*...' (in JME 1951:77).

In 1841 a petition by Gerringong residents to Governor Gibbs stated:

> '*That your Petitioners grievously labouring under the many disadvantages arising from the Want of a practicable Road on the south side of Kiama do humbly pray your Excellency That you may be pleased to allow a continuation of the Jamberoo Parish Road to be surveyed through Kiama as far as Gerringong...'* (in JME 1951:78).

A meeting at Kiama, in 1841, to discuss extending the road from Saddleback Mountain to the Shoalhaven, failed to result in any official action (JME 1951:81). Fifteen years later, in 1856, Surveyor Shone was required to mark a line from Gerringong to Broughton Valley and to report on the expediency of extending the line to Bomaderry. Following further official inaction, Alexander Berry took the initiative, and privately constructed a road across his estate lands from Gerringong to Broughton Creek (Berry) in 1856 and later to Bomaderry by 1858 (JME 1951:81; Cousins 1948:105).

It is this private road that is shown on an 1866 map of the County of Camden (**Figure 4.16** and **Figure 4.17**). The alignment of this road established a transport corridor which has been retained to the present day, with many sections of the Princes Highway retaining the original alignment. The Berry Estate road was distinctive in its use of long straight sections, which often traversed steep spurs and ridges without apparent regard for the consequentially steep gradients. The straight and sometimes steep nature of the road may be explained by:

- The need to minimise length and consequential costs.
- Pressure to establish a road link in a minimal time period.
- The absence of cadastral or land ownership limitations that would otherwise have required deviations and bends.
- The predominant early use of bullock teams to convey produce, and thus a greater tolerance of moderate gradients.

James Wilson is reported to have surveyed and pegged the first "track" from Broughton Creek to the present Foxground area and on to Gerringong (SFHS 2003:vol 2 p.113).

On the 9th August 1858, the *Illawarra Mercury* reported that a road was to be proclaimed from Gerringong to the head of Broughton Creek. It was to be maintained at the expense of the parishes which it traversed. Bayley (1975) notes that the road from Gerringong to Broughton Creek was gazetted by the government in 1858 and Berry sent men to open the road from Gerringong to Bumaderry Creek (Bayley 1975:51).

In August the following year the *Illawarra Mercury reported* that:

> *'Mr. David Berry is also busy in the march of progress. He is opening the new road from Bumaderry [Bomaderry] to Broughton's Creek, and from the number of men employed quarrying stone, and brick making at Bumaderry, Mr. Berry appears at last to have an eye to the future advancement of the district.' (8th August 1859).*

In September 1859 a Municipal Council of Shoalhaven was proclaimed and meetings of elected councillors commenced. Alexander Berry however objected to the inclusion of his estate lands within the boundary of the municipality, and following both a Supreme Court injunction and an appeal to the Privy Council, the area was declared illegal in 1865 and the Council become defunct.

On the 8th December 1859, the *Illawarra Mercury,* reported on the unanimous passing by Council of 'a resolution of Mr. Bice, 'as to the necessity for the immediate survey of the road from Bomaderry to Kiama,' which is very important to the district...'.

In the early 1860s the government provided 140 pounds to be spent on the road between Kiama and Broughton Creek, roughly ten pounds per mile (Cousins 1948:232).

Antill (1982) states that the road from Broughton Creek to Bomaderry was completed and opened for use in July 1869, despite many potholes left by the removal of tree stumps. Bridges over the creeks on the new road between Bomaderry and Gerringong were completed in October (Antill 1982:82).

Prior to Berry's Estate road via Broughton Creek, terrestrial travel southwards had been via Seven Mile beach, with a crossing of the Crooked River near modern Gerroa. Further travel was via the north bank of the Shoalhaven, past Berry's Coolangatta homestead, to a ferry crossing at Numbaa. Following the completion of the Berry Estate road, the ferry service was moved to Bomaderry. A government ferry commenced operation at the Bomaderry crossing in May of 1866 (Shoalhaven Heads website).

Figure 4.16: Extract from an 1866 map of the County of Camden, showing the location of roads between Kiama, Gerringong, Broughton Creek (Berry) and Bomaderry, highlighted in blue. Note the alignment of the Berry Estate Road between Gerringong and Bomaderry which comprises many straight sections with minimal bends and deviations (County of Camden, New South Wales, 1866 compiled by Messrs Braddock & Baly, & engraved by John L. Ross. National Library of Australia 1866. MAP RM 1798. Part 2; http://nla.gov.au/nla.map-rm1798-s1-sd-cd)

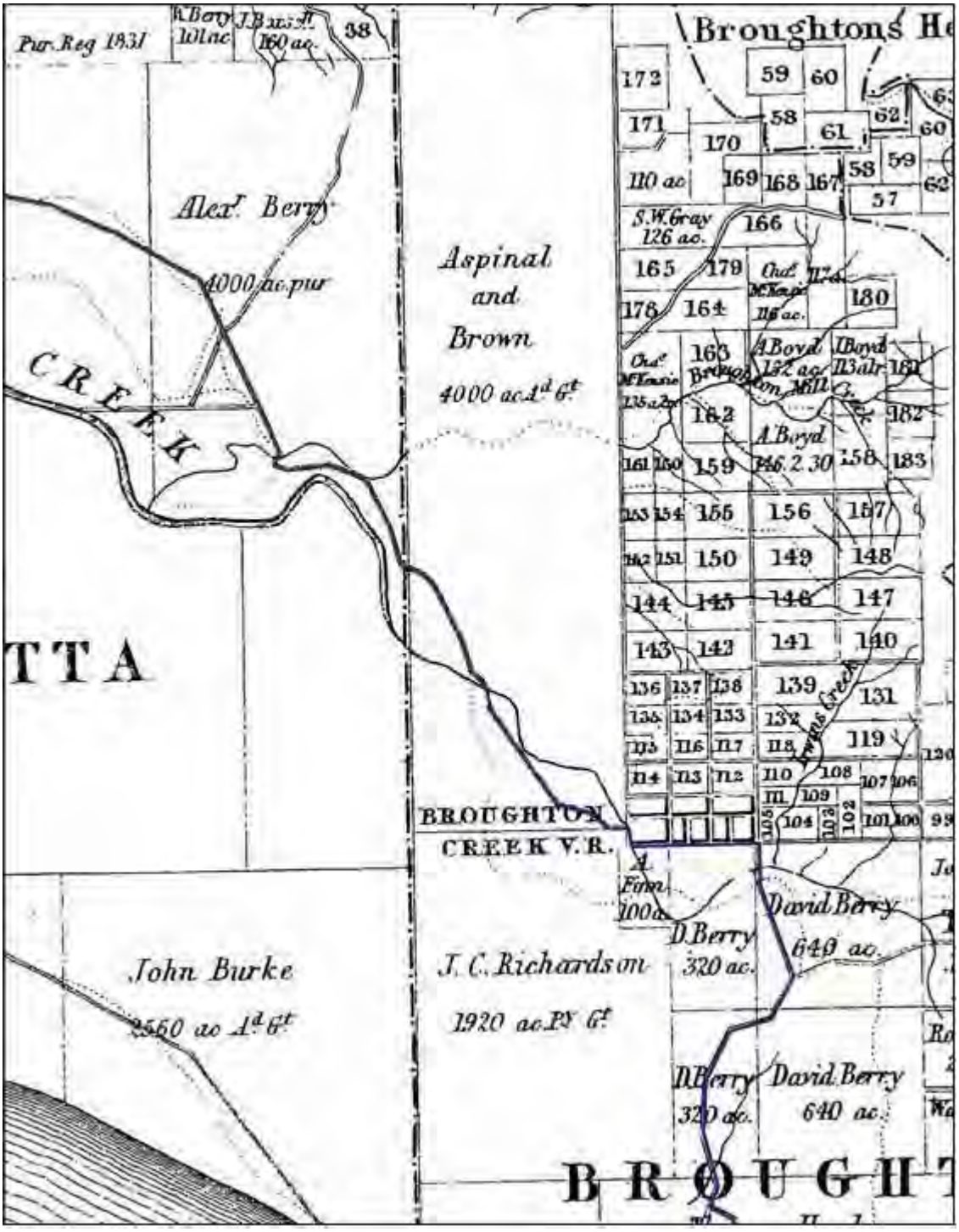


Figure 4.17: Enlarged detail from extract of 1866 map of the County of Camden, showing the location of tracks (black dotted lines) and roads (continuous black lines) in the vicinity of the project. Note the location of the original Berry Estate road (blue overlay) which approximated the alignment of the current Princes Highway and the FBB (County of Camden, New South Wales, 1866 compiled by Messrs Braddock & Baly, & engraved by John L. Ross. National Library of Australia 1866. MAP RM 1798. Part 2; http://nla.gov.au/nla.map-rm1798-s1-sd-cd)

Following the cessation of the Shoalhaven Council, two alternative Municipalities of Numba, (south of Shoalhaven) and of Broughton Creek and Bomaderry (north of the river) were proclaimed in 1868. Many of the roads and bridges constructed by the Berry Estate served as the region's main transport corridors, and consequently came under the jurisdiction of the new Councils. These roads were proclaimed, prior to the Councils commencing systematic clearing and stumping, together with the construction of small bridges and culverts. Much of this work had to be done on the Gerringong road and contracts were let in different sections, some at 15 shillings, some at 17 shillings and some at 19s 6d, a chain. Bridges across some of the creeks were also constructed, one for 23 pounds 7s 6d, and another for 16 pounds (Shoalhaven News in Cousins 1948:266; JME 1951:81).

In 1872, a correspondent to *The Sydney Mail* described the road in the following way:

> *'The road from Jerringong to Broughton Creek is a very hilly one, and, in parts, rough and unformed, though much has been done towards the making and completion of it; and the bridges and culverts are as excellent as they are numerous. Almost the whole of it runs through Mr Berry's estate, over ridge and valley, among pasture farms and comfortable homes, and by tall dead trees rising against the sky, white and ghastly, but relieved by the waving plumes of the cabbage trees that are largely intermixed with them...'*
>
> *'.. and a good deal of "corn" is grown in places; but from the crossing at Upper Broughton Creek until a view is gained at the big rich valley of Broughton Creek proper, few homesteads are visible. The "bush' is still in a comparatively wild state, though there are "clearings" on either side that cannot be perceived from the road.'*
>
> *'...From Broughton Creek to the Shoalhaven at Bomaderry ferry, the road is still less formed than that leading to the Creek; but it has the advantage of being comparatively level, and is in course of improvement, It is lined almost throughout with splendid trees, straight as a ship's mast, and far taller; the size and closeness of these make the task of clearing the land a very heavy one; but even here there are "clearings" and some of the most luxuriant corn in the district.' (The Sydney Mail May 4 1872:p558).'*

The first road constructed by the Broughton Creek and Bomaderry Council was a new line between Broughton Creek (Berry) and Broughton Village in the late 1870s. The new alignment was laid to avoid many of the steep gradients involved in the original alignment which was laid out by Surveyor Mann. Once abandoned, the old alignment was known as "Mann's Folly" (Bayley 1975:131). The works continued to the end of 1877 and included the construction of bridges, culverts and drains. The new road was reportedly surveyed by the Council's Mayor, James Wilson (Robson and Knevitt 2008:9).

In September of 1874 *The Sydney Mail* noted that Mr Morton, an agent to Mr David Berry, met with the Mayors of Broughton Creek and Broughton Vale, 'to mark out and define the lines of road, recently very kindly granted by Mr Berry'. One of the lines is described as 'serviceable for such as have business to Gerringong and Kiama' and almost certainly refers to the estate road initially established in the 1850s.

By 1878 it was reported that:

> *'The Broughton Creek Municipal Council is forming a very good, though circuitous road between Broughton Village and Broughton Creek. There is about twelve chains of road, known as Tates Hill, under the control of the Gerringong Council urgently needing attention.' (Sydney Morning Herald May 4 1878:619).*

The first bridge over Broughton Creek is thought to have been constructed at about the same time, in the 1870s (BDHS website), with a subsequent timber truss bridge probably being erected in the 1890s (RTA s170 register, Broughton Creek bridge citation). However a news article in May 1878 notes that 'the Broughton Creek bridge is dangerous and needs extra support so also does the bridge at Broughton Village; if a flood occurs, both will most likely be swept away' (Sydney Moring Herald May 4 1878:619). A news item in the Sydney Morning Herald on August 27 1889 notes the final availability of funds from the Department of Works for the proposed bridge over Broughton Creek, just north of Broughton Village.

Figure 4.18: "A Sketch of the Broughton Creek Road" (Illustrated Sydney News 21 November 1885:p14 & 16), " not far distant from Broughton Creek [Berry]"

The second main road bridge to span Broughton Mill Creek at Broughton Creek (Berry) was opened in 1888 at a cost of 1856 pounds (Bayley 1975:136; Shoalhaven Heads website).

In August 1888 The Sydney Morning Herald reported that the Minister of Works had assured the Gerringong Municipal Council that a sum of 1000 pounds would be provided, and that:

> *'...on the strength of that assurance an important piece of work at the place known as Brown's Hill will be commenced forthwith. The Brown's Hill is the only acclivity of much importance on the main road between Broughton Village and Gerringong, and when the proposed improvements are erected this line of road will be one of the best on the South Coast, the Council having recently made two or three similar alterations at a cost of several hundred pounds, where the hilly nature of the country presented difficulties to travellers' (Sydney Morning Herald Aug 11 1888:312).*

In January 1889, the Department of Works granted the Gerringong Municipal Council 500 pounds to recoup in part 'money expended with carrying out certain deviations on the main road between Gerringong and Broughton Vale' (Sydney Morning Herald Jan 29 1889:7).

In July of the same year it was noted that the Department of Works:

> *'was about to commence the erection of a bridge over the creek north of Broughton Village, for which a special sum of one thousand pounds was voted some time since. The new bridge is not to be on the present main road but some distance down the creek, which will necessitate the making of about a mile of new road by which the worst hill between Gerringong and Berry will be avoided' (Sydney Morning Herald 16 Jul 1889:p7).*

In the following year it was noted that 'the survey and plan of the proposed alteration in the main south road near Broughton Village will soon be completed (Sydney Morning Herald May 10 1890:1060).

In the period between Berry's original construction of the estate road from Gerringong to Bomaderry in the late 1850s, and the 1890s, the further development of the road by the local Councils resulted in a longer and more angular alignment, involving switch-backs and deviations around spurs. This is evident in a comparison of the 1866 and 1895 County Maps (**Figure 4.19** to **Figure 4.22**). The elaboration and revision of Berry's originally straight alignments appears to have been a consequence of establishing more gradual grades, suitable for horse drawn vehicles, and complying with various farm boundaries and related cadastre. By this time, most of the latter were now freehold title following the break up and sale of the Berry Estate.

Following the death of David Berry in 1889, the estate passed to his cousin John Hay. Hay developed a formal street grid for the town of Broughton Creek in the 1880s, on the western side of Broughton Mill Creek. This was surveyed in 1879 and well established by 1890 (Cousins 1948:262; RMS s170 register, Broughton Creek bridge citation). This provided for the future growth of the town beyond the limited area on the east of the creek where the original town had developed around the Pulman Street ridgeline (refer **Figure 4.10** and **Figure 4.11**). The new grid was orientated slightly differently to the existing emergent streetscape, and this resulted in many buildings being misaligned, necessitating their movement or realignment to the new pavements (Lidbetter 1993:19). Another consequence was that the existing road to Bomaderry which lead away from the town in a straight south westerly trajectory would be truncated by the new grid, and a new approach road would have to be developed at the north western corner of the grid. The current highway alignment follows this late nineteenth century revision (**Figure 4.23**).

In 1912 M.F. Morton officially opened a new replacement bridge over Broughton Mill Creek (Bayley 1975:168, Sydney Morning Herald 17 Aug 1912:p6).

The approximate route of the current Princes Highway was declared the 'Main South Coast Road' through the Local Government Extension act of 1906. However, in 1920, during a visit to Australia of the Prince of Wales, the National Roads Association secured approval from the Prince to name the coastal road after him. An opening ceremony was held at Bulli on 19 October 1920. The road was formally proclaimed the Prince's Highway (State Highway No.1) in 1928 under the *Main Roads Act*.

Figure 4.19 **Extract of an 1895 map of the County of Camden, showing the road between Gerringong and Bomaderry. Note how the development of the road by local councils, and following the break-up of the Berry Estates has introduced numerous bends and irregularities from Berry's original alignment (Map of the County of Camden, Eastern Division, NSW 1895 / compiled, drawn and printed at the Department of Lands, Sydney NSW. 24th June 1895. National Library of Australia http://nla.gov.au/nla.map-f262)**

Figure 4.20: Enlarged detail from extract of 1895 map of the County of Camden, showing the location of the roads between Kiama, Gerringong and Broughton Village, the vicinity of the project

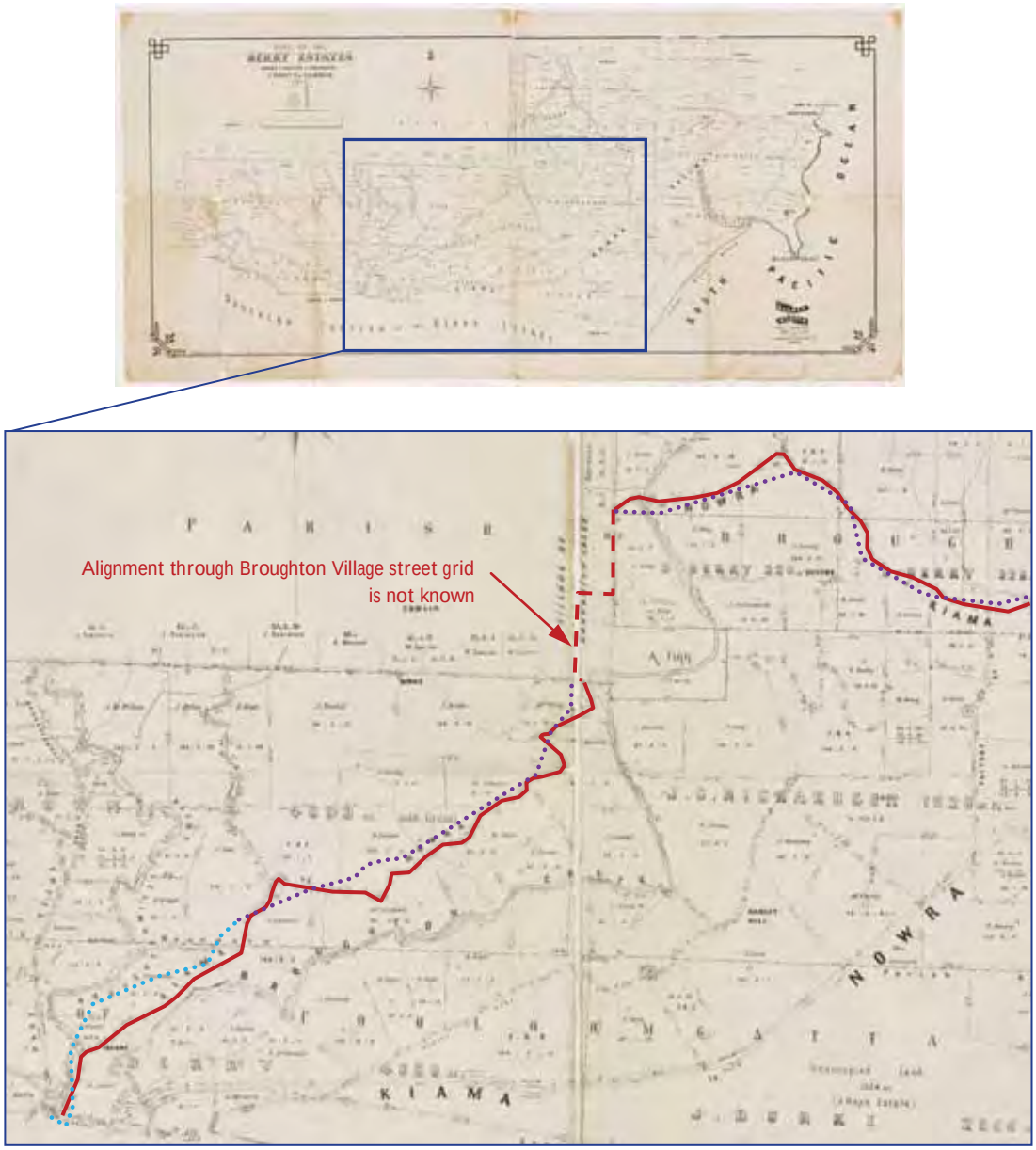


Figure 4.21: Extract from an early 1890s map of 'Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden', The map records the boundaries of former tenant farms, their associated homesteads, and the road between Gerringong and Berry (highlighted in brown). The dotted line is an approximate overlay of the road shown in the 1866 County map, and presumed to be the estate road constructed by Berry in the 1850s (Figure 4.16 and Figure 4.17). Note that the 1890s road avoids higher gradient slopes, and deviates around cadastral boundaries (Map printed by Gibbs Shallard & Co. Sydney for Harper and Harper Civil Engineers, original at State Library of New South Wales, M_Ser4_000_1_MLMSS315_Map 17).

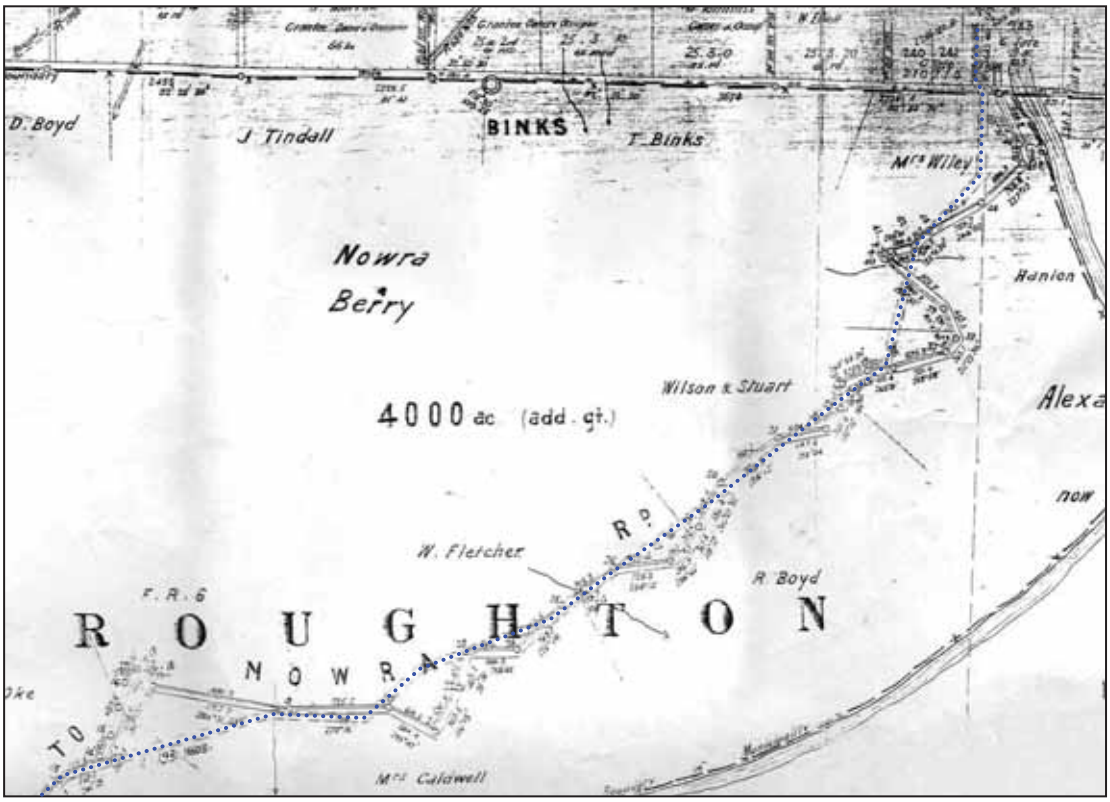
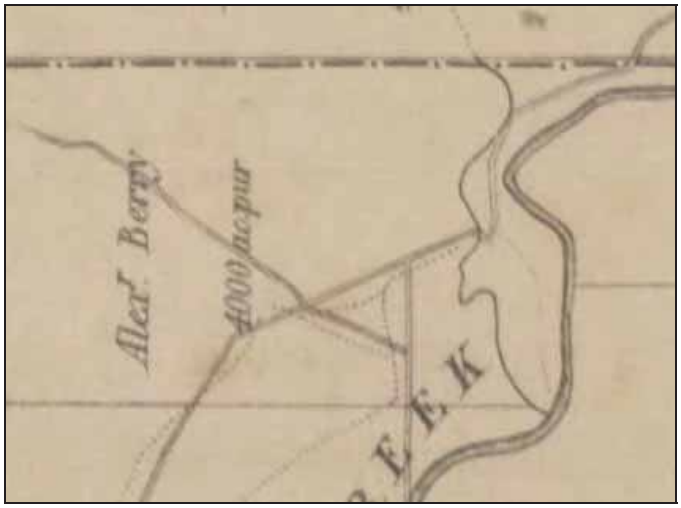


Figure 4.22: Extract from 1892 plan of 'Roads in the Berry Estates' showing interrelation of original 1856 Berry Estate road (blue dotted line overlay), and the later 1870s onwards highway alignment, between Binks Corner (Upper right) and Tindalls Lane intersection (lower left). (Courtesy of Mr Phil Bragg, Broughton).



County of Camden 1866

County of Camden 1895

Parish of Coolangatta 4th Ed

Figure 4.23: Extract from County and Parish maps showing the change in the orientation of the main south road through Broughton Creek (Berry), from a southwest to an east-west alignment occasioned by the establishment of a street grid in the 1880s.

From the passing of the *Local Government Act* in 1906, road maintenance and improvements were the responsibility of local Councils. This meant that highway works were uncoordinated and tended to be local in nature, and driven by local needs. Many of the municipalities along the road depended heavily on the volunteer support of local landholders in the upkeep of the road. The construction of bridges was the responsibility of the Department of Public Works. Following the Main Roads Act in 1924, the formation of the Main Roads Board in 1925 marked the beginning of an integrated approach to highway maintenance and reconstruction. At its formation, the Board found that the highway through the Shoalhaven area consisted of gravel, broken stone or plain earth surfaces (Bayley 1975:178). The Board immediately embarked on a Statewide programme of improving roads to a standard to suit high speed automobile traffic. The Board first arranged with a number of Councils for the urgent reconstruction or construction of portions of the Highway, and later assumed full responsibility for the whole length of the Highway to the Victoria border (excepting a short section through Wollongong), a length of around 342 miles.

Outside of new and reconstructed portions, a program of gradual improvement was pursued, funded by annual maintenance and improvement budgets. This program included works such as widening of existing formations and pavements, improvements to crests and curves, elimination of V-gutters by the construction of culverts, erection of safety fencing, guide posts, and the strengthening of pavements. By December 1932 the highway between Sydney and the Shoalhaven had been improved and most sections surfaced with a bituminous macadam. By 1951, the Highway had a continuous bituminous surface from Sydney to Moruya (JME 1951:84; OzRoads website; RMS s170 Broughton Creek bridge register).

Unemployment relief work was undertaken along the highway during the 1930s. The lookout at Mount Pleasant was constructed in 1935. In 1935-6 a new concrete bridge was constructed over Broughton Creek, on a short deviation, 650 metres downstream of the original timber structure **(Figure 4.24**). The cadastral street grid of Broughton Village was largely bypassed by the new alignment (**Figure 4.25**).

Figure 4.24: 1937 Photo, looking south, across the Broughton Village bypass, showing the original road alignment on the right (middle portion of photo), and new alignment and Broughton Creek bridge on the left (middle portion of photo) State Library of New South Wales.

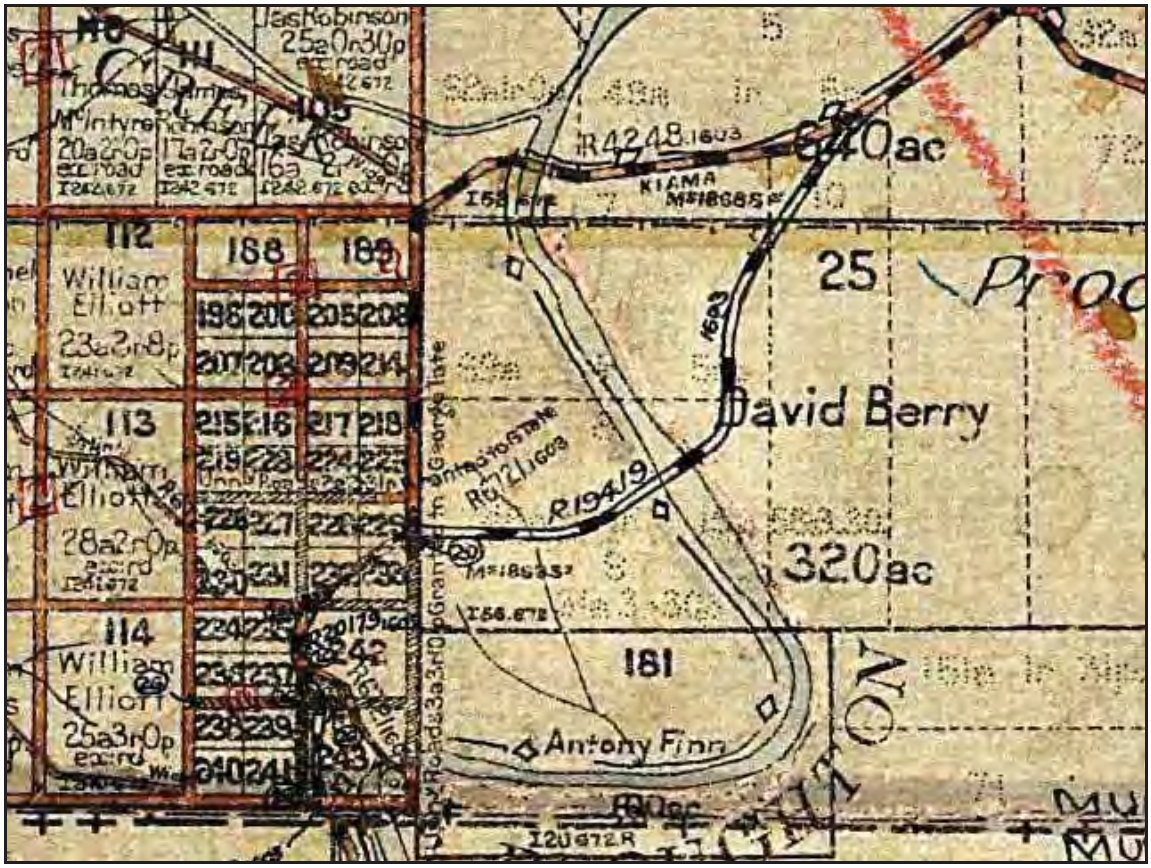


Figure 4.25: Extract from the sixth edition of the 6th Ed Broughton parish map, showing the new 1936 highway alignment which bypassed most of Broughton Village and required the construction of a new bridge.

1936 also saw the completion of a 1.7 kilometre deviation through steep country to the south of the creek **(Figure 4.26**, **Figure 4.27** and **Figure 4.28**). This section included what is now known as 'The Big Dipper', and cut off a tight bend known at the time as 'Binks' Corner (OzRoads website; Parish map of Broughton 6th edition 1916-1938).

Photos in the collection of the Berry and District Historical Society are referenced as depicting road construction at the big dipper around 1918 (refer **Figure 4.29** and **Figure 4.30**). This date is contrary to the documentary record of highway works, but appears consistent with the technology depicted - horse drawn carts and possibly also pneumatic drills (c.f. Lees n.d.). Potential explanations are that: the recorded location or date is wrong; or these excavations occurred prior to the 1936 deviation; perhaps as part of the 1870s construction of the Berry to Broughton Village road. The latter option would depend on the identification of pneumatic drills in the photos being incorrect.

The reconstruction of the highway was halted in 1941 due to the onset of war in the Pacific, with funds and manpower being transferred to major defence routes. One of these was the Mount Ousley Road which provided an alternative descent of the Illawarra Escarpment (OzRoads website). 1941 also saw the possessive form removed from the Highway name, which became simply the 'Princes Highway' (OzRoads website).

In 1954 the highway was included in the National Route system as part of National Route 1. Signage was erected along the length of the highway during June 1955 (OzRoads website).

Figure 4.26: View looking south across a straightened alignment of the Princes Highway, south of Broughton Village, completed in 1936. This road section is known locally as the 'Big Dipper' (State Library of NSW d1_27129r)

Figure 4.27: 'Binks Corner - old abandoned roadway 1937'. The section of former highway was bypassed by the new alignment pictured above in 1936. (State Library of NSW d1_27130r)

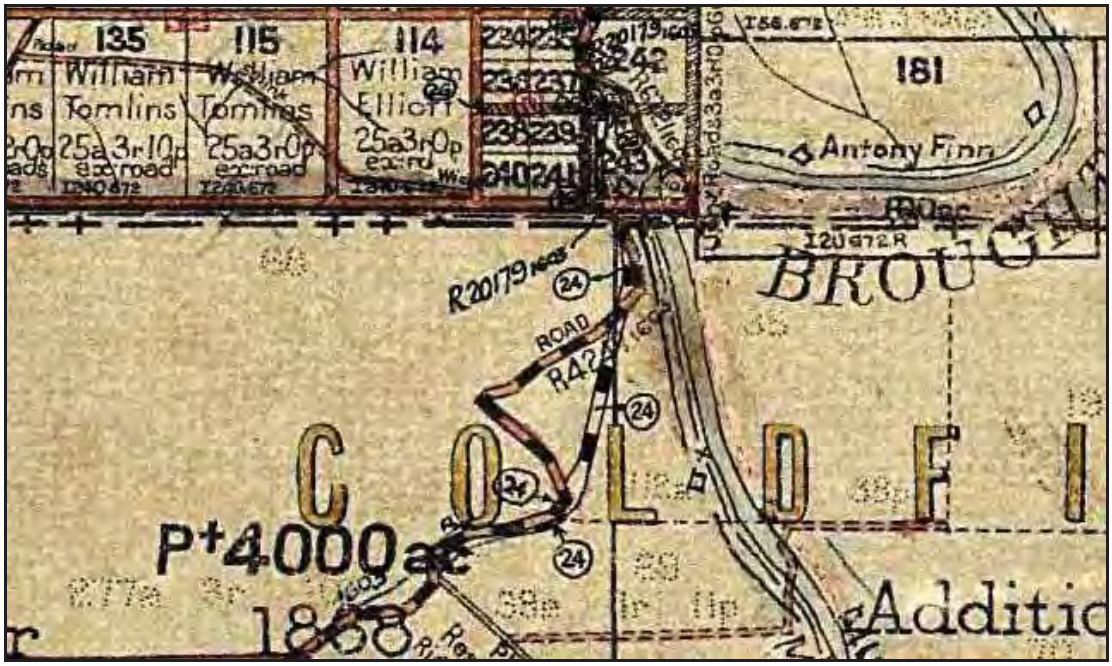


Figure 4.28: Extract from the parish map of Broughton (7th Edition) showing the deviation cutting off 'Bink's corner'

Figure 4.29: Road construction ca. 1918, stated to be in the area of the 'Big Dipper'. Note the apparent depiction of pneumatic drills by the two figures on the left embankment (National Library of Australia nla.pic-vn4607502-v)

Figure 4.30: Road construction at the 'Big Dipper'. This view has been taken of the same cutting, slightly higher and upslope of the picture above. (From collection of Berry and District Historical Society)

In 1955 an inspection of the Broughton Mill Creek Bridge at Berry was made by an appointed administrator of the Shoalhaven Shire, Keith Hawkshaw, who called for a report from the Council engineer on an innovative design of pile for a new bridge. Due to the difficult approach to the bridge, many accidents had occurred. Hawkshaw agreed with Berry residents that actions were required. A new concrete bridge on a new alignment was opened in 1958 (Bayley 1975:213; Robson and Knevitt 2008:48-49).

The 1960s brought the completion of the reconstruction and sealing plan that had been started in 1925. The bitumen finally reached the Victorian Border in 1965.

In 1980, a new three-lane bridge to carry northbound traffic was constructed immediately upstream and adjacent to the 1881 Shoalhaven River steel truss bridge which continued to carry two lanes of southbound traffic. The new bridge cost 2.9 million dollars.

In 1989 the roundabout at the intersection of the Princes Highway and Moss Vale Road (SR79) was installed.

Dual carriageways were completed through Bomaderry in December 1993.

4.2 Cultural heritage studies and inventory of listed heritage items

4.2.1 Statutory and non-statutory registers

The following statutory and non-statutory registers were searched for this assessment (updated July 2012):

Statutory listings:

- World Heritage List.
- The National Heritage List (Australian Heritage Council).
- The Commonwealth Heritage List (Australian Heritage Council).
- The State Heritage Register (NSW Heritage Branch, Office of Environment and Heritage).
- Section 170 Heritage and Conservation Register compiled by the RMS.
- Section 170 Heritage and Conservation Register compiled by Rail Corp.
- Schedule 7 (Heritage Conservation) Shoalhaven Local Environmental Plan 1985 (with amendments as at 21 Oct 2011).
- Schedule 5, Part 1 (Heritage Items, Environmental Heritage) Kiama Local Environmental Plan 2011 (as at 16 Dec 2011).
- Schedule 1 (Items of Environmental heritage) Illawarra Regional Environmental Plan No.1, gazetted 1986 and now deemed a State Environmental Planning Policy, (as at 7 Jan 2011).

Draft statutory listings:

- Schedule 5 (Environmental Heritage) Draft Shoalhaven Local Environmental Plan 2009.
- Kiama Heritage Inventory, Draft Kiama Local Environmental Plan 2010.

Non-statutory listings:

- The Australian Heritage Database (Department of Sustainability, Environment, Water, Population and Communities).
- The State Heritage Inventory (NSW Heritage Branch, Office of Environment and Heritage).
- Australian National Shipwreck Database (Department of Sustainability, Environment, Water, Population and Communities).
- The Register of the National Estate (Australian Heritage Council).
- Shoalhaven Heritage Inventory (includes data sheets on LEP listed items together with non listed items identified in previous Heritage studies and reports).
- Register of the National Trust of Australia (NSW).
- Australian Institute of Architects, Heritage Buildings List.
- Engineers Australia (Engineering Heritage Recognition Program).
- Royal Australian Institute of Architects Twentieth Century Register of Significant Buildings.

The searches found eight heritage items within 200 metres of the project which are included on existing statutory registers (refer **Table 5.1**). These are:

- The existing Princes Highway Broughton Creek bridge listed on the RMS section 170 Heritage and Conservation Register (identified as G2B H29 in this report).
- Six items are included on the Heritage Conservation Schedule (Schedule 7) of the Shoalhaven Local Environmental Plan (1985, with amendments as at 21 Oct 2011):
  - Avenue of Nine Poplar trees on Woodhill Mountain Road, Berry (identified as G2B H62 in this report).
  - *Mananga* Homestead and property, Berry (identified as G2B H16 in this report) .
  - Uniting Church Hall, Berry (identified as G2B H58 in this report).
  - St Patrick's Church, Convent and grounds, Berry (identified as G2B H47 in this report).
  - Mark Radium Park, Berry (identified as G2B H63).
  - Glenvale Homestead and property, Broughton identified as (2B H45 in this report).
- A dry stone wall located on Toolijooa Ridge (G2B H54), may be included within defined heritage schedule items in the Kiama LEP 2011 (Schedule 5, Part 1, Environmental heritage), and the Illawarra Regional Environmental Plan No.1 (Schedule 1, Items of environmental heritage). The LEP includes 'dry stone wall categories for the districts of Foxground (I28) and Kiama (I64), and the REP includes one item defined as 'dry stone walls, Jamberoo, Dunmore and Foxground Area, Kiama'). The inclusiveness of the Schedule definitions is open to debate, however the Kiama Municipal Council assume the REP listing is inclusive of all dry stone walls within the Kiama Local Government Area.

A revision of the Shoalhaven Local Environmental Plan is currently in progress by the Shoalhaven City Council. Public exhibition of a 2009 draft ended in October of 2011 and a revision for re-exhibition is currently in preparation. Schedule 5 (Environmental Heritage) of the Draft Shoalhaven LEP 2009 included the same items as those listed above and did not include any new proposed listings relevant to the project.

Both the Kiama Municipal Council and Shoalhaven City Council compile and maintain heritage inventories, based on NSW Heritage Branch software and data sheet proformas. Neither constitutes a statutory listing and entered items may be based on various received sources although most have been generated by previous Heritage Studies. The inventories serve to inform planning and management actions, but do not infer or define statutory constraints on included items. All or part of the current Kiama Heritage Inventory is included with Schedule 5 of the Kiama LEP 2011. The Shoalhaven Heritage Inventory contains many entries which are not included within either the current 1985, or Draft 2009, Shoalhaven LEP.

Three items are included on non-government registers with no statutory role. Two of these relate to the Berry District Landscape Conservation Area which is a broad scale, landscape based recording, originally defined by the National Trust of Australia (New South Wales). It is listed on the Trust's Register, and was also placed on the Register of the National Estate as an Indicative Place.

A recent addition to the Register of the National Trust is the Berry Township Urban Conservation Area. This listing incorporates three levels:

- A broad scale visual boundary which adopts the regional boundary of the Berry District Landscape Conservation Area.
- A subdivision boundary which relates to the closer urban settlement of the nineteenth century Berry town grid.
- A buffer zone which seeks to protect the immediate rural setting of the urban grid (Clark and Duyker 2010).

The *Mananga* homestead is included on the Royal Australian Institute of Architects 20th Century Register of Significant Buildings (no. 47022656). It is identified simply as a residence on the Princes Highway, with an approximate date of 1910. The presence of very elaborate gable treatment to the southern verandah is noted. This site is also on the Shoalhaven LEP Heritage Schedule.

For detailed descriptions of these recordings please refer to the relevant sections in Appendix G and to register extracts provided in Appendix B.

Table 4.1: Listed heritage items by type and individual heritage schedule, located within or near (within 200 m) the project. (Note, that items on the Shoalhaven Heritage Inventory (ShHI) are only shown on this table if also included on a statutory listing, refer section 4.2.2 for all relevant ShHI listings)

Item			Statutory and draft Statutory listings						Non-Statutory listings				
Project ID	**Name**	**Location**	**HR**	**RTA s170**	**Illaw. REP 1986**	**Shoal. LEP 85**	**Draft Shoal. LEP 2009**	**Kiama LEP 2011**	**RNE**	**SHI**	**NT (NSW)**	**RAIA**	**ShHI**
Equivalent to SICPH CL	Berry District Landscape Conservation Area (BDLCA)	Embraces the coastline south of Kiama some 30 km southward to Greenwell Point, the undulating coastal plain and the flood plain on both sides of the lower Shoalhaven River and including the steep, benched slopes rising up to the escarpment of the Illawarra plateau.							✓ (IP)		✓		✓
Equivalent to SICPH CL	Berry Township Urban Conservation Area	Three levels: *Visual boundary* - equates with BDLCA above. *Subdivision boundary* - comprises area of closer settlement in town C19th urban grid. *Buffer zone* – comprising of the immediate rural setting of the town									✓		
G2B H16	*Mananga* homestead and property	A40 Princes Highway, Berry				✓	✓					✓	✓
G2B H29	Broughton Creek Bridge (Bridge no. 704)	Princes Highway, Broughton Village		✓						✓			
G2B H62	Avenue of nine mature Poplar Trees	Woodhill Mountain Road, Berry				✓	✓						✓

Item			Statutory and draft Statutory listings						Non-Statutory listings				
Project ID	**Name**	**Location**	**HR**	**RTA s170**	**Illaw. REP 1986**	**Shoal. LEP 85**	**Draft Shoal. LEP 2009**	**Kiama LEP 2011**	**RNE**	**SHI**	**NT (NSW)**	**RAIA**	**ShHI**
G2B H63	Mark Radium Park	Cnr of Victoria St and Princes Highway				✓	✓						✓
G2B H45	*Glenval*e homestead and property	A371 Princes Highway, Broughton				✓	✓						✓
G2B H47	St Patrick's Convent, Church and grounds	80 North Street, Berry				✓	✓						✓
Includes G2B H54	Dry stone walls	All examples situated within Kiama LGA			✓*								
Possibly includes G2B H54	Dry stone walls	Foxground and Kiama districts						✓					
G2B H58	Uniting Church Hall (formerly Wesleyan Chapel)	69 Albert St (adj. to North St)				✓							✓

* *The extent to which the 'Dry Stone Walls' listing in Schedule One of the Illawarra Regional Environmental Plan is inclusive of all dry stone walls within the Kiama Local Government Area (LGA) is ill-defined. The inclusion of this listing as applicable to the project is based on the interpretation of the Kiama Municipal Council which considers that the Schedule listing relates to the whole LGA (pers. comm.. Andrew Knowlson, Director of Environmental Services, Kiama Municipal Council, 5 Oct 2011).*

Key

HR *= NSW Heritage Branch Heritage Register.*
SHI *= NSW Heritage Branch State Heritage Inventory.*
RTA s170 *= Roads and Traffic Authority section 170 Heritage & Conservation Register.*
Illaw. REP 1986 *= Illawarra Regional Environmental Plan (first gazetted 1986).*
Kiama LEP 2011 *= Draft Kiama Local Environmental Plan 2010 – Kiama Heritage Inventory.*
Shoal. LEP 85 *= Shoalhaven Local Environmental Plan 1985 – Schedule 7.*
Draft Shoal. LEP 2009 *= Draft Shoalhaven Local Environmental Plan 2009 – Schedule 5.*
ShHI *= Shoalhaven Heritage Inventory.*
RNE *= Register of the National Estate (R = Registered, IP = Indicative Place).*
NT *= Register of the National Trust of Australia (NSW).*
RAIA *= Royal Australian Institute of Architects 20th Century Register of Significant Buildings.*

4.2.2 Cultural heritage studies

The project is situated within the assessment areas of two previous Heritage Studies, the Shoalhaven City Council Heritage Study 1995-1998 (Peter Freeman Pty Ltd 1998) and the Kiama Heritage Study (Latona Masterman & Associates (1987).

The Kiama study has been augmented by a number of follow-up heritage reviews conducted by, or on behalf of, Kiama Municipal Council (Perumal Murphy Wu Pty Ltd 1994; Simpson Dawbin 2000; www.nsw.nationaltrust.org.au/sohkiama.html), and a study of stone walling around Kiama (Mayne Wilson and Associates 2000). This has culminated in the exhibition of a revised heritage inventory (refer listed items section above) as part of Draft Kiama LEP (2010).

A detailed review of heritage studies was prepared during the selection of the preferred route for the project (Navin Officer Heritage Consultants 2007b). The reader is referred to this study for detailed information on the subject.

No heritage items were identified by the Kiama Heritage Study within or near (within 200 metres) the project. Eleven relevant items were identified by the Shellharbour Heritage Study (Refer **Table 4.2**). Seven of these are included within the Local Environmental Plan heritage schedule. The four remaining items consist of two buildings along North Street, one on Woodhill Mountain Road and a pastoral landscape recording for the Berry and Bolong district. All of these items are considered further as heritage items within this project assessment.

Table 4.2: Heritage items in or near (within 200 metres) the project identified in the Shoalhaven City Council Heritage Study 1995-1998

Project ID	Heritage Study ID	Name	Location	Level of Identified Significance	Shoalhaven LEP 1985
G2B H47	B004	St Patrick's Convent	80 North Street, Berry	Local	✓
G2B H47	B005	St Patrick's Church	80 North Street, Berry	Local	✓
G2B H58	B017	Uniting Church Hall (former Wesleyan Chapel)	69 Albert St	Local	✓
G2B H63	B061	Mark Radium Park	Cnr of Victoria St and Princes Highway	Local	✓
G2B H16	B087	*Mananga* Federation, Queen Anne Style Farmhouse	A40 Princes Highway, Berry	Regional	✓
G2B H13	B090	Farm Worker's Cottage	143 North Street, Berry	Local	
G2B H11	B093	Federation Farm House	77 North Street, Berry	Local	
Equivalent to SICPH CL	B094	Berry-Bolong Pastoral Landscapes	Roughly bounded by: • The Shoalhaven River in the S. • The coast in the SE. • The City Council boundary in the E. • The Cambewarra Range escarpment in the NE, N and NW (as far as Browns Mountain). • The northern and eastern margin of Tapitallee, Bangalee and Bomaderry.	Regional	

Project ID	Heritage Study ID	Name	Location	Level of Identified Significance	Shoalhaven LEP 1985
G2B H62	B095	*Populus nigra "italica"* (9 Lombardy Poplars)	Woodhill Mountain Road, Berry	Local	✓
G2B H45	B120	Glenvale (former Berry Estate Tenant's Cottage)	A371 Princes Highway, Broughton	Local	✓
G2B H49	B177	*Oakleigh* Farm House	59 Woodhill Mountain Road, Broughton Vale [Berry]	Local	

4.3 Predictive historical archaeology statement

Unrecorded historic sites and features of heritage significance that potentially may occur within or near the project are likely to comply with the following predictive statements:

- Buildings and structures would be focused in the town and along the early centres and corridors of occupation, agriculture, industry, travel and transport.
- Structures of historical interest and heritage significance may be standing, ruined, buried, abandoned or still in use.
- Standing commercial and public buildings are most likely to survive within the towns and urban landscapes.
- Nineteenth century structures, such as farm dwellings, outbuildings, selector's or tenant farmer cottages may survive as standing buildings, ruins or archaeological deposits and are most likely to survive on less developed rural properties, on early portion numbers, and in or near established farm building complexes.
- Former timber mills and associated infrastructure such as timber pole structures, remains of machinery, tracks and tramways may survive on the outskirts of the towns or adjacent to former or existing forested areas.
- Traces of agricultural and industrial processing or extractive sites such as mills, dairies, factories, and quarries may be found throughout agricultural lands on the valley floor and adjacent low ranges.
- Sites associated with early roads would be closely associated with early private estate and cadastral (public) road reserves, watershed ridgelines, and related to early river and creek crossing points.
- Archaeological sites such as the occupation remains of former dwellings including homesteads, houses and huts, would be distributed in close association with land settlement patterns and correlated with favourable agricultural lands, trading nodes and transport corridors.
- Transport and access routes such as bridle paths, stock routes, and highway alignments of varying forms and ages, may survive as abandoned remnants adjacent to modern transport routes, or as alignments now followed by more modern or upgraded road and track infrastructure.
- Old fence lines (such as dry stone wall and post and rail fencing) may occur along road easement boundaries and enclosed farmlands. Other indications of field systems, such as drainage channels and ridge and furrow ploughlands, may survive in low lying agricultural ground, especially in areas that are now used for grazing, rather than cropping.
- Shipwrecks and the submerged remains of other structures or deposits, such as from wharves, jetties and piers, may occur on river and creek banks and beds.

5 Field inspection results

This chapter provides a summary of Non-Aboriginal field recordings situated within, or within 200 metres of, the project. All previously listed items within the project area are included.

The locations of the recorded items are shown in **Figure 5.1** and Appendix A. Site specific, large scale location mapping is provided in Appendix I. An inventory and summary description of recordings and items is provided in **Table 5.1**. Detailed site descriptions, including site specific background information, are presented in Appendix D.

A description of cultural landscape values and relevant recordings is presented as a separate section (Section 5.3).

Please note that the numbering of the recordings is generated from an on-going inventory of romarchaeological survey results for the whole of the Princes Highway upgrade between Mount Pleasant (Gerringong) and Bomaderry (refer Section 2.4. As a consequence, the numbering sequence is discontinuous.

5.1 Summary of field recordings

Forty non-Aboriginal (European) field recordings have been recorded within or near (within 200 metres) the project (G2B H10-30, 45, 47-63 and SICPH CL).

Six of these recordings were not found to have heritage significance against the assessment criteria (refer section 7.0 and Appendix G). These recordings consist of two cottages (G2B H10 and G2B H50), and four twentieth century highway remnants (G2B H12, G2B H18, G2B H24 and G2B H57).

The remaining 34 recordings were found to have heritage significance and are classed as heritage items. These consist of:

- Ten road sections or remnants (G2B H15, G2B H19, G2B H20, G2B H21, G2B H22, G2B H23, G2B H26, G2B H27, G2B H30 and G2B H55).
- One highway bridge (G2B H29).
- Twelve standing buildings or building groups (G2B H11, G2B H13, G2B H16, G2B H17, G2B H25, G2B H28, G2B H45, G2B H47, G2B H49, G2B H51, G2B H56 and G2B H58).
- Five confirmed or potential archaeological deposits comprising former building sites (G2B H14, G2B H48, G2B H52, G2B H53, and G2B H59).
- One quarried rock outcrop (G2B H61).
- One remnant dry stone wall (G2B H54).
- One tree avenue (G2B 62).
- One public park (G2B H63).
- One item of movable heritage, a skid mounted work-site shed (G2B H60).
- One cultural landscape, the Southern Illawarra Coastal Plain and Hinterland (SICPH CL).

Eight of these heritage items are included on existing statutory heritage listings (G2B H16, G2B H29, G2B H45, G2B H47, G2B H54, G2B H58, G2B H62 and G2B H63).

5.2 Summary table of field recording descriptions

Table 5.1: Summary of non-Aboriginal field recordings within or near (within 200m) the project

ID	Name/location	Description	Statutory listing	MGA references		
				Mid/focal point	end point 1	End point 2
G2B H10	Cottage (72 North St. Berry)	Early twentieth century cottage, impacted by modern renovation		288592.6149727	-	-
G2B H11	*GlenDevan* Federation House (77 North St. Berry)	Federation house with a number of additions		288638.6149772	-	-
G2B H12	Remnant portion of C20th highway (Stewarts Hill cutting and wayside stop, northern entrance to Berry)	Ceased use as part of highway in 1955, now used as a landscaped wayside stop (170 metres)		290137.6149984	290206.6149987	290097.6149908
G2B H13	Burnett Estate Overseer's Cottage (143 North St. Berry)	Simple weatherboard cottage (c. 1917), former residence for agricultural estate worker		289329.6149710	-	-
G2B H14	Archaeological deposit (former C19th *Broughton Creek* town buildings)	A number of former town structures were located on the eastern side of the former highway alignment (G2B H15), roughly opposite *Mananga*, These include the Berry Butter Factory 1889, Overseers Cottage 1858, Court House 1870s, and the Council Chambers 1868, and a Carpenters Cottage		290041.6149820	290063.6149874	290019.6149750
G2B H15	Remnant portion of C20th highway (mid 1950s)	Ceased use as part of highway in 1955, now used as an access road for adjacent residential lots (195 metres)		290056.6149792	290085.6149872	290020.6149720
G2B H16	*Mananga,* Queen Anne style homestead complex and grounds, former Berry Estate Manager's residence (A40 Princes Highway. Berry)	Federation (1894) Queen Anne style homestead, possibly designed by Sydney architect Howard Joseland. Property includes portion of Berry Estate water mill race	SLEP 1985	290103.6149797	-	-

ID	Name/location	Description	Statutory listing	MGA references		
				Mid/focal point	end point 1	End point 2
G2B H17	*Hillview* homestead, former Berry Estate tenant farm (A111 Princes Highway Berry)	Former nineteenth century Berry Estate tenant homestead		290542.6150237	-	-
G2B H18	Remnant portion of C20th highway (mid 1930s)	Now resumed within adjacent dairy farm (150 metres)		291551.6150844	291610.6150911	291500.6150827
G2B H19	Remnant portion of C19th road	Poorly preserved remnant of the original Berry Estate Road (430 metres)		291745.6150873	291567.6150828	291987.6150902
G2B H20	Remnant portion of C20th highway	Now resumed within adjacent dairy farm (195 metres)		292397.6150800	292460.6150870	292324.6150850
G2B H21	Remnant portion of C20th highway	Remnant includes a 90 degree bend and upslope embankment, revegetated (120 metres)		292502.6150985	292567.6150985	292492.6150957
G2B H22	Remnant portion of C19th road	Remnant of original Berry Estate Road, includes shallow cutting (460 metres)		292534.6151013	292713.6151056	292296.6150888
G2B H23	Remnant portion of C19th road	Remnant of original Berry Estate Road (320 metres), road is evident as shallow relief and differences in grass cover		293038.6151225	293162.6151296	292911.6151149
G2B H24	Remnant portion of C20th highway	Poorly preserved, has been used extensively as a fill, gravel and materials dump (180 metres)		293508.6151439	293535.6151482	293405.6151406
G2B H25	*Sedgeford* homestead and grounds (A495 Princes Highway, Broughton Village)	Federation weatherboard homestead (1902) and gardens		293762.6151623	-	-
G2B H26	Remnant portion of C20th highway ("Bink's Corner")	This portion of highway formerly known as "Binks Corner", consists of an angled descent and ascent across a small valley, and was bypassed when the 'Big Dipper' was constructed in 1936. It follows an1870s-80s alignment of the highway (total length around 612 metres)		293692.6151822	294008.6151962	293839.6151602

ID	Name/location	Description	Statutory listing	MGA references		
				Mid/focal point	end point 1	End point 2
G2B H27	Remnant portion of C19th road	This is a portion of the original Berry Estate Road which was superseded by the adjacent, more gradient sensitive 1870s-80s alignment (G2B H26). It includes three straight sections with two corners, including a well preserved cut and benched section of 260m (total length: 550 metres)		293913.6151961	293188.6152199	293742.6151753
G2B H28	*Brookside* homestead (A540 Princes Highway. Broughton Village)	Late nineteenth century to early twentieth century homestead. Buildings have been transported from other locations, also archaeological traces of former outbuildings. This recording includes a memorial tree and plot with the cremated remains of Mr William Chittick (died 2005), located 220 metres upstream of the homestead on the western side of the Creek		294107.6151865	-	-
G2B H29	C20th concrete bridge (Princes Highway. Broughton Creek)	RTA Bridge no. 704, Southern Region. Constructed in 1935, using standard concrete beam design, and widened in 1994	RTA s170	294861.6152838	-	-
G2B H30	Remnant portion of C19th road	A relatively well preserved section of road, situated within a pasture field, along the crest and shoulder of a prominent spurline. This remnant is a portion of the original Berry Estate Road. The road platform is evidenced by side ditches and variably shallow ground relief. Includes bordering gum trees at eastern end and descent to Toolijooa Road saddle (530 metres)		296440.6152555	296738.6152431	296277.6152706

ID	Name/location	Description	Statutory listing	MGA references		
				Mid/focal point	end point 1	End point 2
G2B H45	*Glenvale* homestead, former Berry Estate tenant farm (A371 Princes Highway. Broughton)	Former Berry Estate tenant farm, homestead includes vertical slab construction	SLEP 1985	292662.6151257	-	-
G2B H47	Former St Patrick's Convent (1921), St Patricks Church (1936), and grounds (80 North St. Berry)	Two story brick convent building, brick church, and grounds	SLEP 1985	288660.6149702 (convent) 288688.6149694 (Church)	-	-
G2B H48	Potential archaeological deposit, former Berry Estate tenant farm (now location of Greystanes Lodge)	Location of a former Berry Estate tenant farm, homestead, now redeveloped with modern farm buildings (*Greystanes Lodge*). Any remaining archaeological items are likely to be substantially disturbed		294547.6152597	-	-
G2B H49	*Oakleigh* farmhouse (59 Woodhill Mountain Rd. Berry)	Inter War Bungalow style Farmhouse		289727.6150118	-	-
G2B H50	*Clare Moy* Cottage (342 Princes Highway. Toolijooa)	Early twentieth century weatherboard farm cottage		296794.6152462	-	-
G2B H51	*Graham Park* former agricultural research institution (8, 9 & 13 Schofields Lane, Berry)	Former agricultural research station. The first Artificial Insemination Breeding Station (AIBS) in New South Wales was established at Berry in the 1950s, and was subsequently moved to Graham Park in 1958. The facility closed in the 1990s		287479.6148712	-	-
G2B H52	Potential archaeological deposit, former Berry Estate tenant farm (A441 Princes Highway. Broughton Village)	Potential archaeological deposit of a former Berry Estate tenant farm, situated on the angle in the 'Binks Corner' remnant highway section (G2B H26). The only such PAD where the original relationship between the structures and the 1870s-80s highway may survive		293659.6151844 (approx.)	-	-

ID	Name/location	Description	Statutory listing	MGA references		
				Mid/focal point	end point 1	End point 2
G2B H53	Potential archaeological deposit, former Berry Estate tenant farm structure (just east of the Toolijooa Ridge)	Potential archaeological deposit of a former Berry Estate tenant farm structure, site includes an indeterminate rock rubble alignment which parallels a former C19th road alignment (Berry Estate Road)		296227.6152738		
G2B H54	Remnant portion of C19th dry stone wall, (west side of current highway, just east of Toolijooa Ridge saddle)	Remnant dry stone wall, situated along former western boundary of highway easement, at least 100m in length, and possibly extending for a further 150 metres north (obscured by lantana growth)		296166.6152881	296197.6152799	296152.6153045
G2B H55	Remnant portion of C19th road (north of *Mananga* homestead)	Remnant of original Berry Estate Road (100 metres), evident as a cut and benched platform, impacted by modern cross drains		290207.6149941	290246.6149973	290172.6149916
G2B H56	*Broughton Mill* homestead and Dairy (both disused), former Berry Estate tenant farm, (117 North St., Berry)	Standing ruins of early twentieth century farmhouse, outbuildings, disused dairy, and yards		289005.6149857		
G2B H57	Remnant portion of C20th highway (intersection of Princes Highway and Tindalls Lane)	Small remnant, substantially impacted by more recent road works and the Eastern Gas Pipeline (30 metres)		291636.6150973		
G2B H58	Uniting Church Hall (formerly Wesleyan Chapel 1884-)	Timber frame and weatherboard church hall/chapel	SLEP 1985	289326.6149627		
G2B H59	Archaeological Deposit, and remnant plantings of former non-Berry Estate homestead, Broughton Village – (Finn/Wood/Grant/ Stewart/Dinning families)	Remnant tree plantings, garden plants and surface foundation stones are indicative of an archaeological deposit of a former early C19th farm residence		294612.6152138		

ID	Name/location	Description	Statutory listing	MGA references		
				Mid/focal point	end point 1	End point 2
G2B H60	Skid mounted work-site shed (movable item)	Portable (towable) timber frame and corrugated iron shed, currently located at *Greystanes Lodge,* Broughton Village		294536.6152562		
G2B H61	Quarried rock outcrop, Broughton	A small area of rock quarrying (evidenced by drill roles and fracture surfaces) on a small natural sandstone outcrop forming the bed of a tributary streamline. A nearby concrete highway culvert is situated immediately upslope. Quarrying may be related to an earlier phase of highway construction		292261.6150863	-	-
G2B H62	Avenue of Poplar trees (Woodhill Mountain. Rd, Berry)	Nine Lombardy Poplars, situated along the eastern side of Woodhill Mountain Road, between the current highway and just past the Bundewallah Creek bridge. Numerous younger Poplar plantings continue the avenue to the north, on both sides of the road, but do not form part of the SLEP listed item	SLEP 1985	289851.6149758	289862.6149907	289819.6149672
G2B H63	Mark Radium Park, Berry	Recreational and ornamental park and gardens (developed by Berry Apex Club), which commemorates a local Australian champion pony which held high jump records between 1938-1955	SLEP 1985	288189.6149433	-	-
SICPH CL	Cultural Landscape (Southern Illawarra Coastal Plain and Hinterland)	The cultural landscape of the Southern and eastern falls of the Southern Illawarra Range, and adjacent coastal plain		-	-	-

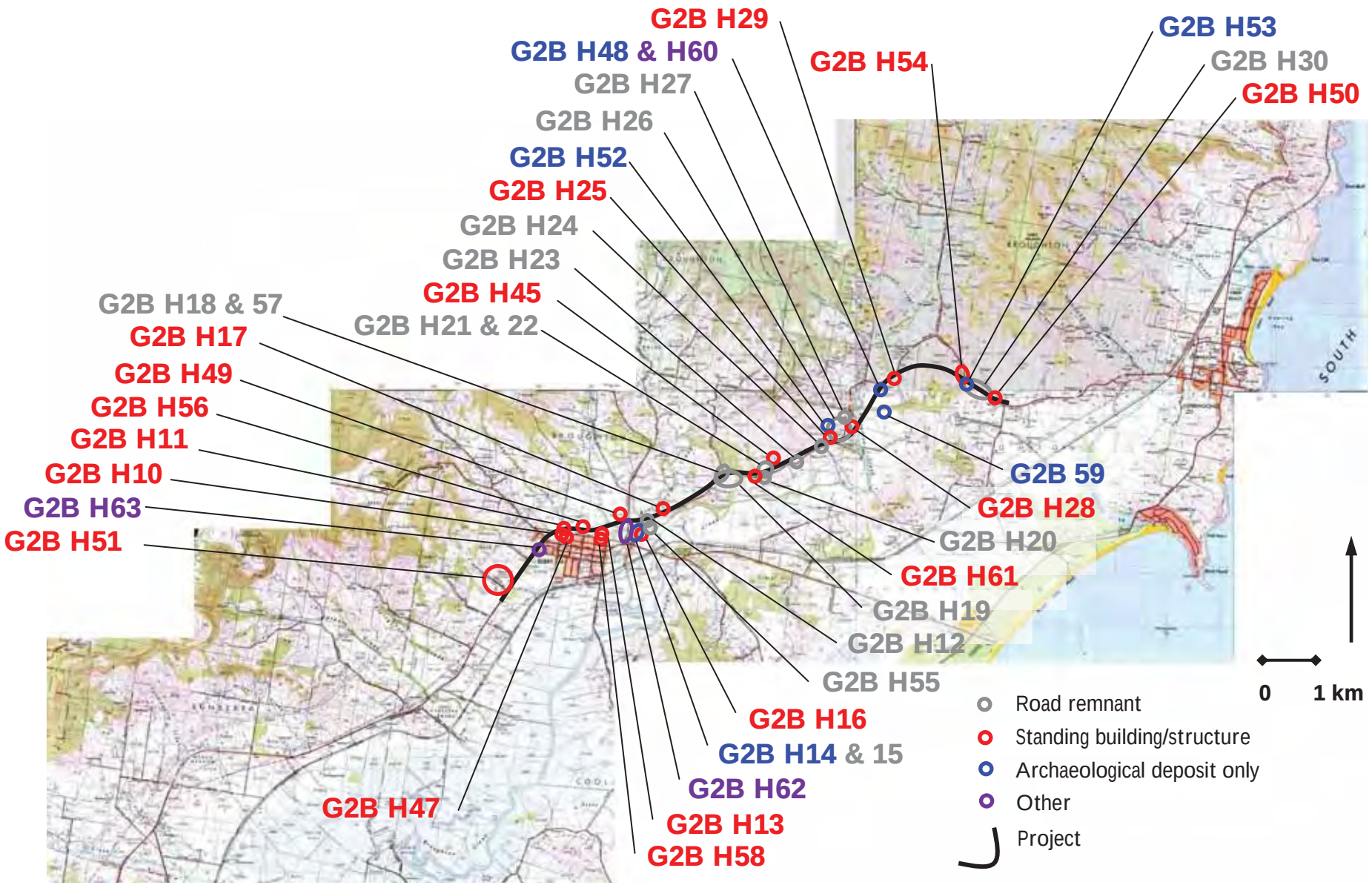


Figure 5.1: General location of non-Aboriginal field recordings (excluding SICPH CL, refer to Figure 5.6 for the location of this item) Base map compiled from extracts from the following 1:25,000 topographic maps published by the Central Mapping Authority of NSW: Berry (1988), Kiama (1985) and Kangaroo Valley (1986); and the Land Information Centre: Gerroa (1986).

5.3 Cultural landscape values

5.3.1 Southern Illawarra Coastal Plain and Hinterland Cultural Landscape (SICPH CL)

The predominantly pastoral landscape character of the coastal plain and basal slopes extending southwards from the Southern Illawarra Range, from Mount Pleasant in the east, to Browns Mountain in the west, and extending southwards to Greenwell Point, has been variously recognised as a landscape with significant heritage and conservation values (**Figure 5.2** to **Figure 5.6**). Previous recognition has been either limited to sub-regions and categories (such as the Berry-Bolong Pastoral Landscape), focused on contextual values relative to urban and town centres (such as the Berry Township Urban Conservation Area), or defined primarily in terms of natural and historical landscape characteristics (the Berry District Landscape Conservation Area).

The adoption, in this report, of a cultural landscape classification for this area seeks to recognise cultural heritage values as a consequence of the interplay between cultural practice and the physical environment. This provides for the management of such area's in terms of human processes and economies, as well as physical characteristics.
The area and boundary of the SICPH CL approximates those for the National Trust listing of the Berry District Landscape Conservation Area (**Figure 5.6**). A detailed analysis and definition of a boundary is beyond the scope of this assessment.

The Shoalhaven City Council Heritage Study recognised the western portion of this precinct, north of the Shoalhaven, as the *Berry-Bolong Pastoral Landscape* (Peter Freeman Pty Ltd 1998:44) (**Figure 5.6**). It was noted that the continuity of dairy farming across the region has contributed to the survival of an underlying nineteenth century and early twentieth century pastoral landscape. The development of this landscape has been structured by the evolution of the Berry Estates and surrounding villages and tenant communities, subsequent Free Selection across the surrounding slopes, the development and predominance of the dairying industry, development of the transport corridors, first by water and then by road and rail, and the drainage of the wetland basins across the Shoalhaven flood plain.

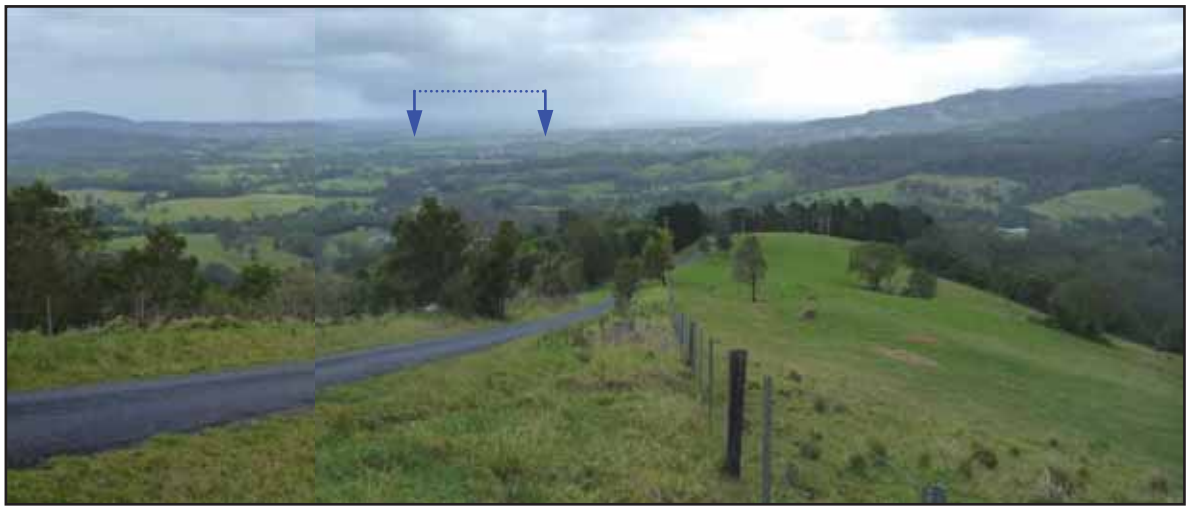


Figure 5.2: Distant view of Berry (indicated by blue arrows) and its landscape context, looking southwest from Tulloch Road. Note the coastal plain context framed by the Southern Illawarra Range escarpment and descending spurs from the far right, and the Coolangatta Mountain on the far left.

Gerroa and the Crooked River

Toolijooa Ridge and Palm valley

Broughton Creek, Broughton Village

Girrakool homestead

Turf farming, Woodhill Mountain Road

Poplars, Woodhill Mountain Road

Figure 5.3: A collection of views demonstrating some of the cultural and aesthetic cultural landscape values of the Southern Illawarra Coastal Plain and Hinterland cultural landscape

Bundewallah Creek

Bundewallah Creek

Valley floor, Broughton Village

Gate, Willow Springs Rd, Broughton Village

Figure 5.4: A collection of views demonstrating some of the cultural and aesthetic cultural landscape values of the Southern Illawarra Coastal Plain and Hinterland cultural landscape

Despite the decline of many smaller villages and communities, changes in population density, the diminishing viability of small farms, and the growth of rural subdivision, the region retains a fundamentally nineteenth century pastoral structure. This is evident as a patchwork of cleared and drained floodplains, cleared estates, vegetated boundaries, forested upper slopes, and a network of townscapes and valley settlements. All of these elements are aesthetically held together by the backdrop of the Illawarra Range, its top escarpment, and prominent ridgelines extending across the plain to the coast. This landscape includes examples of vernacular buildings, farmscapes, churches and public schools, nineteenth century plantings, Victorian residences and a range of buildings, silos, drainage schemes and structures which demonstrate settlement, landuse patterns and the archaeology of the agricultural development of the Southern Illawarra (Peter Freeman Pty Ltd 1998:45).

Railway cutting, Dooley Road, Toolijooa

Off Thompsons Road, Broughton Village

Highway alignment west of Sedgeford

Highway alignment west of Glenvale

Highway alignment at the 'Big Dipper', Broughton Village

Bridge (constructed 1955) over Broughton Mill Creek, Berry

Figure 5.5: A collection of views demonstrating some of the cultural and aesthetic cultural landscape values of the Southern Illawarra Coastal Plain and Hinterland cultural landscape

The vegetation of the region is also a critical component of the cultural landscape. Landscape elements include the continuous pastoral grasslands of the lowlands which extend up slope into a patchwork of smaller former dairy farm clearings, remnant patches of sclerophyll and regenerating rainforest, ribbons of riparian vegetation, and the widespread iconic incidence of often isolated cabbage fan palms, large spreading fig trees, and boundary plantings of Coral trees.

The National Trust (New South Wales) has recognised the cultural, aesthetic and natural values of the landscape values of the Southern Illawarra by defining the *Berry District Landscape Conservation Area* (BDLCA). This area includes the coastline south of Kiama to Greenwell Point, the lower Shoalhaven River plain, and the slopes leading up to and including the Illawarra escarpment **Figure 5.6**). This area is roughly equivalent to that of the SICPH CL. A description of this identified landscape has been entered onto the Register of the National Estate, as an Indicative Place (Place ID 1625), however no formal nomination or assessment was ever prepared (Refer Appendix B).

5.3.2 Berry as an integral component of the SICPH Cultural Landscape

The town of Berry is an integral component of the cultural landscape and its values identified in the SICPH Cultural Landscape recording, and its previously recorded subsets; the Berry Bolong Pastoral Landscape, and the Berry District Landscape Conservation Area. The importance of the town can be summarised by the following points:

- It is the only town within the SICPH CL, and north of the Shoalhaven, which was founded as a private town, and as a part of the Berry Estate.
- It is the only non-coastal, nineteenth century town within the SICPH CL which has developed a viable urban presence, identity and civic centre.
- It demonstrates the historical progression from a private village, initiated and supported by the Berry Estate, to a public town governed by a local government authority.
- It has always been an important part of local district networking and in particular, infrastructure for communication, transport, industry, trade and administration.
- Its road and rail corridors endure as active elements, its maritime corridor (Broughton Creek) remains as an inactive component.
- Its institutions, industry and organisations have variously dominated and influenced the development, extent and structure of the surrounding region.
- It is centrally located within the SICPH CL and provides an aesthetic and cultural focus.
- Many of the nineteenth century traits of the town have not been replaced or overwhelmed by subsequent latter twentieth century urban or industrial development.
- The context of the town remains pastoral.

Many of these characteristics and values are a basis for the recent recognition, by the National Trust of Australia (NSW) of the *Berry Township Urban Conservation Area* (BTUCA). This area was listed on the Trust's Register in 2011 (refer Appendix B). The listing recognises the historic development of the town, and its distinctive urban character set within a rolling agricultural landscape. The following are identified as key components of the town both singly and in combination:

- The range of nineteenth and first half of the twentieth century (mostly single storey) pitched roofed public, commercial and residential buildings.
- The arrangement of buildings within a strict nineteenth century urban grid.
- The residential gardens and street tree plantings.
- The containment of town development within the grid and the abrupt boundary (and resulting contrast) with the adjacent rural lands.
- The views out from the townscape to the rural lands and the Illawarra escarpment.
- The views into the town.

The BTUCA listing incorporates three levels (**Figure5.6**):

- A broad scale visual boundary which adopts the regional boundary of the Berry District Landscape Conservation Area.
- A subdivision boundary which relates to the closer urban settlement of the nineteenth century Berry town grid.
- A buffer zone which seeks to protect the immediate rural setting of the urban grid (Clark and Duyker 2010).

Visual Boundary of the BTUCA, also the boundary of the *Berry District Landscape Conservation Area* (This boundary approximates that for the SICPH CL)

Buffer Zone of the BTUCA

Sub-division Boundary of the BTUCA

Boundary of *Berry – Bolong Pastoral Landscapes*

Figure 5.6: Previously defined landscape conservation areas which include the project: Three levels of the National Trust Berry Township Urban Conservation Area (BTUCA) are defined. (After Figure 13 in Clarke and Duyker 2010; and The boundary of the Berry – Bolong Pastoral Landscapes (Shoalhaven Heritage Inventory) (base image: Google Earth Pro 2009).

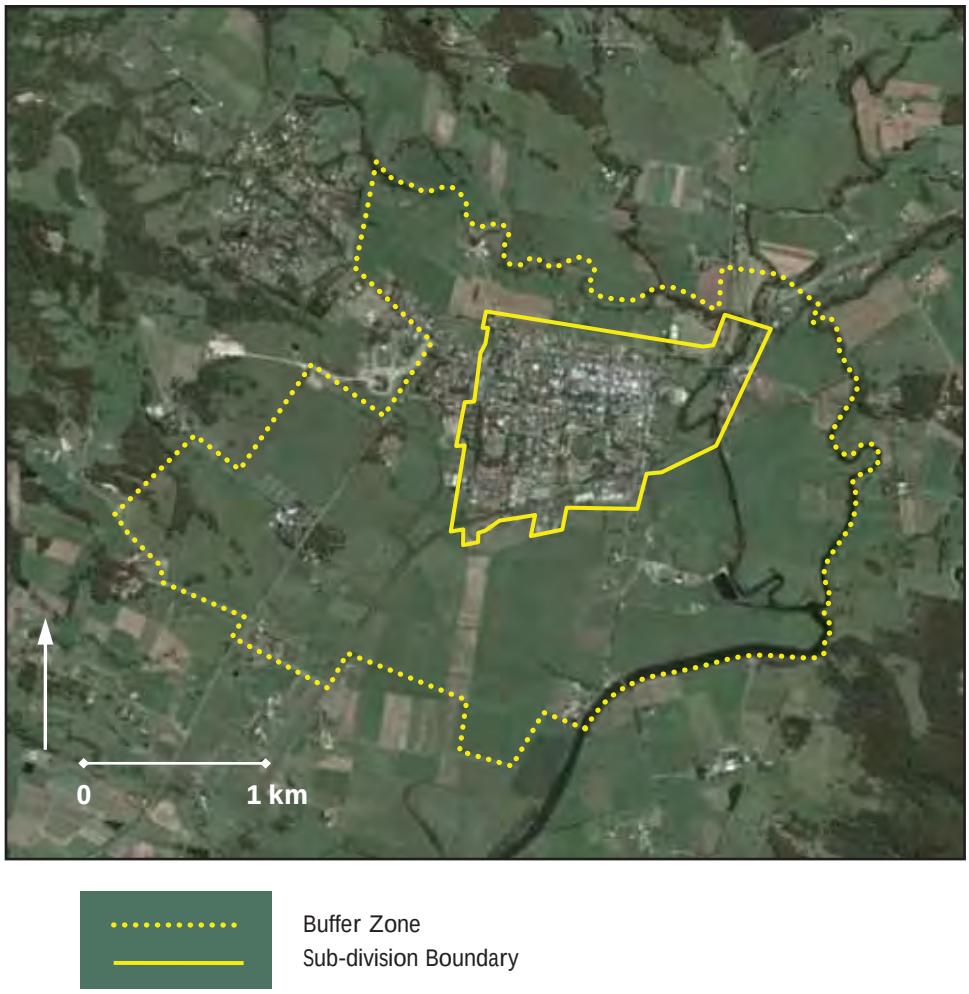


Figure 5.7: Detail of the Sub-division boundary and fringing Buffer Zone for the National Trust defined Berry Township Urban Conservation Area (After Figure 13 in Clarke and Duyker 2010) (Google Earth Pro 2006).

An analysis of the urban and townscape of Berry was conducted by Conybeare Morrison & Partners (1999). Key elements were found to be:

- The town relationship with the surrounding valleys, foothill and ridges.
- The structure of the urban area, including:
  - The earlier, linear topography determined, town development on the spurline east of Broughton Mill Creek.
  - The rectangular grid, established in the 1880s to the west of Broughton Mill Creek, and south of Bundewallah Creek, (and extended towards the rail line in the 1890s).
  - The smoothing of the squared road intersections along the northern town approach which resulted from upgrading of the highway in the 1950s.
  - To these elements can be added the mid to later twentieth century development areas to the west and southwest of the town (**Figure 5.8**).
- Vistas to and from the town, including how the street grid and surrounding landscape reveal, frame or conceal view scapes.

- Urban texture, including the rapid change in the space of two blocks, from a pastoral landscape with vernacular buildings, to the urban Victorian character of the commercial and public buildings along the main street.
- The surrounding pastoral landscape and its interrelation with the town, especially to the north of the town where the boundary is distinct and vistas allow urban and pastoral elements to be juxtaposed.

A visual analysis of the chronological development of the Berry township and its urban structure is provided in **Figure 5.8**. A number of key points can be made from the analysis:

- There have been four major developmental structural influences:
  - The mid to late nineteenth century commercial and civic focus of the 'Broughton Creek" town along the spurline east of Broughton Mill Creek.
  - The establishment of the current town centre and associated urban grid from the 1880s.
  - The imposition of the diagonal rail corridor and associated development across the southeastern corner of the town grid.
  - Urban development outside of, or inconsistent with the grid, from the 1950s onwards. This has focused on elevated topographies to the west and south of the grid. Factors influencing the location of these estates have been the avoidance of low-land subject to flooding, vehicle access, and proximity to the town. These developments have obscured any spatial or visual separation between the town's nineteenth century grid structure and the surrounding pastoral landscape.
- The sharp boundary between urban and pastoral landscape along the north and southern sides of the town grid, noted in both the National Trust and Conybeare Morrison & Partners descriptions, has only become well defined in the second half of the last century (Figure 5.9). This is due to the confinement of urban development in these areas to within the established town grid. Prior to this, the edge of town was far less distinct, with pastures and farmhouses occurring within the grid. The 1949 aerial photograph demonstrates this. It shows a 'porous' edge to the town with much of the current urban grid consisting of pasture (Figure 5.8).
- The survival of the urban-pastoral contrast along northern and eastern edges of the grid is probably a combined consequence of avoiding development on flood prone land, and on the future highway town bypass, anticipated since 1966 to be along North Street.

Conybeare Morrison & Partners (1999) identified a number of significant vistas to and from the town which manifest in the interrelation of heritage and landscape values identified in their analysis (**Figure 5.10**). Consistent with the factors outlined in this review, the vistas relate to the northern and southern margins of the town grid:

- Views from the town grid to the north, as framed from the north-south street alignments (Figure 5.13).
- Views to the west and south from the spurline descent into Berry from the north.
- Views along Pulman Street.

To these can be added:

- Views westwards along North Street, and to the north generally from North Street Figure 5.11 and Figure 5.12).

Figure 5.8:

Comparison of 1949 and 2006 aerial images of Berry township, showing the progressive evolution of three main built environment precincts (SVY 552/Nowra 5164 Run2 (155-166) 4/04/1949; and Google Earth Pro. 2006)

Figure 5.9: Distant view of the northern edge of Berry, looking east from Ben Dooley Rd, Berry Mountain. Note the distinct boundary along North Street (indicated by dotted blue line) between the urban and pastoral landscape.

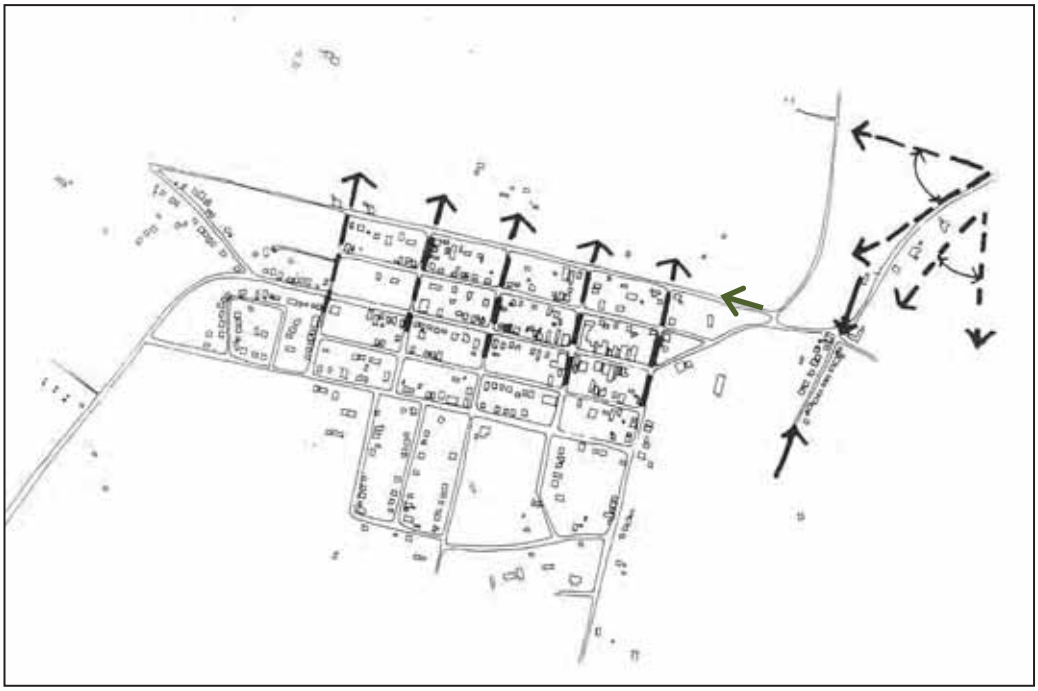


Figure 5.10: Key vistas to and from the Berry township which relate to the heritage and aesthetic values of the town and its interrelation with the surrounding pastoral landscape (after Conybeare Morrison & Partners 1999: Figure 7, green arrow added by authors)

Figure 5.11: Panoramic view, looking west to northeast, from just east of the intersection of Alexandra St and North Street, Berry, showing the pastoral landscape which extends from the North Street easement, and the distant views of the Southern Illawarra Range.

Looking east along North Street, from just east of intersection with the George Street easement

Looking east along North Street, from near intersection with Albany Street

Looking west along North Street, from intersection with Albany Street

Looking west along North Street from near intersection with Alexandra Street

Figure 5.12: Views along North Street, Berry, showing the distinct boundary between the urban and pastoral landscape, and the pastoral context and character afforded to this edge of the town.

Looking north along George Street easement

Looking north from near the end of the George Street easement

Looking north along Edward Street

Looking north from near the end of Edward Street

Looking north along Albany Street

Looking north from near the end of Albany Street

Looking north along Alexandria Street

Looking north from near the end of Alexandria Street

Figure 5.13: Views from the town of Berry which would be impacted by the project, looking north along the north-south aligned town-grid streets.

6 Test excavation program at G2B H14

6.1 Requirement for test excavation

Five potential archaeological deposits were identified as a result of the archaeological survey:

- G2B H14, former C19th Broughton Creek town buildings, Berry
- G2B H48, former Berry Estate tenant farm (now location of Greystanes Lodge, Broughton Village
- G2B H52, former Berry Estate tenant farm, Broughton Village
- G2B H53, former Berry Estate tenant farm structure, Toolijooa Ridge, and
- G2B H59), former non-Berry Estate homestead, Broughton Village.

It was determined that only one of these locations required further archaeological investigation in order to draft appropriate management strategies relative to assessed significance. This site was G2B H14, the location of former buildings at the northern end of the Broughton Creek village (now Berry). Of the remaining four potential archaeological deposits, two would not be subject to direct impact and the others would not require further investigation in order to determine an appropriate management strategy.

6.2 Site description - G2B H14

GDA Grid References midpoint: 290041.6149820
end point 1: 290063.6149874
end point 2: 290019.6149750

The site G2B H14 extends for approximately 130 metres north-south by 15 metres east-west (at its widest point), along the eastern margin of the current Princes Highway alignment, where it diverges from the former pre 1955 alignment, on the northern approach into Berry. The site comprises potential archaeological deposits from former nineteenth and twentieth century Broughton Creek town buildings that were located along the western side of the former highway alignment (G2B H15), roughly opposite *Mananga*. Based on historical research compiled by members of the Berry and District Historical Society, the following structures are known, or reliably predicted, to have occurred in this area:

- The Berry Butter Factory (1889).
- Court House (1870s).
- Roman Catholic Church (1866).
- The Council Chambers (1868).
- Overseers Cottage (1858).
- A Carpenter's Cottage.

An approximation of the possible relative locations of these structures is provided in **Figure 6.1**, which is based on information gathered by the Berry Historic Museum.

It is not clear where exactly these structures were located, or whether any of the earlier buildings were still in existence when the Berry Butter Factory was constructed in 1889.

The site currently comprises a relatively level grassed area with a row of five plane trees planted at 20 metre intervals along a north-south alignment (**Figure 6.1**, also refer Appendix G Figures G.189-G.191). A "Welcome to Berry" sign is located at the northern end of the site (**Figure 6.2** and **Figure 6.3**), approximately 10 metres north of the northernmost plane tree.

An isolated piece of a dressed sandstone block is situated adjacent the current highway verge, towards the southern end of the site. It is unclear whether this item is *in situ*. There are no other identifiable surface features to provide clues to the location of prior structures.

Aerial photography for this location shows that, in the 1940s (**Figure 6.4**), there was at least one structure opposite *old Mananga*, immediately to the southwest of the potential archaeological deposits identified at G2B H14. This building had disappeared by the 1950s (**Figure 6.5**), when the new highway alignment was shifted to the west. Overlays of the various highway alignments and the location of the structure from the 1940s are provided in **Figure 6.6**. It can be seen from these overlays that the structure present in the 1940s was set back approximately 10 metres from the edge of the highway. This translates to about 30 feet, which was a relatively common width for frontages in NSW towns in the nineteenth and early twentieth-century; indeed, the buildings along the main street in Berry were all situated a similar distance from the road.

Figure 6.1: Approximate and indicative location of structures that may have once occupied the area at G2B H14 (Base image - Google Earth 2011)

Figure 6.2: Archaeological hand excavation at test pit D/E100 in front of the Berry entrance sign (Sam Harper pictured).

Figure 6.3: Archaeological recording of features within test pit D/E100 in front of the Berry entrance sign at the northern end of G2B H14, looking south (Dr Rebecca Parkes and Sam Harper pictured).

Assuming that all the buildings in the vicinity of G2B H14 were set back approximately 10 metres from the road verge, it would appear that the current highway alignment runs through the probable locations of any previous structures. As such, the area of identified potential archaeological deposits to the east of the existing highway is likely to relate to building frontages (pedestrian and/or delivery areas) and possibly the margins of building locations across some of the wider sections of the site.

Figure 6.4: 1944 aerial photograph showing the relative locations of the old Princes Highway, *Mananga* homestead and a building at G2B H14.

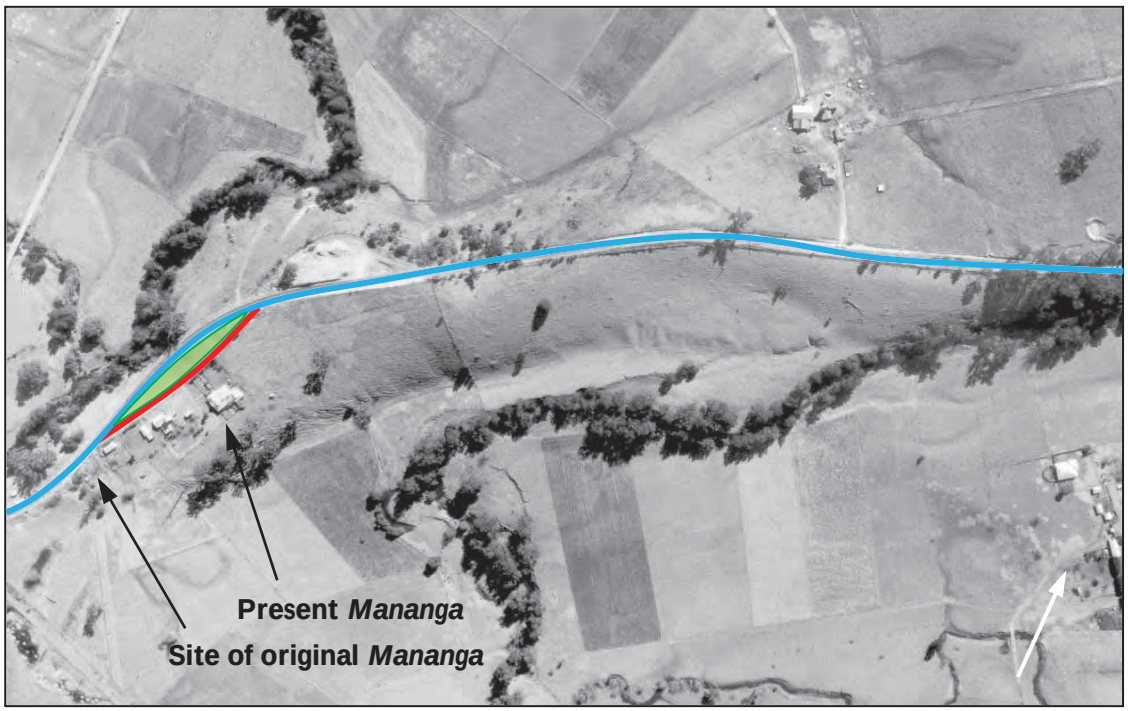


Figure 6.5: 1958 aerial photograph showing the changes in highway alignment: blue is the current alignment, red is the previous alignment. G2B H14 is shaded green.

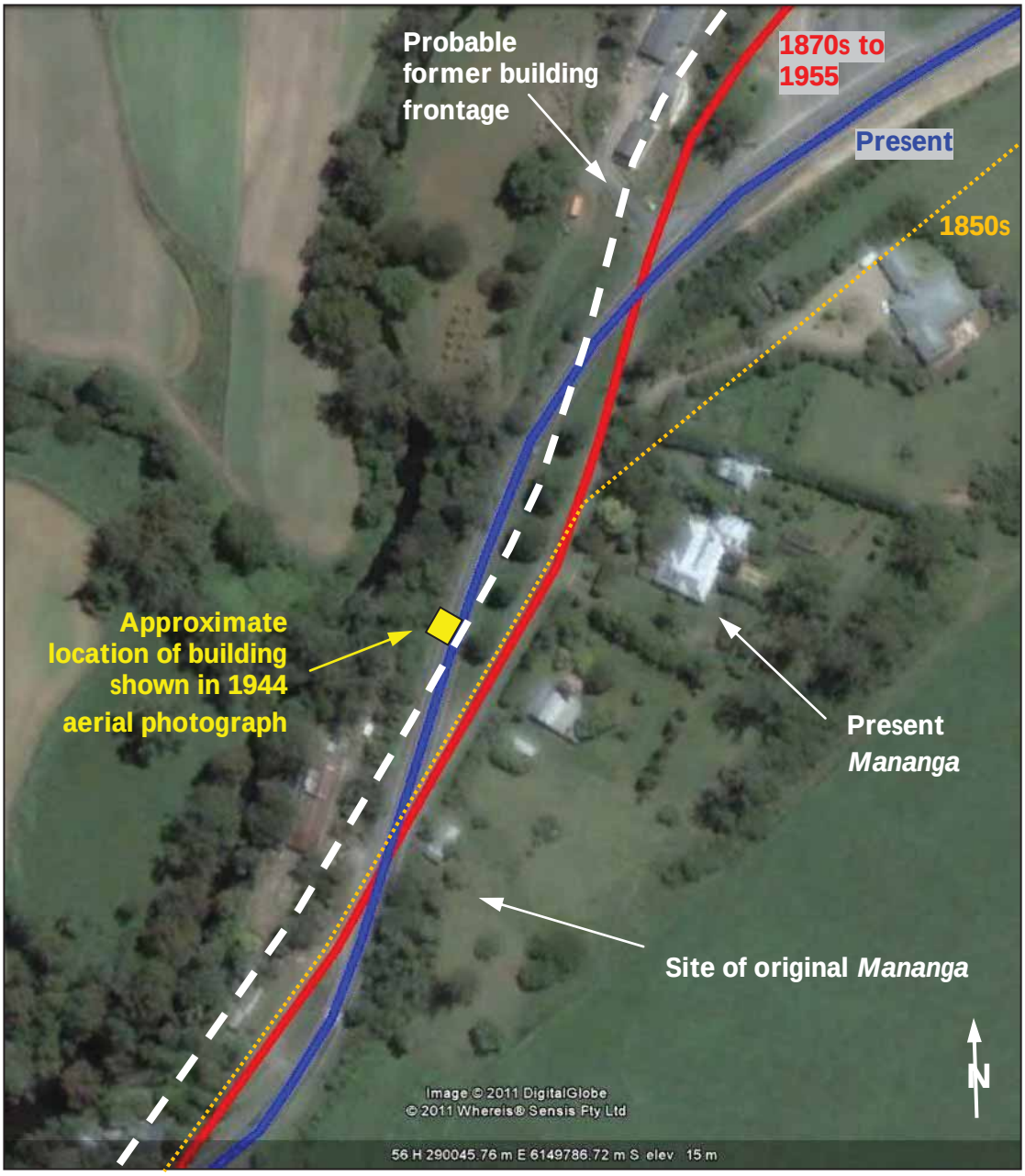


Figure 6.6: Overlay of current and former highway alignments in the area of G2B H14 and an approximation of the probable former building frontage (dashed white line) (Base image – Google Earth Pro 2011).

6.3 Excavation results

6.3.1 Overview

Investigation began with a series of one metre by one metre test pits excavated at 10 metre intervals along the eastern margin of the existing Princes Highway alignment. These pits were then expanded upon, or abandoned, on the basis of the stratigraphy and artefacts contained therein.

Excavation was undertaken by hand (see **Figure 6.2**), using trowels, mattocks, shovels and a pneumatic jack hammer. Individual units included excavation of stratigraphic contexts and excavation of sections with arbitrary contexts.

A summary of the excavation by square and context is provided below in **Table 6.1**. An overview of the layout of the trenches is provided in **Figure 6.7**.

Table 6.1: Summary of contexts excavated across the G2B H14 test pits

Square	Context	Description
A64/B64/C64	22	Quadrats III and IV sectioned down to natural clay subsoil
A80	39	Sectioned down to natural clay subsoil
B61	30	Excavated down to dark-brown sandy loam (old A horizon)
B80	1	Removal of grass/topsoil layer
	34	Excavated down to dark-brown sandy loam (old A horizon)
B95	1	Removal of grass/topsoil layer
	33	Excavated down to dark-brown sandy loam (old A horizon)
B96	36	Excavated down to dark-brown sandy loam (old A horizon)
B100	40	Removal of overburden/fill: excavated down to a yellow-brown sandy loam
	41	Excavated through sandy loam and other fill layers to expose burnt layer
	44	Section Quadrat III and southern portion of Quadrat I down to the natural clay subsoil
C24	43	Cut square down to explore context of sandstone block: disturbed road fill
C50	1	Grass/topsoil layer
	2	Brown loam down to orange-brown gravelly clay fill
	42	Section through fill and old ground surface, down to clay.
C60	1	Grass/topsoil layer
	2	Brown loam down to orange-brown gravelly clay fill
	7	Quadrats I and II excavated down to dark brown sandy loam
	10	Quadrats I and II excavated down to yellow brown sandy clay
C61	12	Removal of overburden/fill to expose old A horizon
C70	1	Grass/topsoil layer
	3	Excavated down to yellow-brown clay fill with tree roots
	4	Removal of yellow-brown clay fill
C79	32	Excavated down to dark-brown sandy loam (old A horizon)
	38	Excavated down to natural clay subsoil

Square	Context	Description
C80	1	Grass/topsoil layer
	2	Brown loam down to orange-brown gravelly clay fill
	28	Mixed clayey gravel and gravelly clay, yellow-brown fill
	31	Brown, variably compact loam, with 10-20mm lens of angular blue metal gravels over an apparent A-horizon soil – excavated down to yellow-brown clay with apparent post hole at base
C95	32	Removal of overburden/fill down to old A horizon
	35	Excavated down to natural clay subsoil
C96	37	Excavated down to dark-brown sandy loam (old A horizon)
C110	1	Removal of grass/topsoil layer
	20	Excavated through gravelly layer to a mixed loam and clay fill
	23	Removal of overburden fill, exposed below Context 20
	29	Section down through quadrats I and II to natural clay subsoil
D80	32	Removal of overburden/fill down to old A horizon
	42	Excavated down to natural clay subsoil
D100	27	Cut square down to burnt layer exposed in E100 at base of Context 21
E64	16	Excavated top 150mm across quadrats III and IV
	19	Sectioned down a further 100mm
E100	1	Removal of grass/topsoil layer
	21	Removal of overburden/fill, burnt layer exposed across southern half
	25	Sectioned northern portion of square down to natural clay subsoil
E120	1	Removal of grass/topsoil layer
	24	Sectioned this square down through overburden to natural clay subsoil
F20	1	Grass/topsoil layer
	2	Brown loam down to orange-brown gravelly clay fill
	9	Dark brown loamy gravel with bitumen, blue metal and larger rounded pebbles/cobbles
	15	Continuation of gravelly context and distinct change to a coarse sandy layer with fewer pebbles/cobbles
	18	Excavation of mixed clay and loamy clay with charcoal and orange brown ash down to yellow brown clay across majority of square.
	26	Excavation of quadrat III, following a pocket of dark brown clay down to yellow brown compact clay
F30	1	Grass/topsoil layer
	2	Brown loam down to orange-brown gravelly clay fill
	6	Removal of yellow-brown clay fill
	11	Excavated down to cobbled surface
F31	13	Excavated square down to yellow brown sandy clay
	11	Excavated down to cobbled surface

Square	Context	Description
F39	8	Equivalent to removal of Contexts 1, 2 and 5, down to old A Horizon soil
	14	Western 2/3 of square excavated down to clay layer, with old telecommunications trench exposed running north-south
F40	1	Grass/topsoil layer
	2	Brown loam down to orange-brown gravelly clay fill
	5	Removal of yellow-brown clay fill, down to brown loam (old A horizon soil) with possible post hole in NW quadrat
F64	1	Removal of grass/topsoil layer across quadrats III and IV
	19	Sectioned down to level consistent with E64

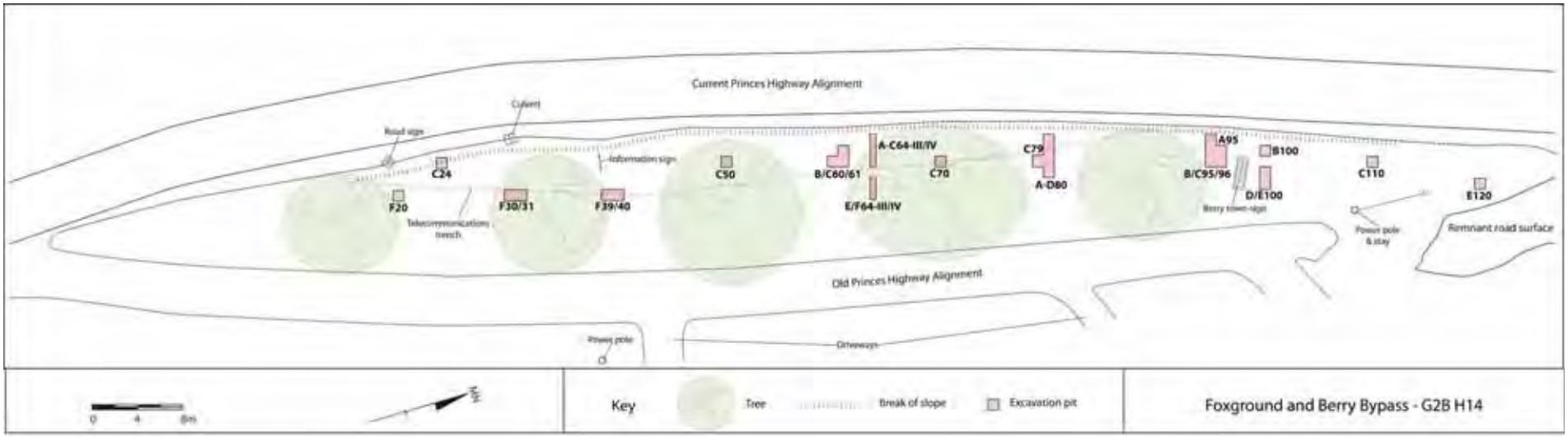


Figure 6.7: G2B H14 site plan

6.3.2 Artefact assemblage

The artefact assemblage from the test pitting program at G2B H14 comprises glass, ceramic, metal and miscellaneous (brick, shell, wood, plastic) items. Two hundred and ninety-four (294) pieces, totalling almost five kilograms in weight (4943.4 grams), were recovered from the excavation (**Table 6.2**; Appendix F). The assemblage is broadly characterised by late nineteenth-century or early twentieth-century material culture and some more recent roadside debris; the latter being most prominent in the upper levels of the site. In terms of material types present, the assemblage is dominated by non corrosive materials such as ceramics or glass. The wet, clayey conditions at the site are likely to have had considerable negative impact on the preservation of metal and other perishable items. Nearly all of the ferrous objects recovered were heavily corroded; often items were unable to be identified in terms of function or chronology. Examples of items that were particularly prone to corrosion include metal fasteners (see **Figure 6.8**). It is probable that such items are underrepresented due to factors influencing artefact survival including possible previous disturbance and the soil moisture content.

Table 6.2: Frequency and weights of material types from the G2B H14 assemblage

Material	Frequency	Frequency %	Weight (g)	Weight %
Ceramic	40	13.6	1988.9	40.2
Glass	194	66.0	742.0	15.0
Miscellaneous	24	8.2	1177.9	23.9
Metal	36	12.2	1034.6	20.9
Total	**294**	**100**	**4943.4**	**100**

There are a number of clear trends regarding the frequency and weights of the different material types recovered from the test excavations (**Table 6.2**). Glass is represented by high artefact numbers (N=194) and a low overall weight (742 g), indicating that glass items tend to be highly fragmented. This level of fragmentation would suggest that the glass at G2B H14 derives primarily from stray rubbish disposal, as opposed to wholesale dumping of bottles and other glassware. Ceramic items, in contrast, are represented by low numbers (N=40) but the highest weight (1988.9 g), by material type. A significant proportion of the ceramic assemblage is from large fragments of stoneware pipe and porcelain insulators. The metal (N=36) and miscellaneous (N=24) elements of the assemblage are characterised by low numbers and roughly equivalent weights (metal: 1034.6 g; miscellaneous: 1177.9 g), indicating that these items tend to be represented by larger, less fragmented pieces.

Not surprisingly, the more fragile elements, such as glassware and ceramic tableware, tend to be more fragmented, while the more robust items are present in large fragments but never whole items. Overall, this suggests that the assemblage from this site derives from secondary deposition of artefacts, from activities such as cleaning. The absence of whole items is also indicative of high levels of post-depositional disturbance, much of which may relate to site abandonment and subsequent realignment of the highway.

The nature of the artefact assemblage varied in terms of composition, chronology and density across the excavation area. At least four distinct areas are identifiable in terms of artefact types and numbers:

- An area in the south with highly fragmented/worn glass and ceramic items from the late nineteenth century.
- A central area with a mix of nineteenth century and modern artefacts and some evidence for post holes.
- An area in the north with evidence of a nineteenth century burning event.
- The northernmost portion of the site, which is characterised by a general absence of artefacts or other archaeological features.

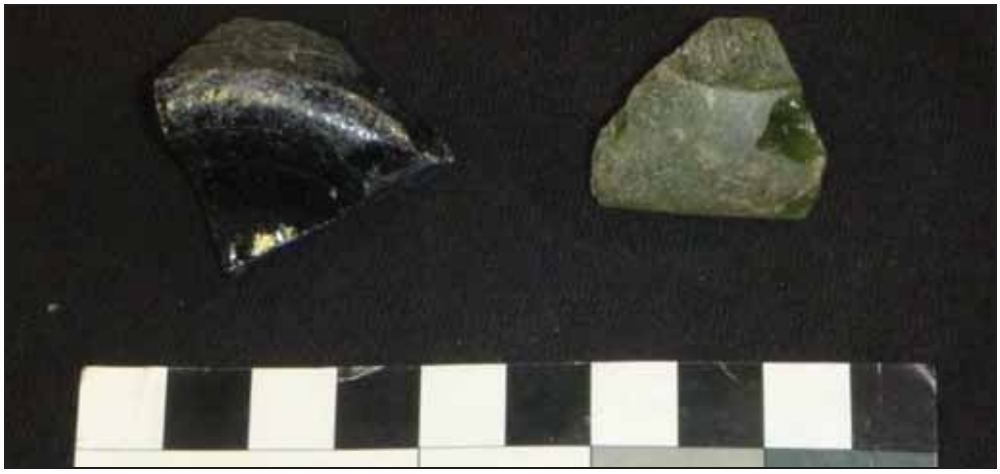


Figure 6.8: Scuffed green glass bottle bases (2058 and 2013). Scale shows 10mm intervals.

The southern section of the site extends for approximately 20 metres from F20 through to F39-40. This portion of the site is characterised by the presence of *in situ* cobbling (F30 and F31), disturbed cobbling (F20 and to a lesser extent F39-F40) and highly fragmented, worn or scuffed artefacts (**Figure 6.8**). Excavations in F39 revealed an early twentieth-century telecommunications trench, which was also evidenced along the western margin of F30-F31. This feature clearly post-dated the cobbled surface.

The glass artefacts from the F20-F40 area were characterised by bottles produced from moulds, which, on the basis of the absence of any pontil marks, would be likely to date from 1870-1920 (Boow, 1991:114, 116). A fragment of window glass (crown glass) from F20 is similarly indicative of the late nineteenth-century period (Boow, 1991:111). Other diagnostic glass items include two machine made, external screw thread finishes, from upper levels in F39 (Context 8) and C24 (Context 43), these items date to the mid to late twentieth-century (Boow, 1991:114). Similarly, fragments of modern car window glass were recovered from F39 (Context 8) and F40 (Context 5).

Metal items from the southern portion of the site were dominated by fasteners such as nails, bolts and washers from F20 (Contexts 2 and 9). These items were all heavily corroded (**Figure 6.9**), although the nails did appear to potentially be wire nails, which were produced from the 1860s to the 1880s (Varman, 1986:260).

Ceramic artefacts from this area include fragments of glazed stoneware pipe (**Figure 6.10**) from F39 (Contexts 8 and 14), which may have been from a drainage pipe that was subsequently disturbed by installation of the telecommunications trench, and two small fragments of domestic items from F20 (Context 9) and F39 (Context 14). Neither of the domestic fragments is chronologically diagnostic.

Miscellaneous artefacts from this area included brick fragments from F20 (Context 18) and F30 (Contexts 6 and 11) and mortar from F39 (Context 8). These items were too fragmentary to assess their age with any confidence.

The central portion of the site, extending for at least 45 metres between C50 and C96, is characterised by limited structural evidence in the form of postholes (C80 and B60 – Appendix E), and a sparse but relatively diverse artefact assemblage. Ceramic items from this area primarily consisted of fragments from stoneware (**Figure 6.10** and **Figure 6.11**), ginger bottles with a crown-seal finish (**Figure 6.11**) from A64-C64 (Context 22); these artefacts are likely to date to the early twentieth-century (Boow, 1991:117). Other ceramic items included a fragment of plate from C50 (Context 42) and cup fragments from B64 (Context 22) and C79 (Context 32).

Figure 6.9: Corroded iron structural items: bolt (4013), washer (4015), and suspected wire nails (4004). Scale shows 10 millimetre intervals.

Glass items from the area around B60-C60 and A64-F64 are predominantly fragments of moulded bottles from the second half of the nineteenth-century. Other glass artefacts include a fragment of lamp glass from A64 (Context 22) and a fragment of crown window glass from B64 (Context 22). Again, these artefacts appear to be indicative of occupation during the late nineteenth-century. In contrast to this, the glass artefacts from the trenches to the north (C70 and C79-D80) are dominated by machine made items typical of early twentieth-century occupation.

A ground shell pendant with inlaid decoration (**Figure 6.12**), presumably from an earring or necklace, was recovered from the lower levels of D80 (Context 32). This is the only personal item recovered from test excavations at G2B H14; it is difficult to ascertain an accurate date for this item, however its handmade nature and state of preservation is potentially indicative of the turn of the nineteenth to twentieth-century.

In terms of structural artefacts from this area there are two brick fragments from C50, (Context 32) of which one appears to be handmade, possibly dating to the middle to late nineteenth-century (Varman, 1986:260). A metal hinge and a bracket were also recovered from C95 (Context 32) and B95 (Context 33) respectively. The presence of these items is potentially indicative of a nearby structure, although there is very little in the way of other structural evidence from this excavation trench.

The third area corresponds to the area around trenches B100 and D100-E100. While the upper layers in these trenches clearly relate to relatively modern fill, as evidenced by the presence of copper wire and insulators from a telegraph line, the lower contexts (Contexts 25, 27 and 41) are associated with nineteenth century bottle glass, carbonised wood and a dense layer of ash. Twenty fragments of heat affected dark green glass were recovered from D100 and E100 (**Figure 6.7** and **Figure 6.13**). The age of this glass, combined with its exposure to heat and association with a burning event, suggest that the carbonised wood in this area may relate to a burning event from the late nineteenth or early twentieth-century.

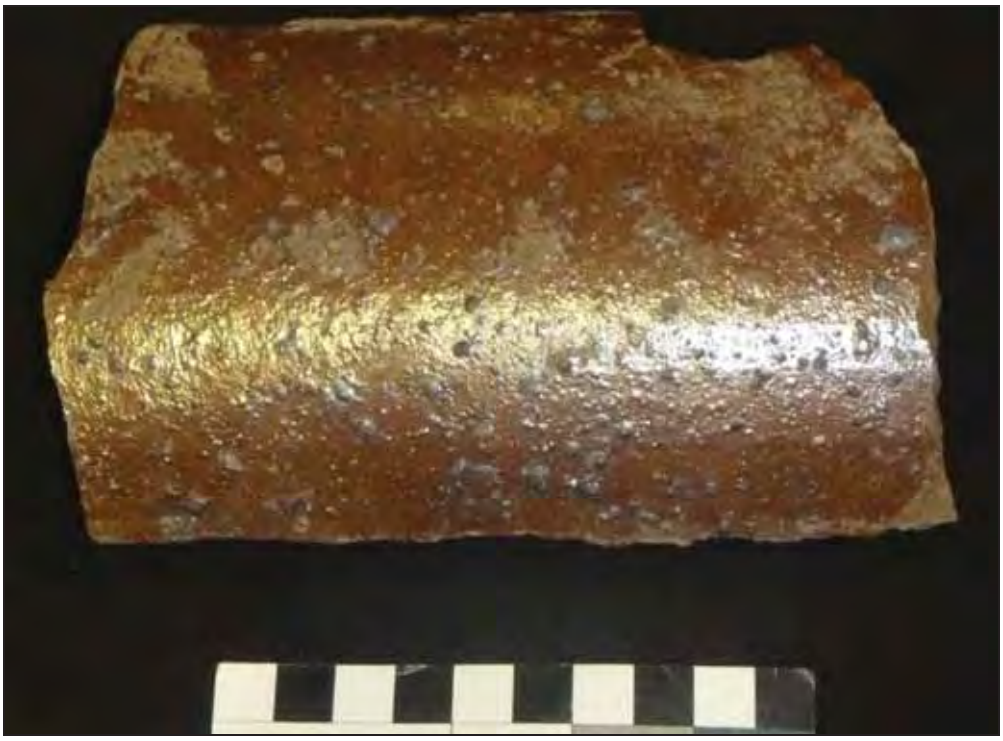


Figure 6.10: Stoneware pipe fragment (1003). Scale shows 10 millimetre intervals.

Figure 6.11: Stoneware crown finish fragments from a ginger beer bottle (1007). Scale shows 10 millimetre intervals.

Figure 6.12: Shell pendant (3018). Scale shows 10 millimetre intervals.

Excavation across the northernmost portion of the site, from C110 to E120, resulted in recovery of a single fragment of amber bottle glass, which probably dates to the second half of the twentieth-century. Soil profiles in this area indicate the presence of at least one burning event below the cap of modern fill associated with construction of the existing highway (Appendix E), which may or may not be associated with the burning event identified in B100 and D100-E100. No other structural or artefactual evidence was identified in this portion of the site.

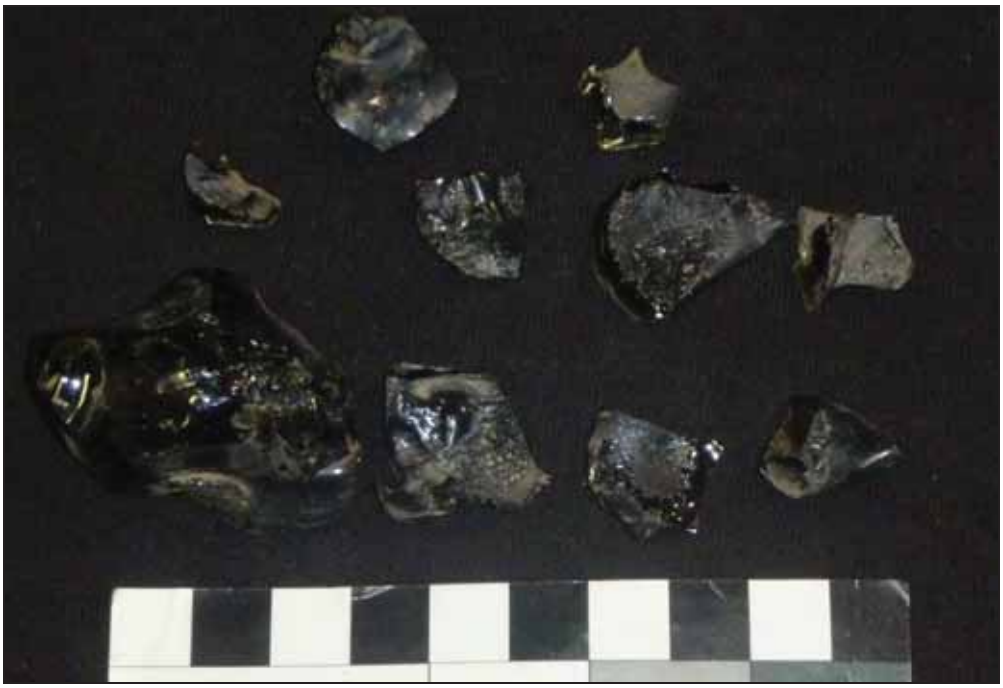


Figure 6.13: Dark green heat affected glass (2008). Scale shows 10 millimetre intervals.

6.4 Summary

The test excavation program at G2B H14 has demonstrated that there are sections, albeit limited areas, of relatively intact deposits from the turn of the nineteenth-twentieth century. Examples of such deposits include the cobbled floor identified in F30-F31, artefacts in association with the old ground surface identified in B60-C61 and A64-C64, the post hole identified in C80 and the burnt layers and associated artefacts in B100 and D100-E100. There are also examples of more disturbed deposits that, while compromised in integrity, appear to contain artefacts that have the potential to provide information about the chronology and function of the site (eg at F20 and F39-F40). However, the northernmost portion of the site, around C110 and E120, appears to be largely sterile below the cap of modern fill.

On the basis of historical research, including analysis of aerial photographs and available maps, it appears that the archaeological deposits at G2B H14 relate primarily to an area of street frontage, as opposed to the site of prior structures. There is however potential for traces of the eastern limits of buildings to occur along the western margins of the site, in the vicinity of A30-B80. The differences in archaeological features and associated artefact assemblages across the site may also be indicative of a series of street blocks, which could potentially be confirmed through additional excavations along a north-south transect.

In summary, archaeological deposits at G2B H14 are assessed as having potential to provide information on the following aspects of the site's history:

- The width of the street frontage and the activities that took place in this area.
- The location of individual buildings or portions of their eastern limits.
- The location of individual lot boundaries that extend east to west across the site.
- Differing site functions across these lots.
- Overall site chronology from the mid nineteenth to mid twentieth-century.

7 Significance assessment

7.1 Assessment criteria

The NSW Heritage Branch has defined a methodology and set of criteria for the assessment of cultural heritage significance for items and places, where these do not include Aboriginal heritage from the pre-contact period (NSW Heritage Branch and DUAP 1996, NSW Heritage Branch 2000). The assessments provided in this report follow the Heritage Branch methodology.

The following heritage assessment criteria are those set out for listing on the State Heritage Register. In many cases items would be significant under only one or two criteria. The State Heritage Register was established under Part 3A of the *Heritage Act 1977* (as amended in 1999) (Heritage Act) for listing of items of environmental heritage that are of State heritage significance. Environmental heritage means those places, buildings, works, relics, moveable objects, and precincts, of State or local heritage significance (Section 4, Heritage Act).

An item would be considered to be of State (or local) heritage significance if, in the opinion of the Heritage Council of NSW, it meets one or more of the following criteria:

Criterion (a) An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).

Criterion (b) An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area).

Criterion (c) An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).

Criterion (d) An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.

Criterion (e) An item has potential to yield information that would contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area).

Criterion (f) An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).

Criterion (g) An item is important in demonstrating the principal characteristics of a class of NSW's:

- cultural or natural places; or
- cultural or natural environments.

(or a class of the local area's:

- cultural or natural places; or
- cultural or natural environments.)

An item is not to be excluded from the register on the ground that items with similar characteristics have already been listed on the register. Only particularly complex items or places would be significant under all criteria.

In using these criteria it is important to assess the values first, then the local or State context in which they may be significant.

Different components of a place may make a different relative contribution to its heritage value. For example, loss of integrity or condition may diminish significance. In some cases it is constructive to note the relative contribution of an item or its components. **Table 7.1** provides a guide to ascribing relative value.

Table 7.1: Guide to ascribing relative heritage value to constituent elements of a heritage item or grouping

Grading	Justification	Status
Exceptional	Rare or outstanding item of local or State significance. High degree of intactness. Item can be interpreted relatively easily.	Fulfils criteria for local or State listing.
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.	Fulfils criteria for local or State listing.
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or State listing.
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or State listing.
Intrusive	Damaging to the item's heritage significance.	Does not fulfil criteria for local or State listing.

7.2 Summary of individual assessments

This section provides a summary of the significance assessments conducted for the forty non-Aboriginal (European) heritage recordings within or near (within 200 metres) the project. A detailed assessment of each site or item, against the assessment criteria is presented in Appendix G.

Of the forty non-Aboriginal (European) field recordings:

- Six have been found to fall below the significance thresholds defined within the assessment criteria. These are G2B H10, G2B H12, G2B H18, G2B H24, G2B H50 and G2B H57. These recordings will not be considered further with regard potential impact and impact mitigation.
- Three cannot be given definitive assessments until the nature of predicted archaeological deposits are confirmed through test excavation. These items have been given indicative assessments of local context significance, subject to confirmation (G2B H48, G2B H52 and G2B H53).
- One is assessed as having State significance (Graham Park – former agricultural research institution).
- The remaining thirty items are assessed as having heritage significance within a local context, according to one or more of the specified significance criteria.

These assessments are outlined in **Table 7.2**.

Table 7.2: Summary of Non-Aboriginal significance assessments

ID	Recording	Context of significance	Significance criteria							Summary statement of significance
			a	b	c	d	e	f	g	
G2B H10	Early C20th Cottage (72 North St. Berry)	Below threshold								The cottage at G2B H10 does not meet any of the significance criteria. This item falls below the threshold for heritage listing.
G2B H11	Federation Cottage c.1894 (77 North St. Berry)	Local							✓	The *GlenDevan* house (G2B H11) is of local significance as a representative example of Federation period housing on the Berry Estate.
G2B H12	Remnant portion of C20th highway (N. Berry wayside stop)	Below threshold								**Twentieth century highway remnants** The twentieth century road remnants comprised by the recordings G2B H15, G2B 20, G2B 21 and G2B 26 form an important example of elements of early twentieth century highway design, construction and modification. In particular, G2B H26 is important in the course of local highway upgrades. It is also directly associated with the Binks, an early tenant farming family that is of importance due to its involvement with the development of the local dairy industry. Items G2B H20, G2B 21 and G2B 26 all have the potential to yield information regarding standards in early twentieth century road design and construction, and G2B H15 and 26 are notable in terms of their rarity and representativeness. Remnant recordings G2B H12, G2B 18, G2B 24 and G2B 57 all fall below the threshold of significance defined in the assessment criteria.
G2B H15	Remnant portion of C20th highway (Adj to *Mananga* homestead)	Local						✓	✓	
G2B H18	Remnant portion of C20th highway (near and opposite Tindalls Lane intersection)	Below threshold								
G2B H20	Remnant portion of C20th highway (Broughton)	Local					✓			
G2B H21	Remnant portion of C20th highway (Broughton)	Local					✓			
G2B H24	Remnant portion of C20th highway	Below threshold								
G2B H26	Remnant portion of C20th highway	Local	✓	✓			✓	✓	✓	
G2B H57	Remnant portion of C20th highway (intersection of Highway and Tindalls Lane)	Below threshold								
G2B H13	Burnett Estate Workers Cottage c.1917 (143 North St. Berry)	Local							✓	The Burnett Estate Overseer's Cottage at G2B H13 is a well preserved and locally representative example of an early twentieth century weatherboard overseer's cottage.

ID	Recording	Context of significance	Significance criteria							Summary statement of significance
			a	b	c	d	e	f	g	
G2B H14	Archaeological deposit (former C19th *Broughton Creek* town buildings)	Local	✓				✓	✓	✓	The site G2B H14 is of importance in terms of the local history, particularly the development of nineteenth-century commercial and government premises and the road network. Excavations at the site have demonstrated that the G2B H14 archaeological deposits have the potential to yield information that will contribute to an understanding of site function(s), the spatial organisation of the urban landscape at Broughton Creek, and site chronology and formation processes. The remaining deposits at G2B H14 are rare within the local Berry context as the only remnants of this northernmost portion of the urban landscape and as a representative example of a relatively undisturbed portion of a nineteenth century street frontage.
G2B H16	*Mananga,* 1894, Queen Anne style homestead, former Berry Estate Manager's Residence (A40 Princes Highway. Berry)	Local	✓	✓	✓		✓		✓	The Mananga Homestead and the broader site complex are of local historical importance due to their role in the course of the history and development of the Berry Estate and Broughton Creek Village. Mananga Cottage and Mananga Homestead are both directly linked to important members of the Stewart Family, and as such have a strong and special historical association. The complex as a whole, and the Mananga Homestead in particular, display landmark qualities and are important in demonstrating aesthetic characteristics of a Federation period homestead. The site also has the potential to yield information that would contribute significantly to an understanding of the history of and development of the site, the Berry Estate and Broughton Creek Village. Of particular note is the existence of traces of the water race from the 1830 Broughton Creek saw mill. This item is also locally representative of a complex with multiple phases of occupation and a Federation Queen Anne style farm house with Art Nouveau character.
G2B H17	*Hillview* homestead (2nd half C19th) former Berry Estate tenant farm) (A111 Princes Highway Berry)	Local					✓	✓	✓	The *Hillview* homestead is a locally rare and representative example of a mid-nineteenth century slab house from a Berry Estate tenant farm. It is characteristic of a Scottish style of house layout and it has the potential to contribute, through archaeological survey/excavation to an understanding of organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.
G2B H19	Remnant portion of C19th road (West of Gembrook Lane)	Local	✓	✓			✓	✓		**Remnants of the Berry Estate Road (c.1856-1870s)** The remnant sections of the nineteenth century Berry Estate road are representative and relatively rare examples of a transport corridor that was locally important as a private road and as the first inland route that bypassed Seven Mile Beach. These road remnants have a strong association with Messrs Alexander and David Berry, who were of local importance due to their prominent role in European settlement. They also
G2B H22	Remnant portion of C19th road	Local	✓	✓			✓	✓		
G2B H23	Remnant portion of C19th road	Local	✓	✓			✓	✓		

ID	Recording	Context of significance	Significance criteria							Summary statement of significance
			a	b	c	d	e	f	g	
G2B H27	Remnant portion of C19th road	Local	✓	✓			✓	✓	✓	display the potential to yield information, through archaeological excavation and survey, that would contribute to an understanding of nineteenth century road construction and use.
G2B H30	Remnant portion of C19th road	Local	✓	✓			✓	✓	✓	
G2B H55	Remnant portion of C19th road (north/upslope of *Mananga* homestead)	Local	✓	✓			✓	✓	✓	
G2B H25	*Sedgeford* homestead, 1902, (A495 Princes Highway, Broughton Village)	Local		✓					✓	The *Sedgeford* homestead and gardens have a strong and special association with the Binks Family, a well known local family who have, since the beginning of the twentieth century, made a lasting contribution to the local and wider community through the dairy industry. G2B H25 is representative of an early twentieth century dairy farm in association with a disused highway alignment; it retains well preserved examples of the Federation period homestead and the associated gardens.
G2B H28	*Brookside* homestead (A540 Princes Highway. Broughton Village)	Local					✓		✓	The Brookside homestead comprises two salvaged structures, one of which appears to be from portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. Investigation and analysis of the Brookside homestead's constituent elements, in particular the section from portion 181, may yield information that will help in interpretation of deposits at G2B H59. The archaeological traces of former structures, including a dairy, at G2B H28 have the potential to yield information that will contribute to an understanding of the history of the local dairy industry. They also have the potential to be representative of such a site.
G2B H29	C20th concrete bridge, 1935, (Princes Highway. Broughton Creek)	Local	✓		✓			✓	✓	The Broughton Creek Bridge's construction is associated with the grand scheme of highway improvement undertaken by the Main Roads Board cum Department of Main Roads in an attempt to bring the State's main roads up to the standard required by the modern motoring age emerging in the inter-war period. As a widened bridge, it represents the continual process of upgrading required in response to the increased volume, weight and speed of traffic on this busy highway
G2B H45	*Glenvale* homestead, former Berry Estate tenant farm (A371 Princes Highway. Broughton)	Local					✓	✓	✓	The *Glenvale* homestead is a locally rare and representative example of a mid-nineteenth century slab house from a Berry Estate tenant farm. It is characteristic of a Scottish style of house layout and it has the potential to contribute, through archaeological survey/excavation to an understanding of organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

ID	Recording	Context of significance	Significance criteria							Summary statement of significance
			a	b	c	d	e	f	g	
G2B H47	Former St Patrick's Convent, and St Patrick's Church and grounds (80 North St. Berry)	Local				✓		✓	✓	St Patrick's Church and grounds, including the former St Patrick's Convent, are strongly associated with the local Catholic community; the site has been associated with the Catholic Church since the late nineteenth century. The former convent is a locally rare site type and the complex as a whole is representative of inter-war religious architecture and a Catholic site complex.
G2B H48	Potential archaeological deposit, former Berry Estate tenant farm (now Greystanes Lodge)	Local (subject to confirmation through test excavation)					✓			The potential archaeological deposits at G2B H48 are locally significant as a site that may contribute to an understanding of life on Berry Estate tenant farms.
G2B H49	*Oakleigh* homestead (59 Woodhill Mountain Rd. Berry)	Local					✓		✓	The homestead at G2B H49 is locally representative of 1930s farm house construction. It is a well preserved example of its type.
G2B H50	*Clare Moy* Cottage (342 Princes Highway. Toolijooa)	Below threshold								The *Clare May* Cottage does not meet any of the significance criteria. This item falls below the threshold for heritage listing.
G2B H51	*Graham Park* former agricultural research institution (8, 9 and 13 Schofields Lane, Berry)	State	✓	✓	✓		✓	✓	✓	Graham Park Research Station is of local and State importance in terms of its role in the development of agricultural research, in particular artificial insemination and stock breeding. It is also historically linked to pioneering research sponsored by the Berry Estate under Alexander Hay, and directly linked to the life and works of Edward Graham, an individual of State importance in the context of government policy on agriculture and agricultural development. Graham Park also derives significance at local and State levels due to its contributions to agricultural research. The complex of buildings, laboratories, sheds and enclosures has the potential to yield information, through archaeological investigation, that would contribute to an understanding of the development and operation twentieth century agricultural research stations. It is a locally rare site that is also representative of its type at local and State levels.
G2B H52	Potential archaeological deposit, former Berry Estate tenant farm (A441 Princes Highway. Broughton Village)	Local (subject to confirmation through test excavation)					✓	✓	✓	The potential archaeological deposits at G2B H52 relate to a nineteenth century Berry Estate tenant farm. This site is of local significance as a place that has the potential to yield information about tenant farms and the interrelationship between such sites and sequences of transport corridor modifications through the nineteenth and early twentieth centuries. It is also locally important as an example of a former tenant farm that maintains its original configuration with the 1856 and 1870s highway alignment and as a representative example of such a site.

ID	Recording	Context of significance	Significance criteria							Summary statement of significance
			a	b	c	d	e	f	g	
G2B H53	Potential archaeological deposit, former Berry Estate tenant farm structure and indeterminate rock rubble alignment (Toolijooa Ridge)	Local (subject to confirmation through test excavation)					✓			The potential archaeological deposits at G2B H53 are locally significant as a site that may contribute to an understanding of life on Berry Estate tenant farms.
G2B H54	Remnant C19th dry stone wall (former highway boundary, Toolijooa Ridge)	Local			✓		✓	✓	✓	The dry stone wall at G2B H54 is of local significance in terms of its aesthetic values, research potential, and its rarity as a fence type and regional outlier.
G2B H56	Farmhouse and Dairy (disused), early to mid C20th, (117 North St., Berry)	Local					✓		✓	The Broughton Mill homestead and dairy is a good and locally representative example, albeit somewhat dilapidated, of an early twentieth century dairy farm.
G2B H58	Uniting Church Hall (formerly Wesleyan Chapel), 1884, Victorian Carpenter Gothic style, (69 Albert St, adj. to North St)	Local	✓			✓		✓	✓	The Uniting Church Hall is of local historical importance as the first building to be erected on land legally acquired in the new township of Berry; it is also important in the course of the development of the township and its places of religious worship. This item is also of local social significance due to its ongoing connection with the Uniting Church community. The church hall is also a locally rare and representative item in terms of a Victorian Carpenter Gothic building.
G2B H59	Archaeological deposit and remnant plantings, former early C19th homestead (Broughton Village)	Local	✓	✓			✓	✓	✓	The potential archaeological deposits at G2B H59 are of local significance as a site associated with early land alienation, in particular an unusually small land grant amongst a series of larger estates. The site also appears to be directly associated with Anthony Finn, an individual of local importance. The potential deposits at G2B H59 have the potential to contribute to an understanding of the nature and phases of nineteenth century occupation. This site is also important as a relatively intact, rare and representative example of archaeological deposits relating to a local, small nineteenth century farm.
G2B H60	Skid mounted work-site shed	Local					✓	✓	✓	The G2B H60 work-site shed on skids is a relatively well preserved and representative example of its type and demonstrates the design and functional requirements of such a structure. It is likely to be a rare example of this shed type, which is unlikely to be well documented, or represented in collections, museums or reserves.
G2B H61	Quarried rock outcrop, Broughton	Local							✓	Quarried rock at Broughton (G2B H61) is a locally representative example of a small sandstone quarry for rock, probably used in early road construction.

ID	Recording	Context of significance	Significance criteria							Summary statement of significance
			a	b	c	d	e	f	g	
G2B H62	Avenue of Poplar trees	Local			✓					The Poplar trees planted at G2B H62 are a locally significant landmark and aesthetic landscape component.
G2B H63	Mark Radium Park	Local		✓	✓					Mark Radium Park is listed on the Shoalhaven LEP heritage schedule as a place of local importance due to its aesthetic qualities and historical association with Jack McGee and his pony Mark Radium.
SICPH CL	Southern Illawarra Coastal Plain and Hinterland Cultural Landscape	Local	✓	✓	✓	✓	✓	✓	✓	The Southern SICPH CL is of local significance in terms of its historical associations and importance in the pattern of local history. It is also locally significant in terms of its strong and special association with the local Aboriginal community. More notably, it is of local and State significance in terms of its aesthetic qualities, which relate in part to the unique natural character of the junction of the coastal plain with the Illawarra escarpment, and in part from the striking contrast between the culturally modified elements of the landscape and the more natural elements. The clearly identifiable nineteenth century structure of the landscape also contributes to the aesthetic value of the SICPH CL. The SICPH CL is a rare landscape type, both in terms of its natural features and also the retention of such clear examples of the late nineteenth and early twentieth century pastoral landscape and associated private towns. It is the only remaining such portion of the broader Illawarra cultural landscape that has not been substantially impacted by urban infill. As such it is also representative of its type and displays considerable research potential in terms of historical themes at local and State levels.

7.3 The significance of the town of Berry as a component of the Southern Illawarra Coastal Plain and Hinterland Cultural Landscape

For the purposes of this assessment, it was considered more effective to recognise the heritage values of the town of Berry, as part of a wider interconnected cultural landscape, than to describe the town as a separate heritage entity with debatable curtilage and viewshed boundaries. This is not to infer however, that the town cannot, or should not, be defined in such a way. But rather, given that the potential for project impact lay within the landscape context of the town, it was preferred to assess this impact relative to the inclusive values of a defined cultural landscape.

As such, the heritage significance of the landscape context of Berry is not simply aesthetic or visual in nature. Also of integral importance are those natural and constructed landscape elements which demonstrate the past and present interrelation of the town with its wider region. Typically these include transport, trade and communication corridors, cadastral patterns of land alienation, and a matrix of resource exploitation mediated by logistical and commercial interests. Local examples of corridors are Broughton Creek, the highway and the Illawarra rail line. The interrelation of surviving forests, pastures, croplands and townscapes provides a further information and contextual layer.

As described in section 5.3.2, Berry was, and remains, an integral component of the Southern Illawarra Coastal Plain and Hinterland Cultural Landscape (SICPH CL). The town holds a central geographic position and was a critical administrative, service, commercial and community centre. Initially it served as an industrial focus for the processing of cedar from the Berry Estate, and subsequently grew with the agricultural development of the Estate. North of the Shoalhaven River, the town was a critical centre for the Estate, together with the main estate buildings at Coolangatta. The town also served as a focus for settlers who established holdings to the north of the Berry Estate, and for the economic diversification that following the Estate's breakup.

This history and role remains evident in the landscape surrounding the town and evident from it. The town is strategically placed on elevated ground adjacent to the navigable limits of the Broughton Creek. A locus which happened to also coincide with an established Aboriginal encampment which probably predated European arrival. The town is connected by a highway and railway, both of which avoid crossing the swampy basins of the plain by traversing the fringing basal slopes and spurlines. Agricultural and pasture lands continue to fringe the town boundaries to the north and south. On the upslope side, the escarpment and higher slopes of the Illawarra Range provide a permanent backdrop, a natural foil to the nineteenth century order of the town grid and its built environment.

All of these elements reveal a past and present interplay between the natural and cultural worlds which are the signature of a cultural landscape. When the high degree of integrity and the retention of these elements are combined with the aesthetic values of the natural landscape, the town and context of Berry must be acknowledged as an exceptional constituent component of the SICPH CL.

8 Statutory and policy context

8.1 Overview of key legislation

8.1.1 Commonwealth legislation

The main Commonwealth Act concerned with the protection and management of cultural heritage places is the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The jurisdiction of this Act relates to heritage places on Commonwealth owned or controlled lands; heritage values which may be impacted by actions by the Commonwealth, heritage values associated with items of national environmental significance; and places with heritage significance consistent with World Heritage, National or Commonwealth Heritage listing.

There are no places within the project with cultural heritage values consistent with these jurisdictions.

8.1.2 The Register of the National Estate

The register of the National Estate (RNE) was established under the now repealed *Australian Heritage Commission Act 1975.* The National Estate was defined under this Act as 'those places, being components of the natural environment of Australia or the cultural environment of Australia, that have aesthetic, historical, scientific or social significance or other special value for future generations as well as for the present community'. The project includes one item included on the RNE as an indicative place (the Berry District Landscape Conservation Area).

Following amendments in 2006 to the *Australian Heritage Council Act 2003* (AHC Act), from February 2012 all references to the Register have been removed from the EPBC Act and the AHC Act. The RNE is now maintained on a non-statutory basis as a publicly available archive.

8.1.3 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act), and its regulations, schedules and associated guidelines require that environmental impacts are considered in land-use planning and decision making. Environmental impacts include cultural heritage.

There are four main areas of protection under the EP&A Act:

- Environmental planning instruments allow particular uses for land and specify constraints. Part 3 governs the preparation of planning instruments. Both Aboriginal and historical (non-Aboriginal) cultural heritage values should be assessed when determining land-use.
- Provision for a fast track approval process of developments declared to be State Significant infrastructure, by order or in a State environmental planning policy.
- Part 4 relates to the development assessment process.. Impact to both Aboriginal and historical (non-Aboriginal) cultural heritage values are included.
- State Government agencies which act as the determining authority to decide whether to proceed with proposals must consider a variety of community and cultural factors in their decisions, including Aboriginal and historical (non-Aboriginal) cultural heritage values. Part 5 relates to activities which do not require consent but still require an environmental assessment, such as projects by government authorities.

Under the EP&A Act, various environmental planning instruments can be prepared and approved, such as local environmental plans (LEPs) (Part 3, Division 4) and State Environmental Planning Policies (SEPPs) (Part 3 Division 2). These planning instruments may identify places and features of cultural heritage significance and define various statutory requirements regarding the potential development, modification and conservation of these items. In general, places of identified significance, or places requiring further assessment, are listed in various heritage schedules that form part of a local environmental plan. Listed heritage items are then protected from certain defined activities, normally including demolition, renovation, excavation, subdivision, and other forms or damage, unless consent has been gained from an identified consent authority. The consent authority under a local environmental plan is normally the Local Shire or City Council.

As of 1 July 2009, regional environmental plans (REPs) are no longer part of the hierarchy of environmental planning instruments in NSW. All remaining REPs are deemed to be State environmental policies.

8.1.4 Projects lodged under former Part 3A of the EP&A Act

Prior to its repeal in October 2011, Part 3A of the EP&A Act established a separate development assessment and approvals regime for infrastructure projects This regime removed the need for single-issue approvals under eight other Acts, including the Heritage Act. Environmental planning instruments such as within regional and local environmental plans, (other than State environmental planning policies) do not apply to projects declared under Part 3A.

Assessment under Part 3A required the preparation of an environmental assessment including a Statement of Commitments (SoC), as per the specifications of the Department of Planning and Infrastructure (DP&I). The SoC specified how the project would be managed in an environmentally suitable manner. The Minister could refuse the project, or approve it with any conditions considered appropriate.

Transitional arrangements now cover projects which were lodged under the now repealed Part 3A. Project applications for which DGRs were issued on or before 8 April, 2011, will remain as Part 3A applications. The Foxground and Berry bypass project falls into this category and will be assessed as a Part 3A application.

8.1.5 NSW Heritage Act 1977

The Heritage Act regulates the identification, assessment and management of non-Aboriginal heritage values within NSW. The Act recognises two levels of heritage significance – State and local significance across a broad range of values.

Some key provisions of the Act are:

- The establishment and functions of the Heritage Council (Part 2).
- Interim heritage orders (Part 3), the State Heritage Register (Part 3A).
- Heritage Agreements (Part 3B).
- Environmental planning instruments (Part 5).
- The protection of archaeological deposits and relics (Part 6).
- The establishment of Heritage and Conservation Registers for State Government owned and managed items (Part 7).

Generally this Act provides protection to items that have been identified, assessed and listed on various registers including the:

- State Heritage Register (consisting of items and places of State heritage significance).
- State government authority Section 170 registers (consisting of significant items and places managed by State authorities).
- Heritage Schedules included within Local and Regional environmental plans, and administered by Local Government.

In addition, section 139 of the Act specifically provides protection for any item classed as a relic. A relic is defined as:

> *"...any deposit, artefact, object or material evidence that:*
>
> *(a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and*
>
> *(b) is of State or local heritage significance."*
>
> (*Heritage Amendment Act 2009*, Part 1, Section 4).

Section 146 of the Act requires that the discovery of a previously unknown relic be reported to the Heritage Council within a reasonable time of its discovery.

Current policy and interpretation by the NSW Heritage Branch (Department of Planning and Infrastructure) limits the scope of the 'relic' definition to exclude above ground structures and a range of ground features or 'works' which may include roads, embankments and other forms of constructed ground relief. This interpretation is based on the definition of 'environmental heritage' in Section 4 of the Act which states that environmental heritage means 'those places, buildings, works, relics, moveable objects and precincts, of State or local significance'. The Heritage Branch interprets each of these categories to be mutually exclusive (correspondence from Reece McDougall, Executive Director, Dept of Planning, to K. Officer, Navin Officer Heritage Consultants 30/5/07).

In general, the Act disallows interference with a place or item listed on the State Heritage Register, or disturbance to a relic, except according to the provisions of a permit. A number of standard exemptions and general or additional exceptions to the requirement for permits have also been defined (Sections 57 and 139).

For projects lodged under the now repealed Part 3A of the EP&A Act, these permit provisions do not apply.

Section 170 of the Act requires all state government instrumentalities to establish and maintain a Heritage and Conservation Register that lists items of environmental heritage. The register is to include items which are, or could potentially be, the subject of a conservation instrument, and which are owned, occupied or otherwise under the control of that instrumentality. One item listed on the RMS Section 170 register occurs within the project (G2B H29).

8.1.6 The National Trust of Australia (NSW)

The National Trust of Australia (NSW) compiles and maintains a register of items and places which the Trust determines to have cultural significance and to be worthy of conservation. Although the Register has no statutory authority, the inclusion of an item or place is likely to lend support to an assessment of heritage value.

8.2 Implications for the project

This project is being assessed under the EP&A Act as a project lodged under the now repealed Part 3A of that Act. As such, the Act removes the requirement for permits under section 139 of the *Heritage Act 1977*. Similarly, environmental planning instruments established in Regional and Local Environmental Plans do not have legal effect. There remains however requirements to report any findings to the Heritage Branch, OEH (Section 146 of the Heritage Act).

Despite these exemptions, as a part of the environmental assessment for the project required under the EP&A Act, the potential impact on historic heritage values must be assessed and effective impact mitigation and conservation management proposed. The application of this process to historic heritage values is mentioned specifically in the DGRs for the project (refer section 1.3).

9 Impact assessment

9.1 Representative and worst case impact

The general requirements included in the Director-Generals Requirements for the project specify that the environmental assessment must include:

> *An assessment of the key issues, including an assessment of the worst case and representative impact for each issue for all aspects of the project…* (general requirement no.3)

For this assessment, representative impact is defined as that impact which has been anticipated in this analysis and to which the proposed management and impact mitigation strategies are directed. It is representative of the expected scenario, based on an analysis of the best information available and on a reasonable or normative level of prediction.

Worst case impact is defined as an extreme scenario where the highest conceivable degree of impact is anticipated due to unexpected occurrences which are extraordinary and outside of a reasonable level of prediction.

The worst case scenario with regard to non-Aboriginal cultural heritage values consists of the unexpected encounter of a heritage item or items which, due to a high level of assessed significance (such as at a State or National level) warrants in situ conservation and a consequential change in the project alignment. This would conceivably be due to the discovery of a previously undetected and unpredicted item, or to a much less likely degree, the discovery of a new feature associated with a known heritage item. Conceivable examples of worst case scenario discoveries include the following:

- A unique, well preserved and substantial remnant or archaeological deposit of the early industry and occupation of the Berry Estate (such as a cemetery, maritime vessel, convict stockade, road bridge or mill).
- An archaeological deposit containing rare and well preserved organic items due to water logged and anaerobic conditions, such as may be found within a swamp or peat deposit.

The potential for a worst case scenario is considered to be very low and has been minimised by the conduct of a robust analysis which included:

- The use of predictive modelling and a review of historical documentary and pictorial sources.
- Archaeological survey and interpretation.
- Reference to oral tradition and information provided by local community sources.
- Review of aerial photography.

An unexpected finds procedure has been developed by the RMS which defines a protocol to be followed in the event that an unexpected find is made during the process of construction (refer Appendix H). The adoption of this procedure provides both a safeguard and management process in the event of a worst case scenario.

9.2 Potential development impact categories

The classification of development impact falls into two broad categories, direct or indirect impact. This classification is made relative to the identified heritage item (which may also include or constitute a place and/or curtilage). Direct impact is where a development would result in physical loss or change to a heritage item, causing a loss of heritage value or significance. Direct impact may occur to a part of an item (partial impact), or affect the whole of the item (whole impact).

Indirect impact is where a development would change the context and surroundings of an item, causing a loss of heritage value or significance. This may include visual, sonic and olfactic changes, as well as the physical loss or concealment of landscape elements. Indirect impacts may reduce the integrity of an item, by effecting components of its setting which are important for an appreciation of its history, function and meaning.

The potential impacts of the project on heritage items consist of the following categories:

a. A whole or complete degree of direct impact to a heritage item resulting in the physical loss of the item. This can be expected to occur in up to 100 per cent of the planned highway easement, although there may be some limited potential for site remnants to survive in undeveloped areas or in some ancillary areas.
b. Partial or minor direct impact to heritage item(s). The resulting loss or reduction in heritage significance will depend on the nature of the item and the extent and scope of the physical impact. Included in this category are: instances where a proportion of the item will remain, impact to the defined curtilage of an item, and impact to a minor or small proportion of an item, such as the root stock of a heritage tree.
c. Indirect impacts, such as to the contextual and landscape values associated with an item. Typically this occurs when a development is now adjacent to, or closer to the item.
d. Indirect impact to items of movable heritage which could be moved to avoid direct impact and as a consequence lose contextual integrity.
e. No significant impact. This category involves instances where the development would either: not pose an impact to a heritage item (direct or indirect), or any measurable impact was insignificant and did not reduce the heritage value or significance of the item. An example would be where a development occurs within the viewshed from an item, but does not obscure, remove or reduce the role of contextual or landscape components that contribute to the significance of the item. A further example would be where a development, close to an item, does not increase the level of impact that has already occurred from existing elements or actions.

9.3 Summary of impact and items subject to impact

A summary of the project impact on the non-Aboriginal heritage items is provided below. Detailed and site specific statements of heritage impact are provided in Appendix I.

Of the 34 heritage items, 19 would not be directly impacted, six would be partially impacted, and nine wholly impacted. Of those not directly impacted (19), 13 occur within 50 metres of the construction footprint (CF) and 11 would be subject to indirect impacts relating to their landscape contexts.

A summary of the impact categories is provided in **Table 9.1** The interrelation of the categories used in this analysis and a simplified scheme provided by the RMS (refer below), is shown in **Table 9.2**. An inventory of item specific impact is provided in **Table 9.3**.

Mapping of recording locations relative to a simplified scheme of impact categories is provided in Appendix A.1. The simplified scheme is preferred by the RMS for a general audience. The interrelation of the categories used in this analysis and the simplified scheme is shown in **Table 9.2**, and used in **Table 9.5**. The scheme equates direct impact with *physical impact*, and indirect impact with *visual impact*. In this regard it should be noted that the term *physical impact* refers only to the type of impact to the heritage item. Its use in the simplified scheme is distinct from the physical impact of the project which may also cause indirect or *visual* impacts. Although *visual impact* does not strictly include all indirect impacts, such as non-visual changes to a heritage item's context (such as noise, hydrology, and access), this inclusivity should be assumed in the simplified scheme. Lastly, the term *no impact* is applied to mean no significant impact. That is, the degree of impact does not rise above a threshold relative to the significant values of the heritage item or a pre-existing level of impact. An example of a pre-existing threshold would be an already present road in close proximity to an item. An example of a non-significant impact could be a distant visual intrusion into a viewscape or vista from a heritage item or a relatively small increase in noise.

Table 9.1: Summary of heritage items according to construction impact categories (refer Section 9.2 for category definitions)

Direct impact	Impact category	Items	Total items
yes	a) Whole direct impact	G2B H11, G2B H19, G2B H21, G2B H22, G2B H23, G2B H30, G2B H53, G2B H55 and G2B H61	9
yes	b) Partial direct impact	G2B H14, G2B H15 and G2B H63	3
yes	b) Partial direct impact *and* c) Indirect impact	G2B H28, G2B H54 and SICPH CL	3
no	c) Indirect impact	G2B H13, G2B H16, G2B H17, G2B H25, G2B H29, G2B H47, G2B H48, G2B H49, G2B H56, G2B H59 and G2B H62	11
no	e) No significant impact	G2B H20, G2B H26, G2B H27, G2B H45, G2B H51, G2B H52, G2B H58 and G2B H60	8

Table 9.2: Interrelation of impact categories used in this analysis and the RMS simplified classification scheme (refer Appendix A.1, where these categories are employed in project mapping)

Simplified Impact Category	Categories used in analysis			
	Direct Impact	Impact category	Items	Total items
Physical impact – Wholly impacted	yes	a) Whole direct impact	G2B H11, 19, 21, 22, 23, 30, 53, 55 and 61	9
Physical impact – Partially impacted	yes	b) Partial direct impact	G2B H14, 15 and 63	3
	yes	b) Partial direct impact *and* c) Indirect impact	G2B H28, 54 and SICPH CL	3
Visual impact only	no	c) Indirect impact	G2B H13, 16, 17, 25, 29, 47, 48, 49, 56, 59 and 62	11
No impact	no	e) No significant impact	G2B H20, 26, 27, 45, 51, 52, 58 and 60	8

Table 9.3: Itemised summary of construction impacts to heritage items

Site ID	Recording type	Direct impact	Impact category	Comments (CF = Construction footprint)
G2B H11	*GlenDevan* Federation House (77 North St. Berry)	yes	a	Whole of site would be impacted
G2B H13	Burnett Estate Overseer's Cottage (143 North St. Berry)	no	c	Located within 50 metres of CF
G2B H14	Archaeological deposit (former C19th *Broughton Creek* town buildings)	yes	b	Partial impact – due to construction of on-ramps and off- ramps and a realigned service road intersection
G2B H15	Remnant portion of C20th highway	yes	b	Partial impact – due to upgrade as extended service road and new intersection
G2B H16	*Mananga,* homestead complex, (A40 Princes Highway. Berry)	no	c	Located within 50 metres of CF
G2B H17	*Hillview* homestead (A111 Princes Highway Berry)	no	c	Located within 50 metres of CF
G2B H19	Remnant portion of C19th road	yes	a	Whole of site would be impacted
G2B H20	Remnant portion of C20th highway	no	e	Located within 50 metres of CF
G2B H21	Remnant portion of C20th highway	yes	a	Whole of site would be impacted
G2B H22	Remnant portion of C19th road	yes	a	Whole of site would be impacted
G2B H23	Remnant portion of C19th road	yes	a	Whole of site would be impacted
G2B H25	*Sedgeford* homestead (A495 Princes Highway, Broughton Village)	no	c	Grounds located within 50 metres of CF
G2B H26	Remnant portion of C20th highway	no	e	Southern end of remnant occurs within 50m of CF
G2B H27	Remnant portion of C19th road	no	e	Located more than 150m away from CF
G2B H28	*Brookside* homestead (A540 Princes Highway. Broughton Village)	yes	b & c	Partial impact – Acquisition of land for the bypass easement would include a southern outbuilding and associated platforms. Main residential buildings occur outside of the easement boundary but are in close proximity (within 50 - 100 metres of an elevated bridge over Broughton Creek). A memorial planting is 200 metres away from CF
G2B H29	C20th concrete bridge (Princes Highway. Broughton Creek)	no	c	Bridge would be retained for use on service road, located immediately adjacent to CF (within 50 metres of CF)

Site ID	Recording type	Direct impact	Impact category	Comments (CF = Construction footprint)
G2B H30	Remnant portion of C19th road	yes	a	Whole of site would be impacted
G2B H45	*Glenvale* homestead, (A371 Princes Highway. Broughton)	no	e	Homestead buildings occur 120 metres from easement boundary. Note that the whole of the current property holding is listed on the Shoalhaven. LEP 1985 and portions of this property would be directly impacted, however this would not result in any loss of heritage significance
G2B H47	Former St Patrick's Convent, St Patricks Church and grounds (80 North St. Berry)	no	c	Located within 50 metres of CF
G2B H48	Potential archaeological deposit, former Berry Estate tenant farm (now Greystanes Lodge)	no	c	Located within 50 metres of CF
G2B H49	*Oakleigh* homestead (59 Woodhill Mountain Rd. Berry)	no	c	Located 100 metres away from easement boundary
G2B H51	*Graham Park* former agricultural research institution (8, 9 & 13 Schofields Lane, Berry)	no	e	Located within 50 metres of CF
G2B H52	Potential archaeological deposit, former Berry Estate tenant farm (A441 Princes Highway. Broughton Village)	no	e	Located 300 metres away from CF
G2B H53	Potential archaeological deposit, former Berry Estate tenant farm (Toolijooa Ridge)	yes	a	Whole of site would be impacted
G2B H54	Remnant C19th dry stone wall (Toolijooa Ridge)	yes	b & c	Partial – At least the southern half of the known extent of the wall would be directly impacted
G2B H55	Remnant portion of C19th road (north of *Mananga* homestead)	yes	a	Whole of site would be impacted
G2B H56	*Broughton Mill* Homestead and Dairy (disused) (117 North St., Berry)	no	c	Located within 50 metres of CF
G2B H58	Uniting Church Hall (formerly Wesleyan Chapel)	no	e	Located 200 metres away from CF
G2B H59	Archaeological deposit former (non Berry Estate) homestead (Broughton Village)	no	c	Located 180 metres away from CF
G2B H60	Skid mounted work site shed (movable item)	no	e	Current location is within 50 metres of CF, but location is not intrinsic to heritage value of item

Site ID	Recording type	Direct impact	Impact category	Comments (CF = Construction footprint)
G2B H61	Quarried rock outcrop, Broughton	yes	a	Whole of site would be impacted
G2B H62	Avenue of Poplar trees	no	c	Located within 50 metres of CF - the northern most Poplar tree is located 10m from a proposed water quality pond.
G2B H63	Mark Radium Park	yes	b	Partial - a narrow portion of land along the western margin of the park would be impacted
SICPH CL	Cultural Landscape (Southern Illawarra Region)	yes	b & c	Partial – Impacts would include the visual and structural impact of the carriageway formation, deep cuttings, and visually obtrusive embankments

9.4 Impact to cultural landscape values and the Berry township

The following section provides an overview of the development impact to cultural landscape values. A detailed statement of heritage impact is provided in Appendix I under the Southern Illawarra Coastal Plain and Hinterland recording, item SICPH CL. **Figure 9.1** and **Figure 9.2** illustrate the location of the project relative to the zones and boundaries of the SICPH CL and previous landscape recordings.

9.4.1 The nature and extent of anticipated development impact

The project would impose a modern structural component onto the landscape. The formal traits of the project would contrast with those of the existing landscape in the following ways:

- The horizontal alignment of the project would be curvilinear within the constraints of standardised and even radius curves. This would contrast with most of the existing broad scale man made landscape features which are based on grids, right angles, or straight intervals joined by relatively tight curves.
- The vertical alignment of the project would be gradual and incremental, and would include ramps, embankments and cuttings to maintain standard rates of climb or descent. This is in contract to most of the existing broad scale man made landscape features which are more reflective of natural gradients and elevations.
- The width of the project corridor (including the carriageways, ramps and associated easement) would vary from around 50 metres to up to 200 metres. This is in major contrast to existing man made corridors which are nearly all less than 50 metres in width.
- Unlike the alignment of existing roads which, through their curves, and opportunistic alignments, manifest the natural topography they are traversing, the bypass alignment would create its own topography of cuttings and embankments as required by limited tolerances in vertical and horizontal alignment. As a consequence the bypass may run contrary to the natural flow of ridges, valley orientation, and slope contours.
- Whereas the overwhelming character of property boundaries, field delineation, artificial lowland drainage, and secondary and minor roads is one of a grid and rectangular divisions, the bypass would superimpose this patchwork with a visually dominant and curvilinear corridor, following its own independent directional agenda.

In the general proximity of Berry, the project would:

- Impact upon the short and mid-distance view-sheds from the town's northern streetscapes.
- Impose a contrasting and modern (curvilinear) road form upon, the grid dominated nineteenth century character of the existing rural town fringe.
- Impact upon some remnant pastoral open space along the northern margin of the town grid. This margin provides a visually appealing contrast between the urban and rural, and contributes a pastoral character and setting for the town.

These impacts, without mitigation, would amount to a significant deterioration in the cultural landscape values of the SICPH CL and specifically to the Berry landscape setting. The construction of the project would intersect, interrupt, or truncate previous landform elements which contribute to those values such as roads, field systems, natural landforms and vegetation belts. On the northern margin of Berry, the existing pastoral setting of valley-floor fields, farm buildings, and converging tree lined streamlines, would be divided by the project, and blocked from near and middle distance views from the town. This combination of interruption and obscuration could, without mitigation, amount to a significant impact to the northern landscape setting of the town, and thus the heritage values of that setting.

The project, due to its size and engineered character would also have the potential to significantly change the character of its surroundings. The necessary vertical alignment of the project would, in places, result in substantial cuttings, embankments and ramps. These, and their continuous nature, ensure the potential of the project to be a dominant landform in its own right. Across the northern margin of Berry, from east to west, the project would descend to the valley floor via the bridge at Berry over Broughton Mill Creek. It would then traverse the valley floor before passing under Kangaroo Valley Road via a cutting at the Berry interchange. Each of these sections, the bridge, valley traverse, and underpass/interchange, have the potential to impose significant visual impacts onto the town setting. This potential includes both disruption to existing elements, and the introduction of new and inappropriate elements, such as modern and incompatible design and engineering elements.

9.4.2 Project aspects which respect or enhance the cultural landscape values

The Southern Illawarra Coastal Plain and Hinterland has an assessed local level of significance under all criteria: a, b, c, d, e, f and g.

Apart from substantial deviations across the Broughton Creek valley and around Berry, the project would generally follow the original corridor of the first European road constructed for vehicles between Berry and Gerringong – the 1856 Berry Estate Road. This provides a degree of historical and functional integrity to the project. It would remain a modern manifestation of an original mid nineteenth century access and transport corridor.

The construction of a bypass of Berry avoids the need to widen and transform one of the town grid streets to accommodate the highway traffic. If the latter option was adopted it would irrevocably change the amenity and heritage character of the town, and require the full or partial demolition of many properties with heritage value.

It is proposed to minimise and ameliorate adverse visual impacts of the project, through careful design of the project corridor and its infrastructure, minimising cuttings, embankments and carriageway elevation where feasible, and the establishment of vegetation.

Visual Boundary of the BTUCA, also boundary of the *Berry District Landscape Conservation Area* and approximate boundary of SICPH CL

Buffer Zone of the BTUCA

Sub-division Boundary of the BTUCA

FBB Bypass

Figure 9.1: Location of proposed project relative to the SICPH CL. (After Figure 13 in Clarke and Duyker 2010; and The boundary of the Berry – Bolong Pastoral Landscapes (Shoalhaven Heritage Inventory) (base image: Google Earth Pro 2009)

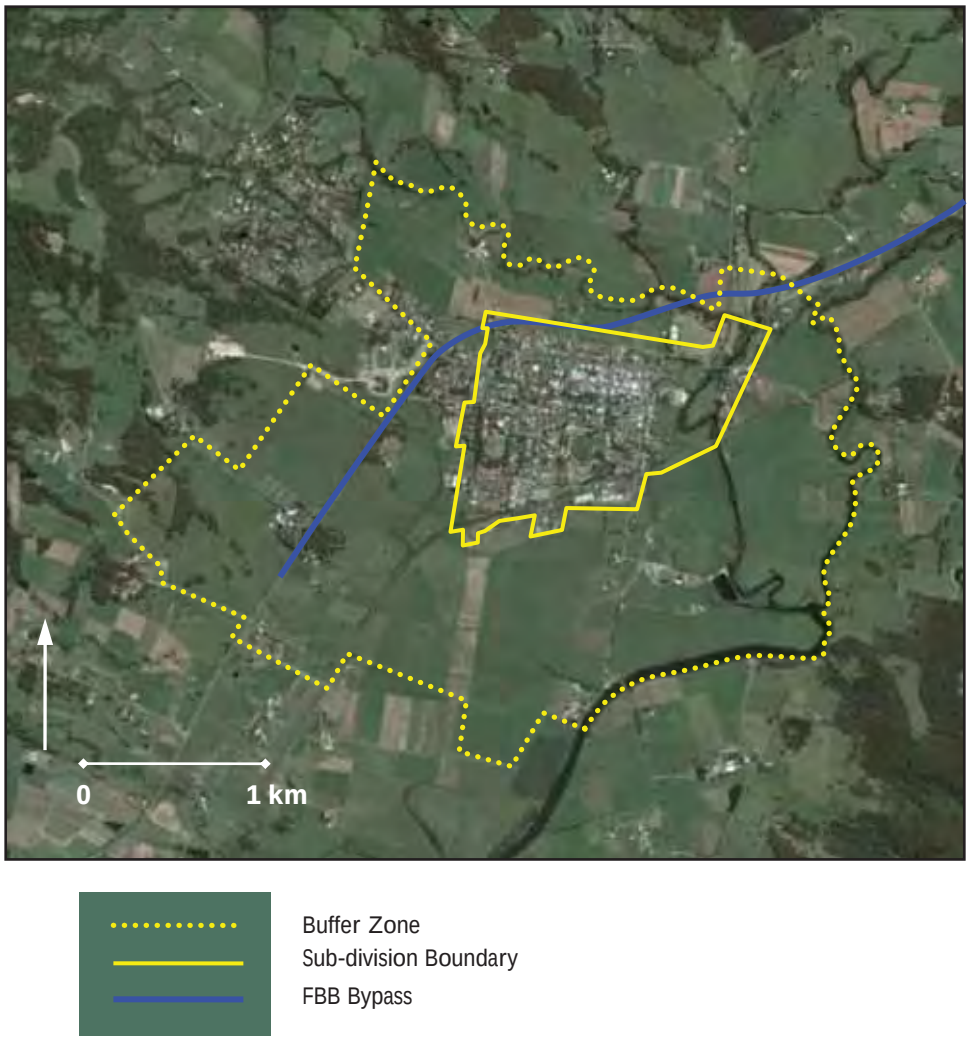


Figure 9.2: Location of proposed project relative to the Buffer Zone and Subdivision Boundary of the National Trust defined Berry Township Urban Conservation Area (After Figure 13 in Clarke and Duyker 2010) (Google Earth Pro 2006).

9.5 Avoidance and mitigation of impacts to cultural landscape values

9.5.1 Proposed strategies for managing impact

The following strategies are proposed to avoid and mitigate project related impacts to cultural landscape values and specifically, the landscape context of the Berry township:

- It is proposed to minimise and ameliorate adverse visual impacts where feasible through the appropriate design and conduct of construction and finishing of the project corridor, embankments and cutting faces, and the re-establishment of vegetation.
- The establishment of appropriate forms of vegetation along the project corridor and adjacent areas would be an important strategy in mitigating the broad scale landscape and visual impacts of the project corridor. This would be conducted with an awareness of maintaining important vistas from the road corridor, and the use of vegetation boundaries and alignments which conform to the rectangular patchwork of the surrounding landscape and serve to breakup or scatter the dominant curvilinear character of the project corridor.
- Where there is an opportunity to incorporate artistic elements in structures adjacent to the carriageway, (such as bridgework and retaining and noise abatement walls), it is proposed that designs derived from local cultural heritage themes be considered, especially at locations in close association to places of significance.
- The design, construction and finishing of the project in the general vicinity of the Berry township would be realised with the dual aims of:
    - Minimising and mitigating the visual obstruction caused by the project to views of the surrounding pastoral landscape and the Illawarra Range from the streetscape of the town. The construction of a landscaped noise barrier on the southern and eastern side of the project adjacent to Berry should form one strategy to realise this aim.
    - Being sympathetic to the heritage values and character of the town and its streetscapes. The use of heritage related design elements and materials should be considered in the design of the town interchanges and adjacent noise barriers.
- The visual impact of the bypass from the northern margins of Berry would be mitigated by a landscaped barrier which would also serve as a noise barrier. Appendix I - *Urban Design Technical Paper* (AECOM, 2012) of the environmental assessment provides details of this barrier and various options for its configuration. The barrier would be landscaped in such a way as to reduce the visual impact of the project on the landscape context of the Berry township, and of heritage items on the northern margin of the town. It is proposed that the barrier would reach a height of up to around four metres and consist of a reinforced soil noise barrier with a landscaped south-facing slope creating a 'Ha-ha' effect. This is where a containing wall is concealed in a particular direction by an adjacent slope and/or trench. This would provide a visual barrier that could be treated so that it was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. Views to the escarpment and upper slopes of the Illawarra Range would remain unaffected for viewers positioned away from the barrier.

9.5.2 Residual impacts following mitigation

The 'Ha-ha' function of the proposed noise barrier to be installed between the project and the northern margin of Berry, would substantially reduce the visual impact of the project on the heritage values of the Berry landscape context and the northern town margin. The barrier, combined with the planting of vegetation that was compatible with the rural and town settings, would largely obscure both the carriageway and the vehicles using it. The view of the Illawarra Range's upper slopes and scarps would remain unaffected. Despite the unavoidable physical impact of the project on the rural setting north of Berry, the proposed barrier would mask these impacts and reinstate a more-or-less continuous visual screen which would support and maintain the rural character of the northern town margin.

Following the establishment of mitigation, the residual impacts of the project on the landscape setting of Berry would consist of:

- Views of the project, away from the northern town margin, such as from Woodhill Mountain Road, of the southern and northern interchanges, and the southern bypass approach to the town.
- The disturbance to, and loss of, landscape elements due to the physical placement of the project. These include fencelines, field systems, riparian vegetation, and road alignments. None of these features had heritage significance as individual items however. Their value is as constituent parts of the much larger SICPH CL.
- The visual impact of the project looking south, from the north side of the project. This however, is not a significant heritage viewshed as it does not include the framing upper register of the Illawarra Range, nor serve as part of a visitor's experience of the Berry town.

Many of these residual visual impacts occur in settings already impacted by the existing highway town entrances or by later twentieth century urban development. The visual amenity of the key vistas and settings with remaining heritage value, namely those looking northwards from the northern margin of the town, would be substantially maintained through the conduct of the proposed mitigation strategies. On this basis, it can be concluded that the residual impacts to the Berry landscape setting would be acceptable when weighed against the benefits and objectives of the project.

In general, and away from the Berry setting, the project would present a similar set of residual impacts to the SICPH CL:

- The addition of a major engineered landscape component in the form of a consistently graded and angled curvilinear road platform associated with extensive bridges, cuttings and embankments.
- Visual intrusion of the project into views of, and across, the landscape.
- Disturbance to, and loss of, landscape elements due to the physical placement of the project. These include ridge and creeklines; cadastral boundaries defined by fencelines, field systems, and road alignments; and patterns of both native and introduced vegetation.

The primary means of mitigating the landscape impacts of the project would be through the re-establishment of vegetation, the appropriate use of landscaping and barriers, and the use of complimentary visual components and compatible design elements. With the effective use of these strategies, it can be concluded that the residual impacts to the SICPHL would be acceptable when weighed against the benefits and objectives of the project.

9.6 Management of recovered artefacts

Subject to stakeholder agreement (including consultation with Heritage Branch), it is proposed to lodge any non-Aboriginal artefactual material recovered during test and proposed salvage excavations with either the Berry Museum (Berry and District Historical Society) or the Gerringong Heritage Museum (Gerringong and District Historical Society), depending on the location (LGA) and nature of the finds. The material would be appropriately inventoried and accompanied by supporting documentation.

9.7 Summary of impacts and proposed management actions

All heritage items subject to direct impact are of an assessed local scale of significance. One site of State significance, the former Graham Park agricultural research station (G2B H51), occurs in close proximity to the project, and action would be taken to ensure that incidental or accidental direct impact does not occur.

The project would directly impact a large proportion of the remaining traces of the 1856 Berry Estate Road (G2B H19, G2B H22, G2B H23, G2B H30 and G2B H55). In most instances, the remains of this roadway consist of low ground-surface relief indicating the presence of a road platform, side ditches, and in some cases cutting and benching. In order to compensate for the loss of these remains, it is proposed to combine a program of archival recording and selective archaeological salvage, with the conservation and public interpretation of a high value and representative portion of the road situated away from the development zone at "Bink's Corner", Broughton Village (incorporating items:G2B H25, G2B H26, G2B H27 and G2B H52). In combination with an adjacent portion of the existing highway, and the project, this location could showcase 150 years of highway construction and engineering.

The impact mitigation and management actions proposed for heritage items affected by the project fall into five broad categories:

- No further action (one item).
- Avoid or minimise impact (five items).
- Manage indirect impacts (Visual and contextual) only (nine items).
- Conduct archival recordings and/or archaeological excavations prior to impact (14 items).
- Conserve and manage as specified (five items).
- Manage cultural landscape values (one landscape item).

These categories and the heritage items involved are outlined in **Table 9.4**. A summary of impacts and proposed management measures is provided in **Table 9.5**. An item specific list of proposed impacts, mitigation measures, and before and after significance assessments is provided in **Table 9.6**.

Table 9.4: Summary of project impact categories and proposed Impact mitigation and management actions for heritage items

Management categories		Type of impact	Heritage Items
No further action		No impact	G2B H58
Avoid or minimise impact	Avoid direct impact	No direct impact	G2B H20, 51, 59 & 62
	Avoid or minimise impact where feasible	Direct impact	G2B H63
Manage indirect (visual and contextual) impacts only		Indirect impact only	G2B H13, 16, 17, 25, 45, 47, 49, 56 & 62
Conduct archival recording and/or archaeological excavation prior to impact	Conduct salvage excavation and/or archival recording prior to impact	Direct impact	G2B H11, 14, 15, 19, 21, 22, 23, 28, 30, 53, 54, 55 & 61
	Conduct test/salvage excavation if direct impact anticipated	Potential direct impact	G2B H48
Conserve	Conserve, and as specified: manage and/or interpret	No direct impact	G2B H26, 27, 29 & 52
	Movable heritage – remove and donate to museum		G2B H60
Manage cultural landscape values	Manage and mitigate impact to cultural landscape values	Direct and indirect impacts	SICPHCL

Table 9.5: Summary of measures to mitigate construction impacts

Management measures	Extent of impact*	Heritage items	Total no. of heritage items
'No go' zones (e.g. Use of temporary fencing, signage, tool box talks, etc)	Full physical impact	n/a	n/a
	Partial physical impact	G2B H14, 15, 28, 45, 54,	5
	Visual impact only	G2B H13, 16, 17, 25, 62, 63,	6
	Nil	G2B H29, 47, 48, 51, 56, 59, 60	7
Minimise through urban design	Full physical impact	n/a	n/a
	Partial physical impact	G2B H28, 45, 54	3
	Visual impact only	G2B H13, 16, 17, 25, 47, 49, 56, 62	8
	Nil	n/a	n/a
Archival recording	Full physical impact	G2B H11, 19, 21, 22, 23, 30, 53, 55, 61	9
	Partial physical impact	G2B H15, 28,	2
	Visual impact only	n/a	n/a
	Nil	G2B H27	1
Archaeological monitoring and/or salvage	Full physical impact	G2B H11, 23, 30	3
	Partial physical impact	G2B H14	1
	Visual impact only	n/a	n/a
	Nil	G2B H27	1
Interpretation strategy	Full physical impact	G2B H11	1
	Partial physical impact	n/a	n/a
	Visual impact only	n/a	n/a
	Nil	G2B H26, 27, 29, 52	4
Relocation of item	Full physical impact	G2B H11	1
	Partial physical impact	n/a	n/a
	Visual impact only	n/a	n/a
	Nil	n/a	n/a
Conservation of fabric	Full physical impact	n/a	n/a
	Partial physical impact	n/a	n/a
	Visual impact only	n/a	n/a
	Nil	G2B H48	1
Unexpected Finds Procedure	n/a	Unexpected finds within construction footprint	n/a
S170 Heritage Register listing	n/a	All heritage items within RMS road reserve	n/a

**The impact categories used in this table is the RMS simplified classification scheme (refer Table 9.2).*

Table 9.6: Summary of proposed project impacts, mitigation and consequential significance assessments for all heritage items

ID	Heritage Item	Current significance		Project impact	Proposed mitigation	Likely significance of item following mitigation actions and project completion
		Context	Criteria			
G2B H11	Federation Cottage c.1894 (77 North St. Berry)	Local	g	Whole direct impact	Conduct archival recording prior to impact, monitor ground disturbance, salvage and reuse some materials. Allow a potential third party to relocate all or part of structure	No significance. If all or part(s) of the building are salvaged and reused this remaining fabric may have limited local significance, depending upon its context and function.
G2B H13	Burnett Estate Workers Cottage c.1917 (143 North St. Berry)	Local	g	Indirect impact	Manage indirect (visual and contextual) impacts only	Current significance would be maintained.
G2B H14	Archaeological deposit (former C19th *Broughton Creek* town buildings)	Local	aefg	Partial direct impact	Conduct salvage excavation prior to impact	Remaining portions of the deposit would continue to have current significance. The information generated from the salvage excavations would augment and support the research value of the remaining deposit portions.
G2B H15	Remnant portion of C20th highway (Adj to *Mananga* homestead)	Local	fg	Partial direct impact	Minimise impact and conduct archival recording prior to those impacts	Current significance would be maintained.
G2B H16	*Mananga,* 1894, Queen Anne style homestead, former Berry Estate Manager's Residence (A40 Princes Highway. Berry)	Local	abceg	Indirect impact	Manage indirect (visual and contextual) impacts only	Current significance would be maintained.
G2B H17	*Hillview* homestead (2nd half C19th) former Berry Estate tenant farm) (A111 Princes Highway Berry)	Local	efg	Indirect impact	Manage indirect (visual and contextual) impacts only	Current significance would be maintained.
G2B H19	Remnant portion of C19th road (West of Gembrook Lane)	Local	abef	Whole direct impact	Conduct salvage excavation and archival recording prior to impact	No significance.
G2B H20	Remnant portion of C20th highway (Broughton)	Local	e	No significant impact	Avoid direct impact	Current significance would be maintained.

ID	Heritage Item	Current significance		Project impact	Proposed mitigation	Likely significance of item following mitigation actions and project completion
		Context	Criteria			
G2B H21	Remnant portion of C20th highway (Broughton)	Local	e	Whole direct impact	Conduct archival recording prior to impact	No significance.
G2B H22	Remnant portion of C19th road	Local	abef	Whole direct impact	Conduct archival recording prior to impact	No significance.
G2B H23	Remnant portion of C19th road	Local	abef	Whole direct impact	Conduct salvage excavation and archival recording prior to impact	No significance.
G2B H25	*Sedgeford* homestead, 1902, (A495 Princes Highway, Broughton Village)	Local	bg	Indirect impact	Manage indirect (visual and contextual) impacts only	Current significance would be maintained. The conservation status and heritage management of this item would have been improved.
G2B H26	Remnant portion of C20th highway	Local	abefg	No significant impact	Conserve, and as specified: manage and interpret	Current significance would be maintained. The conservation status and heritage management of this item would have been improved.
G2B H27	Remnant portion of C19th road	Local	abefg	No significant impact	Conserve, and as specified: manage and interpret	Current significance would be maintained. The conservation status and heritage management of this item would be improved.
G2B H28	*Brookside* homestead (A540 Princes Highway. Broughton Village)	Local	eg	Partial direct impact and indirect impact	Minimise impact, conduct archival recording prior to impact	Current significance would be reduced due to substantial loss of integrity to the homestead's landscape context.
G2B H29	C20th concrete bridge, 1935, (Princes Highway. Broughton Creek)	Local	acfg	Indirect impact	Conserve, and as specified: manage and/or interpret	Current significance would be maintained.
G2B H30	Remnant portion of C19th road	Local	abefg	Whole direct impact	Conduct salvage excavation and archival recording prior to impact	No significance.

ID	Heritage Item	Current significance		Project impact	Proposed mitigation	Likely significance of item following mitigation actions and project completion
		Context	Criteria			
G2B H45	*Glenvale* homestead, former Berry Estate tenant farm (A371 Princes Highway. Broughton)	Local	efg	No significant impact	Manage indirect (visual and contextual) impacts only	Current significance would be maintained.
G2B H47	Former St Patrick's Convent, and St Patrick's Church and grounds (80 North St. Berry)	Local	dfg	Indirect impact	Manage indirect (visual and contextual) impacts only	Current significance would be maintained.
G2B H48	Potential archaeological deposit, former Berry Estate tenant farm (now Greystanes Lodge)	Local (subject to confirmation through test excavation)	e	Indirect impact and potential direct impact	Avoid impact to remnant fig trees, Conduct test/salvage excavation if direct impact to deposit is anticipated	Current significance could be maintained if demolition of existing buildings or further building is not required.
G2B H49	*Oakleigh* homestead (59 Woodhill Mountain Rd. Berry)	Local	eg	Indirect impact	Manage indirect (visual and contextual) impacts only	Current significance would be maintained.
G2B H51	*Graham Park* former agricultural research institution (8, 9 and 13 Schofields Lane, Berry)	State	abcefg	No significant impact	Avoid impact and manage as specified	Current significance would be maintained.
G2B H52	Potential archaeological deposit, former Berry Estate tenant farm (A441 Princes Highway. Broughton Village)	Local (subject to confirmation through test excavation)	efg	No significant impact	Conserve, and as specified: manage and interpret	Current significance would be maintained. The conservation status and heritage management of this item would be improved.
G2B H53	Potential archaeological deposit, former Berry Estate tenant farm structure and indeterminate rock rubble alignment (Toolijooa Ridge)	Local (subject to confirmation through test excavation)	e	Whole direct impact	Conduct salvage excavation and archival recording prior to impact	No significance.

ID	Heritage Item	Current significance		Project impact	Proposed mitigation	Likely significance of item following mitigation actions and project completion
		Context	Criteria			
G2B H54	Remnant C19th dry stone wall (former highway boundary, Toolijooa Ridge)	Local	cefg	Partial direct impact and indirect impact	Avoid impact where feasible, conserve remaining portions and conduct archival recording prior to impact	Current significance would be reduced due to partial loss of wall section at southern end, however, the remaining portion would be restored and conserved, thereby increasing the conservation management status of the item.
G2B H55	Remnant portion of C19th road (north/upslope of *Mananga* homestead)	Local	abefg	Whole direct impact	Conduct salvage excavation and archival recording prior to impact	No significance.
G2B H56	Farmhouse and Dairy (disused), early to mid C20th, (117 North St., Berry)	Local	eg	Indirect impact	Manage indirect (visual and contextual) impacts only	Current significance would be maintained. Site is actively deteriorating and its management is outside the scope of this assessment.
G2B H58	Uniting Church Hall (formerly Wesleyan Chapel), 1884, Victorian Carpenter Gothic style, (69 Albert St, adj. to North St)	Local	adfg	No significant impact	No further action	Current significance would be maintained.
G2B H59	Archaeological deposit and remnant plantings, former early C19th homestead (Broughton Village)	Local	abefg	Indirect impact	Avoid direct impact	Current significance would be maintained.
G2B H60	Skid mounted work-site shed	Local	efg	No significant impact	Movable heritage – remove and donate to museum	Current significance would be maintained.
G2B H61	Quarried rock outcrop, Broughton	Local	g	Whole direct impact	Conduct salvage excavation and/or archival recording prior to impact	No significance.
G2B H62	Avenue of Poplar trees	Local	c	Indirect impact	Avoid direct impact and manage indirect (visual and contextual) impacts	Current significance would be reduced due to visual intrusion of overpass across Woodhill Mountain streetscape.

ID	Heritage Item	Current significance		Project impact	Proposed mitigation	Likely significance of item following mitigation actions and project completion
		Context	Criteria			
G2B H63	Mark Radium Park	Local	bc	Partial direct impact	Minimise impact where feasible	Current significance (which relates to commemorative function of park) would be maintained despite loss of area from around eastern park boundary.
SICPH CL	Southern Illawarra Coastal Plain and Hinterland Cultural Landscape	Local	abcdefg	Partial direct impact and indirect impact	Manage and mitigate impact to cultural landscape values	Project impacts can be minimised and managed through effective mitigation. Despite residual impacts, current significance can be maintained, including contextual values around Berry.

9.8 Potential impact within ancillary areas

The location of heritage sites and items relative to the indicative location of ancillary areas is shown in Appendix A.2.

There are no known or predicted sites that would be potentially affected by ancillary works which are in addition to the sites and features addressed in this report.

The following recordings occur within the indicative location of ancillary areas:

- G2B H24 Remnant portion of C20th highway.
- G2B H30 Remnant portion of C19th road (1856 Berry Estate Road).
- G2B H48 Potential archaeological deposit, former Berry Estate tenant farm (Greystanes Lodge).
- G2B H49 Oakleigh farmhouse (Interwar) (59 Woodhill Mountain Rd. Berry).
- G2B H54 Remnant C19th dry stone wall (former highway boundary, Toolijooa Ridge).
- G2B H60 Skid mounted work-site shed (movable item).

Of these, two recordings do not impose constraints on ancillary functions: no further action is recommended for G2B H24; and construction impact to G2B H30 would be managed through archival recording (including archaeological excavation) prior to impact.

The remaining four recording are associated with the following constraints to ancillary functions:

- Avoidance of direct impact to the dry stone wall, G2B H54 on Toolijooa Ridge.
- Avoidance of direct impact to significant fabric within the Oakleigh farmhouse, G2B H49.
- Avoidance of direct impact to the mature tree plantings and potential archaeological deposits at G2B H48 (location of the current Greystanes farmhouse).
- Avoidance of direct impact to the skid mounted work-site shed at Greystanes farmhouse, G2B H60.

10 Recommendations

The following recommendations relate specifically to the assessed impacts of the project as it is described in this report. In the event of a future change to the anticipated area or nature of project impact, it should not be assumed that the absence of a reference to a particular heritage item in these recommendations means that no action remains appropriate in the light of any change.

10.1 Indirect and accidental impact

1. It is recommended that measures be instigated to protect the following heritage items, or their remaining portions, from accidental impact during construction: G2B H13, G2B H14, G2B H15, G2B H16, G2B H17, G2B H25, G2B H28, G2B H29, G2B H45, G2B H47, G2B H49, G2B H51, G2B H54, G2B H56, G2B H59, G2B H62 and G2B H63. This may involve, but not be limited to, the erection of temporary fencing to define 'no-go' areas.
2. Where there would be impact to the visual and landscape context values of heritage places/items (this is classified as an indirect impact to the place or item), it is recommended that the design, construction and finishing of the project in the vicinity of the place/item should be realised with the aim of minimising the visual impact to those values. Possible means to achieve this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping. This strategy applies to: G2B H13, G2B H16, G2B H17, G2B H25, G2B H28, G2B H45, G2B H47, G2B H49, G2B H54, G2B H56 and G2B H62.

10.2 Nineteenth century road remnants

3. All heritage items comprising nineteenth century road remnants that would be directly impacted by construction should be the subject of a co-ordinated archival recording program prior to any impact (G2B H19, G2B H22, G2B H23, G2B H30 and G2B H55). This program should include archaeological salvage excavation at selected and representative locations within sites G2B H19, G2B H23, G2B H30 and G2B H55, to record any ditch profiles, subsurface foundations or former surface treatments. The archival recording program should aim to present a researched and documented archival record of the road remnants and the transport systems of which they formed part. The degree and detail of recording required at each remnant will vary according to the nature and preservation of each item.
4. In order to compensate for the loss of a significant proportion of the remaining probable remnants of the former Berry Estate Road, it is recommended that the complex of road related remnants, G2B H26, G2B H27 and G2B H52, situated at 'Bink's Corner', Broughton Village, be permanently conserved, managed and interpreted as a site which illustrates the history of local road construction, function and economics. As part of this management strategy, a detailed recording of these items should be made with the aim of identifying the conservation and management requirements of the complex. Together with the completed project and the existing adjacent highway (known locally as 'the Big Dipper'), this grouping of highway platforms would present, within a limited area, 160 years of road and highway construction history, beginning with the original Berry Estate Road.

   The optimal format(s), location(s) and strategies for the public interpretation of this complex of roads and road remnants should be defined in a Heritage Interpretation Plan (HIP) to be developed as part of the project (refer recommendation 37).

None of these heritage items would be subject to direct impact from the project. The recommended conservation management of these items is necessary to:

a. Compensate for the loss of all remaining remnants of the Berry Estate Road within the project area, and

b. Conserve the best of the remaining sections of the Berry Estate Road.

10.3 Twentieth century road remnants

5. A co-ordinated archival recording program should be conducted at heritage items, G2B H15 and G2B H21, prior to any impact. The scope of the recording at each item should be relative to the type and quality of information which can be recovered. This program may include excavation at selected locations, if and where necessary. These recordings should be incorporated into the archival recording report specified in recommendation three, with the aim of creating an integrated record of former highway construction and alignments for the local area.
6. Impact to G2B H15 (adjacent to *Mananga* homestead) should be limited to essential works. This remnant is an important element in the heritage context of the Mananga homestead. Direct impact to that portion of the road remnant adjacent to the Mananga homestead should be minimised.
7. No further action is required at field recordings G2B H12, G2B H18 and G2B H24.

10.4 Potential archaeological deposits

8. In the event that construction related impacts would occur at the G2B H48 potential archaeological deposit (current location of *Greystanes Lodge*), it is recommended that an archaeological program of monitoring and/or salvage excavation, as appropriate, be conducted with the aim of recording and recovering any artefacts or other information which relates to the former Berry Estate tenant farm at this location.
9. In the event that demolition of the modern farmhouse (previously known as *Greystanes Lodge*), situated on site G2B H48 would be required, it is recommended that a program of archaeological monitoring by an archaeologist be conducted with the aim of recording and recovering any artefacts or information which relate to the former Berry Estate tenant farm.
10. The remnant tree plantings at G2B H48, which predate the modern farmhouse, should be conserved and protected from damage.
11. The potential archaeological site G2B H52, should be conserved and managed as part of the complex of road related sites outlined in recommendation 4.
12. Prior to the commencement of construction impact, a program of archival recording and archaeological salvage excavation, should be conducted at G2B H53, as appropriate, and as required by the nature and significance of the relics encountered.

10.5 Archaeological deposits

13. A program of salvage excavation should be conducted within the construction footprint at G2B H14, south of test pit C110. Where the vertical alignment of the existing highway carriageway within the G2B H14 area is to be lowered, the potential for impact to potential archaeological deposits below the current road platform should also be assessed, and salvage excavation conducted according to the determination of that assessment.

    The aim of the salvage excavations would be to recover as much information as possible regarding the history of site use, including the sequence of occupation, property boundaries and activity areas/site functions.

10.6 Standing buildings and structures

14. The concrete Broughton Creek bridge (G2B H29), should be conserved, protected from construction impact and continue to function as a road-bridge for the highway when it is converted to a service road following the opening of the project.

15. Interpretive information should be made available to the public on the concrete Broughton Creek bridge (G2B H29). The format and location of this information should be determined by and defined in a Heritage Interpretation Plan (refer recommendation no.37)., it is recommended that interpretive signage and visitor access, off the existing highway (downgraded to a service road) be installed at heritage item G2B H29. Together with this 1930s bridge and the new bridge proposed as part of the project, the interpretation of this site could include the original early nineteenth century ford crossing at this location, and the sequence of wooden bridges on the original Broughton Village road alignment 620 metres upstream.

16. Where and as feasible, direct development impact to the *Brookside* homestead (G2B H28) should be minimised. The standing structures with heritage value should be protected from construction impact as much as possible and continue to be used as a farmhouse complex or adaptively reused in such a way that heritage values can be maintained.

17. The natural character of Broughton Creek and its banks in the vicinity of the bridge immediately south of the *Brookside* homestead (G2B H28) should be maintained and enhanced as much as feasible. The aim of this strategy is to ameliorate impact to the landscape context by maintaining and reinforcing the visual quality of the creek corridor. This can be achieved by maintaining and augmenting native bank side vegetation, and maximising the distance between the banks and bridge abutments.

18. Prior to impact, an archival recording should be conducted at the *Brookside* homestead (G2B H28), inclusive of those features subject to direct impact, and the homestead building which incorporates structures previously moved from site G2B H59.

19. An archival recording should be conducted of *GlenDevan* (G2B H11) and its grounds prior to any development impact. This record should include documentation of construction methods and materials exposed during any demolition works. Ground disturbance in the area of G2B H11 should be monitored by an archaeologist with the aim of recording any features relevant to the archival recording, and recovering any significant relics.

20. The RMS should remain open to the possibility of a third party proposing to conserve all or part of the G2B H11 structure by moving it to a new location within or near Berry, at that party's expense. In the event of simple demolition, suitable materials (such as bricks and stone masonry) should be recovered and reused (with commemorative identification) in appropriate local infrastructure such as interpretive or entrance features, way-side stop facilities, landscaping or artwork.

21. Direct impact to the existing *Graham Park* (G2B H51) entrance structures (gates, pillars and sculpture of a bull) should be avoided. During construction, temporary fencing should be erected around the feature to identify a 'no-go' area.

22. It is recommended that the design of any access roadworks in the vicinity of the *Graham Park* entrance (G2B H51) should not exclude the capacity for visitors to pull over and safely inspect the entrance feature. If necessary, allowance should be made in the design for the potential future installation of interpretive signage.

23. No further action is required at sites G2B H10 and G2B H58.

10.7 Miscellaneous site types

24. Where feasible, direct impact to the remnant dry stone wall G2B H54 should be avoided, and the wall actively conserved and managed. In the event that direct impact to all or part of this site is anticipated then an archival recording of the wall should be conducted prior to any construction impact occurring. Any rock material displaced from the wall as a result of construction works, should be retained for use in the repair and conservation management of the original wall.
25. An archival record should be compiled of the quarried rock outcrop, G2B H61, prior to impact.
26. The most northern Poplar tree in the tree avenue G2B H62, should be conserved in situ and would be situated within 10 metres of a proposed water quality pond. Temporary protective fencing should be erected around the root zone of the tree during the period of construction to define a no-go area. Any post-construction planting of the bypass easement in the area of Woodhill Mountain Road should aim to reinforce and replicate the existing landscape character created by the existing planted avenues of poplar trees.
27. Where feasible, the existing front yard plantings at G2B H17 (Hillview homestead) which would fall within the bypass easement (and particularly the Oak tree) should be retained. This may require a minor deviation of the proposed service road.
28. Construction impact to Mark Radium Park (G2B H63) should be minimised wherever feasible.
29. Direct impact to the Shed on skids, G2B H60, should be avoided. It is recommended that the structure be donated and relocated to an appropriate museum, where and if the capability to conserve and store the structure can be demonstrated.

10.8 The Southern Illawarra Coastal Plain and Hinterland (SICPH CL)

30. Where feasible, the construction and finishing of the project corridor, embankments and cutting faces should be conducted in such a way to minimise and ameliorate adverse visual impacts, and facilitate the re-establishment of vegetation.
31. The establishment of appropriate forms of vegetation along the project corridor and adjacent areas should be an important strategy in mitigating the broad scale landscape and visual impacts of the project. This should be conducted with an awareness of maintaining important vistas from the project, and the use of vegetation boundaries and alignments which conform to the rectangular patchwork of the surrounding landscape and serve to breakup or scatter the dominant curvilinear of the bypass corridor.
32. Where there is an opportunity to incorporate artistic elements in structures adjacent to the carriageway, (such as bridgework and retaining and noise abatement walls), it is recommended that designs derived from local cultural heritage themes be considered, especially at locations in close association to places of significance.
33. The design, construction and finishing of the project in the general vicinity of the Berry township should be realised with the dual aims of:

    a) Minimising and mitigating the visual obstruction caused by the project to views of the surrounding pastoral landscape and the Illawarra Range from the streetscape of the town. The construction of a landscaped noise barrier on the southern and eastern side of the bypass adjacent to Berry should form one strategy to realise this aim (refer details in Appendix I of the environmental assessment).

    b) Being sympathetic to the heritage values and character of the town and its streetscapes. The use of heritage related design elements and materials should be considered in the design of the town interchanges and adjacent noise barriers.

10.9 Ancillary facilities

34. The positioning of ancillary facilities and the conduct of ancillary functions should avoid direct impact to the following features: G2B H54 (dry stone wall on Toolijooa Ridge); significant fabric within G2B H49 (*Oakleigh* farmhouse); the mature tree plantings and potential archaeological deposits at G2B H48 (current location of *Greystanes Lodge*); and the skid mounted work-site shed at *Greystanes Lodge*, G2B H60.

10.10 General

35. All heritage items which would remain in whole, or in part, within the project corridor following the end of project construction, should be entered on the Section 170 Heritage and Conservation Register(s) compiled by RMS, and any conservation or management requirements determined and adopted.

36. In the event that unexpected cultural heritage finds are encountered during project construction then the Unexpected Finds Procedure (provided in Draft form in Appendix H), or an RMS approved revised version, should be adopted and followed. The Procedure should be included within a Construction Environmental Management Plan or equivalent document.

37. The cultural values of the project area should be promoted, interpreted and presented to current and future public audiences using formats, locations and strategies developed by, and defined in a Heritage Interpretation Plan (HIP). The HIP should be drafted with the involvement of relevant stakeholders, landowners and local Councils. Options to be considered should include interpretive signage, onsite public access and/or viewing points, educational materials, and supporting local museum displays. In particular, the HIP should address how best to provide for the public interpretation of the former Berry Estate road (and the surviving remnant G2B H27), and the Broughton Creek bridge (G2B H29).

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Appendix A

General location mapping and impact classification of Non-Aboriginal cultural heritage recordings within the Foxground and Berry bypass project

General location mapping and impact classification of Non-Aboriginal of cultural heritage recordings within the Foxground and Berry bypass project

KEY TO GRAPHICS

Field recording code or ID

Non-Aboriginal field recording

Non-Aboriginal field recording with indeterminate or approximate boundary

Boundary of property listed on a Local Environmental Plan Heritage Schedule

Simplified categories of project impact

Physical Impact – Wholly impacted
(corresponds to (a) 'Whole direct impact' as used in report analysis)

Physical Impact – Partially impacted
(corresponds to (b) 'Partial direct impact' with or without (c) 'Indirect impact', as used in report analysis)

Visual Impact only
(corresponds to (c) 'Indirect impact' as used in report analysis)

No Impact
(corresponds to (e) 'No significant indirect impact'

Non heritage item – impact not defined

Note: For large scale mapping of individual recordings refer to Appendix I

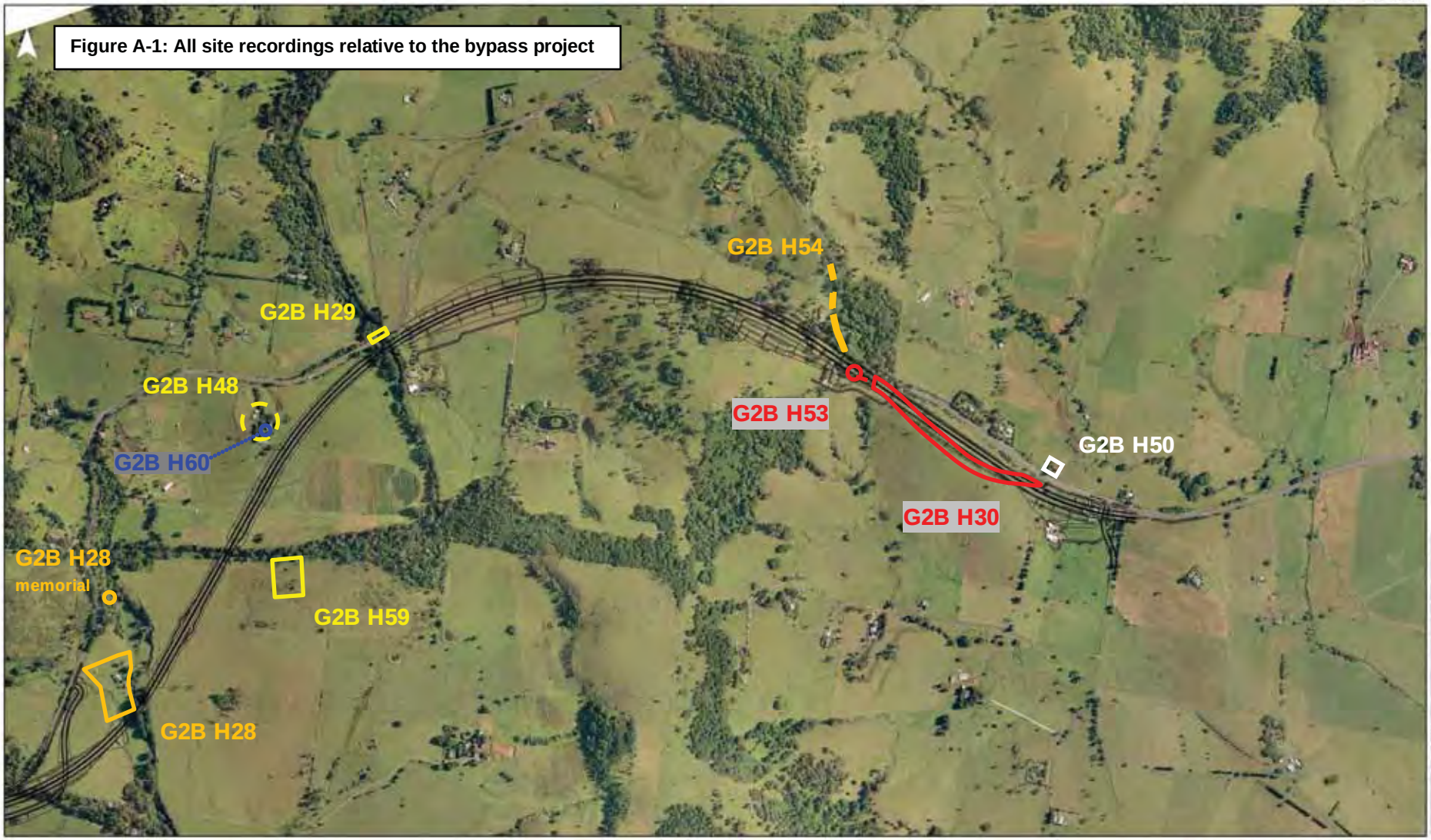
KEY TO FIELD RECORDING CODES SHOWN ON MAPS

Site ID	Recording
G2B H10	Cottage (72 North St. Berry)
G2B H11	*GlenDevan* Federation Cottage (77 North St. Berry)
G2B H12	Remnant portion of C20th highway (Stewarts Hill cutting)
G2B H13	Burnett Estate Overseer's Cottage (143 North St. Berry)
G2B H14	Archaeological deposit (former C19th *Broughton Creek* town buildings)
G2B H15	Remnant portion of C20th highway
G2B H16	*Mananga,* Queen Anne style homestead complex, former Berry Estate Manager's residence (A40 Princes Highway. Berry)
G2B H17	*Hillview* homestead former Berry Estate tenant farm) (A111 Princes Highway Berry)
G2B H18	Remnant portion of C20th highway
G2B H19	Remnant portion of C19th road (1856 Berry Estate Road)
G2B H20	Remnant portion of C20th highway
G2B H21	Remnant portion of C20th highway
G2B H22	Remnant portion of C19th road (1856 Berry Estate Road)
G2B H23	Remnant portion of C19th road (1856 Berry Estate Road)
G2B H24	Remnant portion of C20th highway
G2B H25	*Sedgeford* homestead (A495 Princes Highway, Broughton Village)
G2B H26	Remnant portion of C20th highway ("Bink's Corner") Broughton Village
G2B H27	Remnant portion of C19th road (1856 Berry Estate Road)
G2B H28	*Brookside* homestead (A540 Princes Highway. Broughton Village)
G2B H29	C20th concrete bridge (Princes Highway. Broughton Creek)
G2B H30	Remnant portion of C19th road (1856 Berry Estate Road)
G2B H45	*Glenvale* homestead, former Berry Estate tenant farm (A371 Princes Highway. Broughton)
G2B H47	St Patrick's (former) Convent, Church and grounds (80 North St. Berry)
G2B H48	Potential archaeological deposit, former Berry Estate tenant farm (*Greystanes Lodge*)
G2B H49	*Oakleigh* farmhouse (Interwar) (59 Woodhill Mountain Rd. Berry)
G2B H50	*Clare Moy* Cottage (342 Princes Highway. Toolijooa)
G2B H51	*Graham Park* former agricultural research institution (8, 9 & 13 Schofields Lane, Berry)
G2B H52	Potential archaeological deposit, former Berry Estate tenant farm (A441 Princes Highway. Broughton Village)
G2B H53	Potential archaeological deposit, former Berry Estate tenant farm structure and indeterminate rock rubble alignment (Toolijooa Ridge)
G2B H54	Remnant C19th dry stone wall (former highway boundary, Toolijooa Ridge)
G2B H55	Probable remnant portion of C19th road (1856 Berry Estate Road) (NE of *Mananga*)
G2B H56	*Broughton Mill* Farmhouse and Dairy (disused) (117 North St., Berry)
G2B H57	Remnant portion of C20th highway (nr Tindalls Lane)
G2B H58	Uniting Church Hall (formerly Wesleyan Chapel)
G2B H59	Archaeological deposit, and plantings, former C19 and C20th (non-Berry Estate) homestead
G2B H60	Skid mounted work-site shed (movable item)
G2B H61	Quarried rock outcrop, Broughton
G2B H62	Avenue of Poplar trees
G2B H63	Mark Radium Park

SUMMARY OF PROJECT IMPACT CATEGORIES AND AFFECTED HERITAGE ITEMS

Simplified Impact Category	Map Key	Categories used in analysis			
		Direct Impact	Impact category	Items	Total items
Physical impact – wholly impacted		yes	a) Whole direct impact	G2B H11, 19, 21, 22, 23, 30, 53, 55 & 61	9
Physical impact – partially impacted		yes	b) Partial direct impact	G2B H14, 15 & 63	3
		yes	b) Minor or partial direct impact *and* c) Indirect impact	G2B H28, 54 & SICPH CL	3
Visual impact only		no	c) Indirect impact	G2B H13, 16, 17, 25, 29, 47, 48, 49, 56, 59 & 62	11
No impact		no	e) No significant impact	G2B H20, 26, 27, 45. 51, 52, 58 & 60	8

Figure A-1: All site recordings relative to the bypass project



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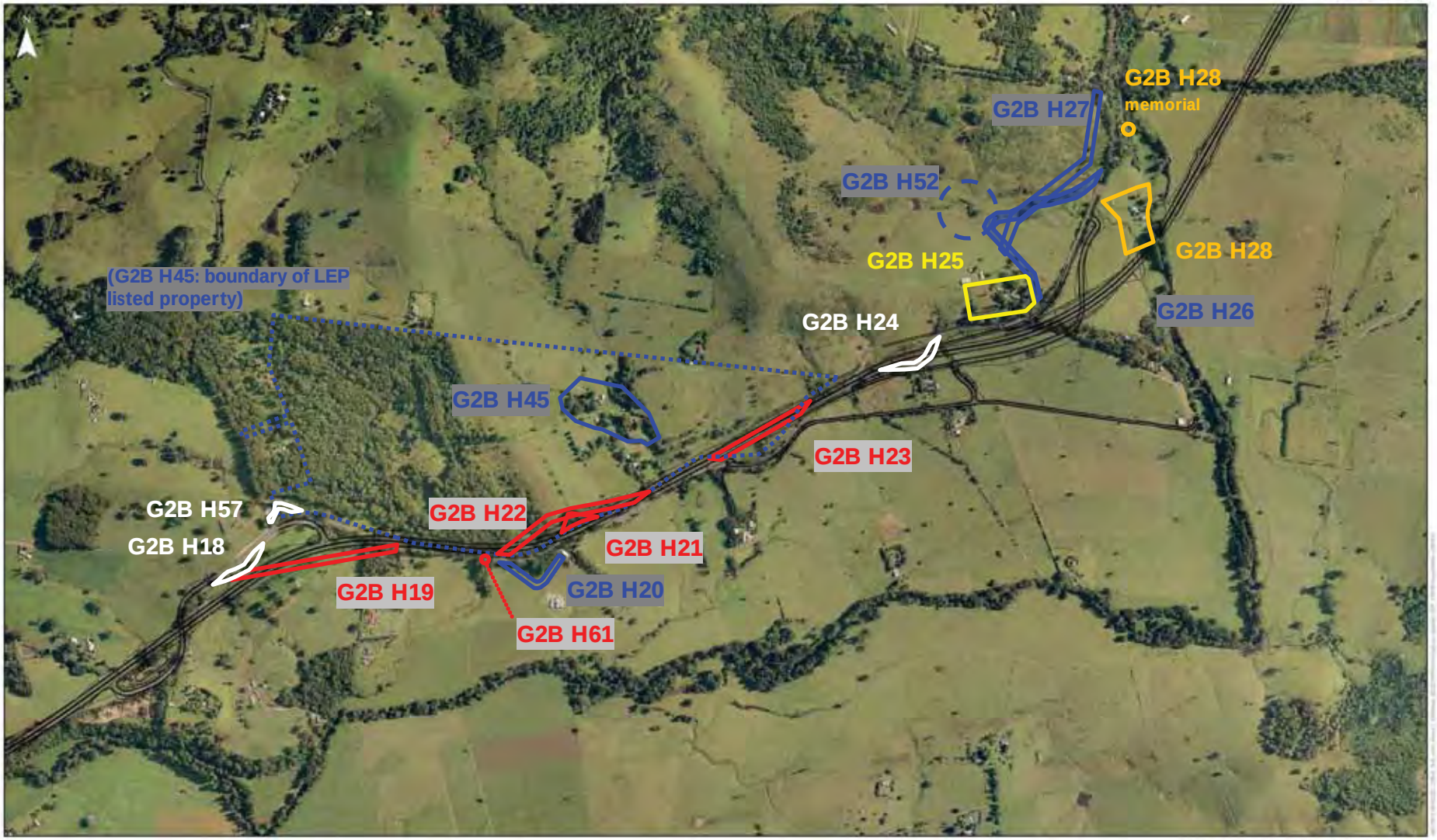
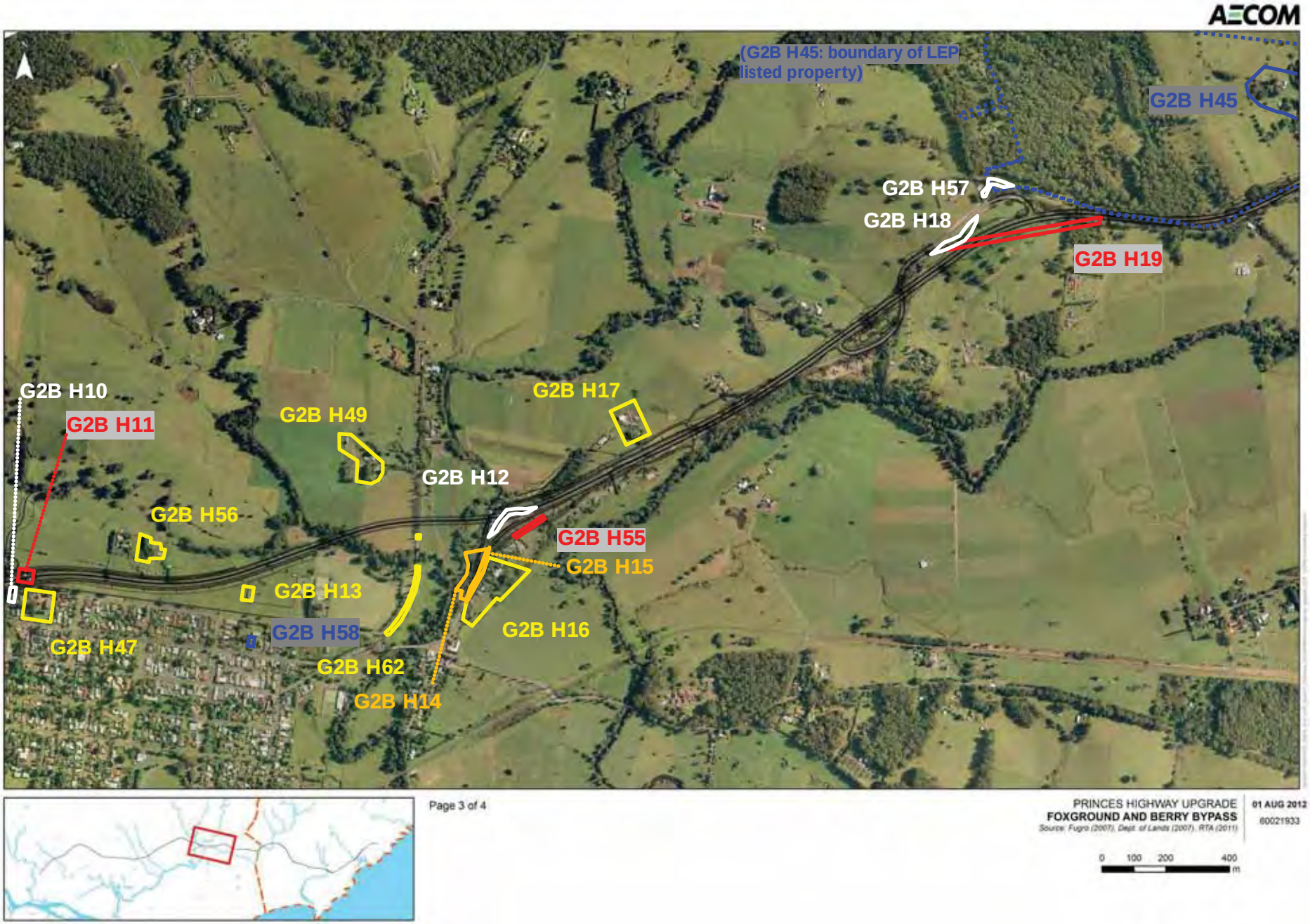
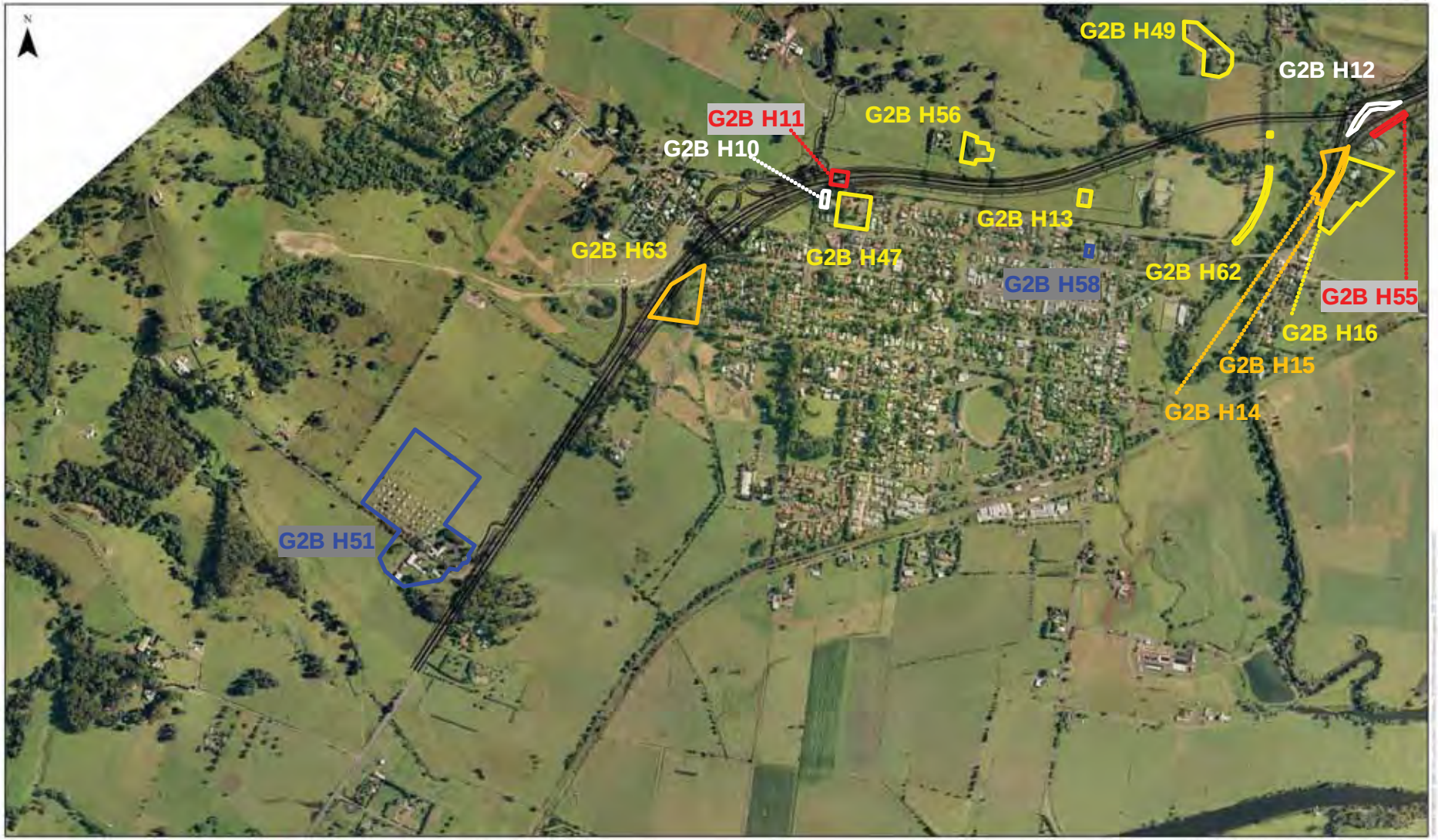
PRINCES HIGHWAY UPGRADE
FOXGROUND AND BERRY BYPASS
Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)

01 AUG 2012
60021933

0 100 200 400 m


AECOM
G2B H28
memorial
G2B H27
G2B H52
G2B H28
G2B H25
G2B H26
(G2B H45: boundary of LEP listed property)
G2B H24
G2B H45
G2B H23
G2B H57
G2B H22
G2B H18
G2B H21
G2B H19
G2B H20
G2B H61
Page 2 of 4
PRINCES HIGHWAY UPGRADE
FOXGROUND AND BERRY BYPASS
Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)
01 AUG 2012
60021933
0 100 200 400
m


AECOM
(G2B H45: boundary of LEP listed property)
G2B H45
G2B H57
G2B H18
G2B H19
G2B H10
G2B H11
G2B H49
G2B H17
G2B H12
G2B H56
G2B H55
G2B H15
G2B H13
G2B H58
G2B H16
G2B H47
G2B H62
G2B H14
Page 3 of 4
PRINCES HIGHWAY UPGRADE
FOXGROUND AND BERRY BYPASS
Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)
01 AUG 2012
60021933
0 100 200 400
(m)



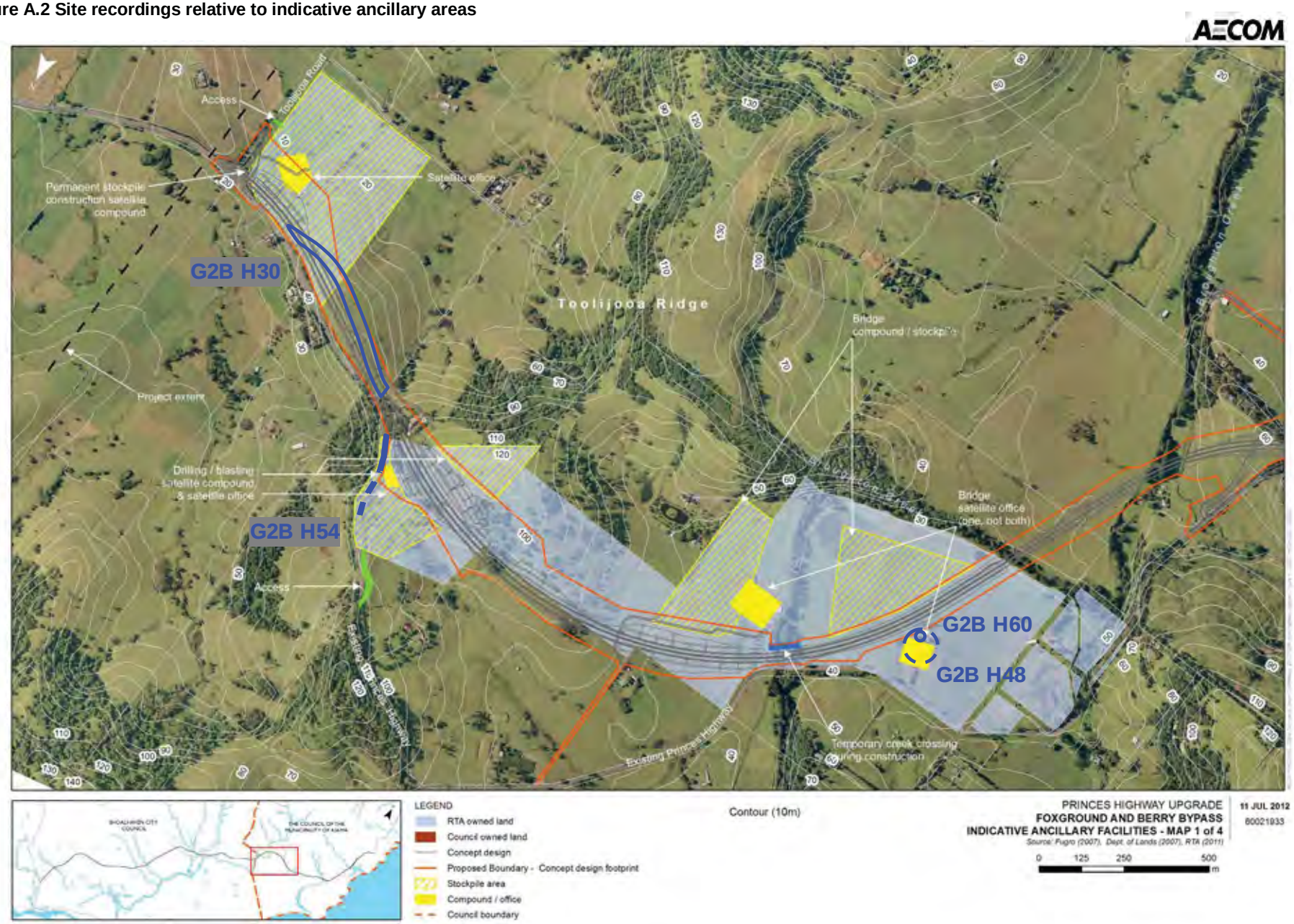
Page 4 of 4

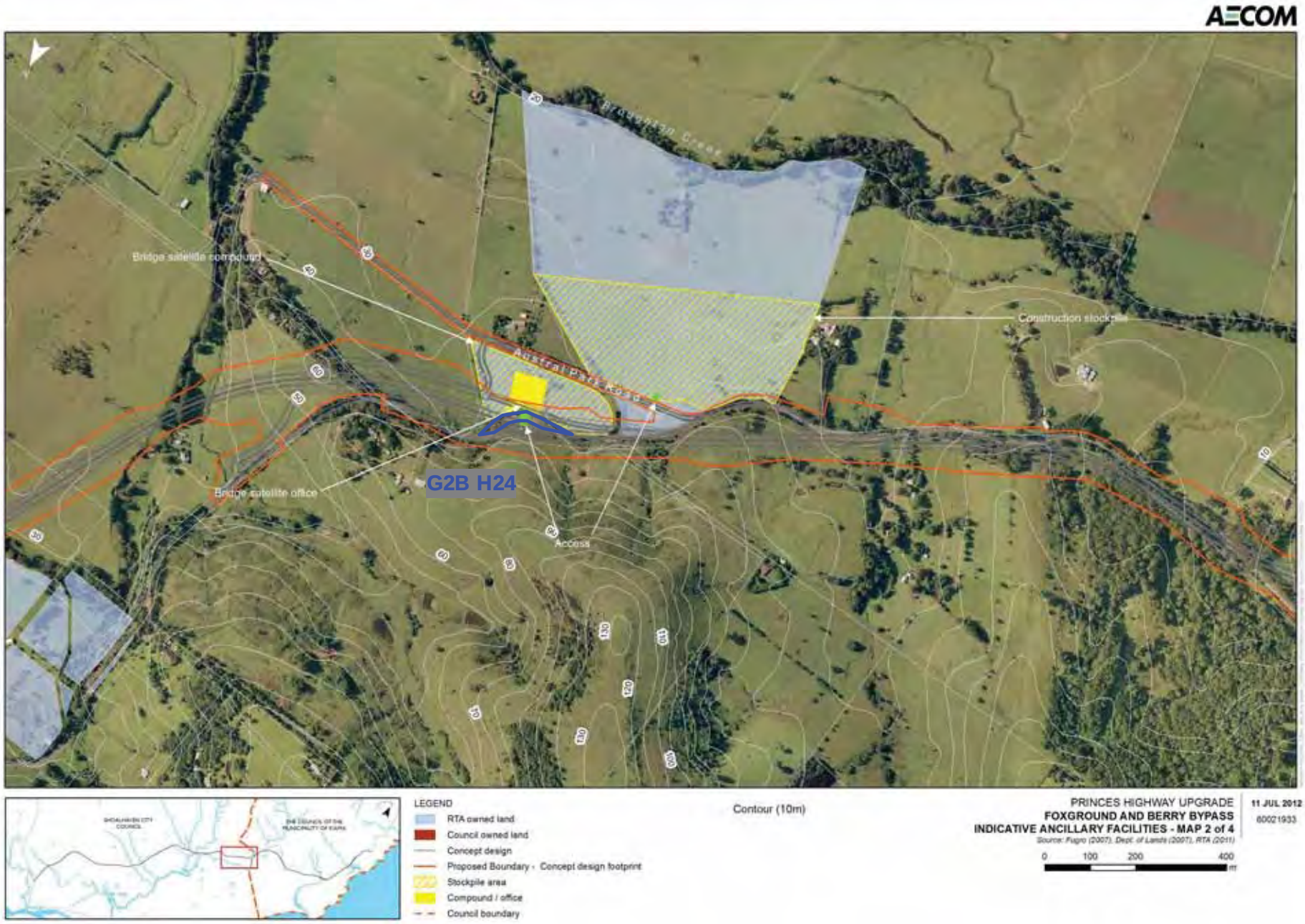
PRINCES HIGHWAY UPGRADE
FOXGROUND AND BERRY BYPASS
Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)

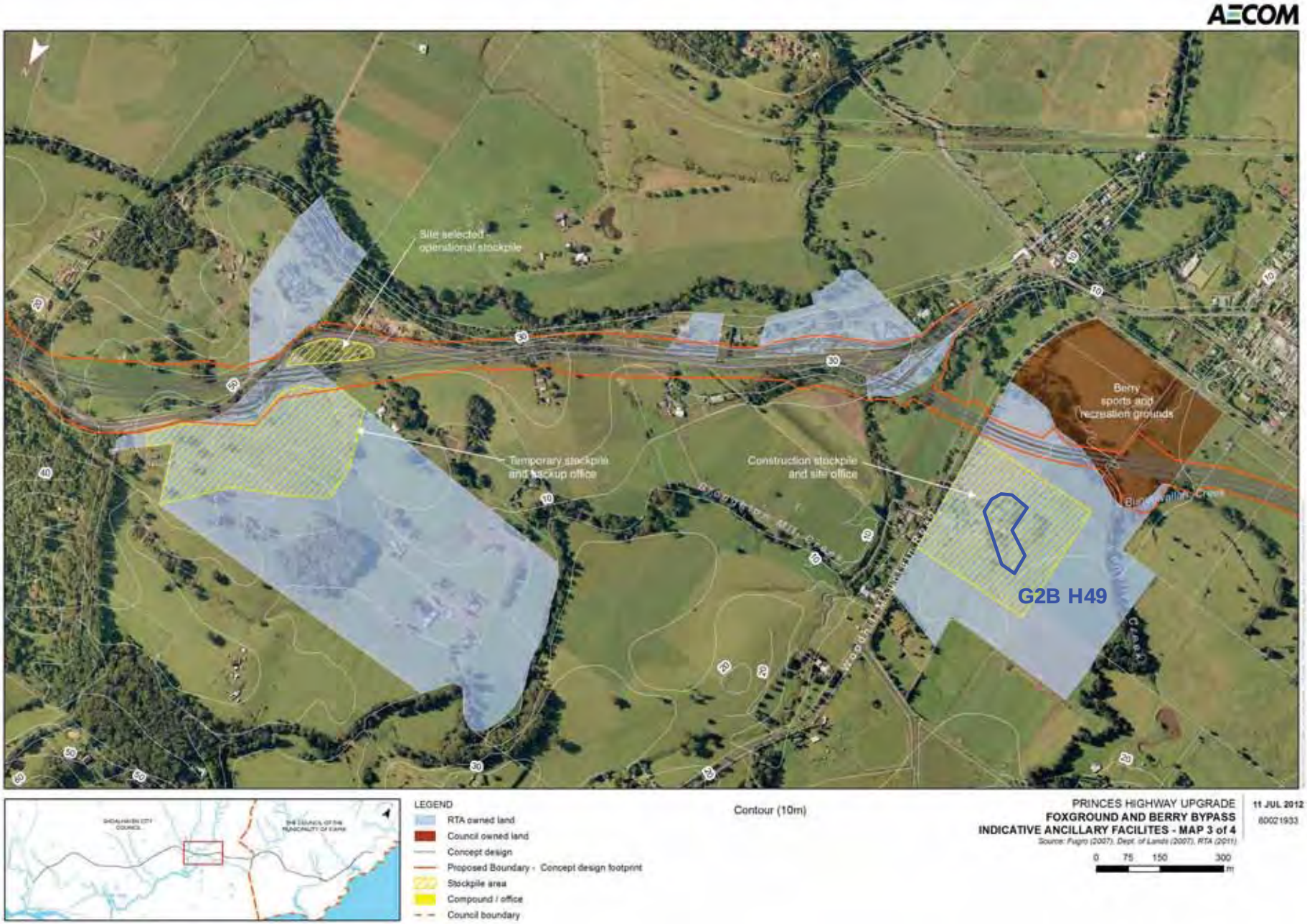
01 AUG 2012
60021933

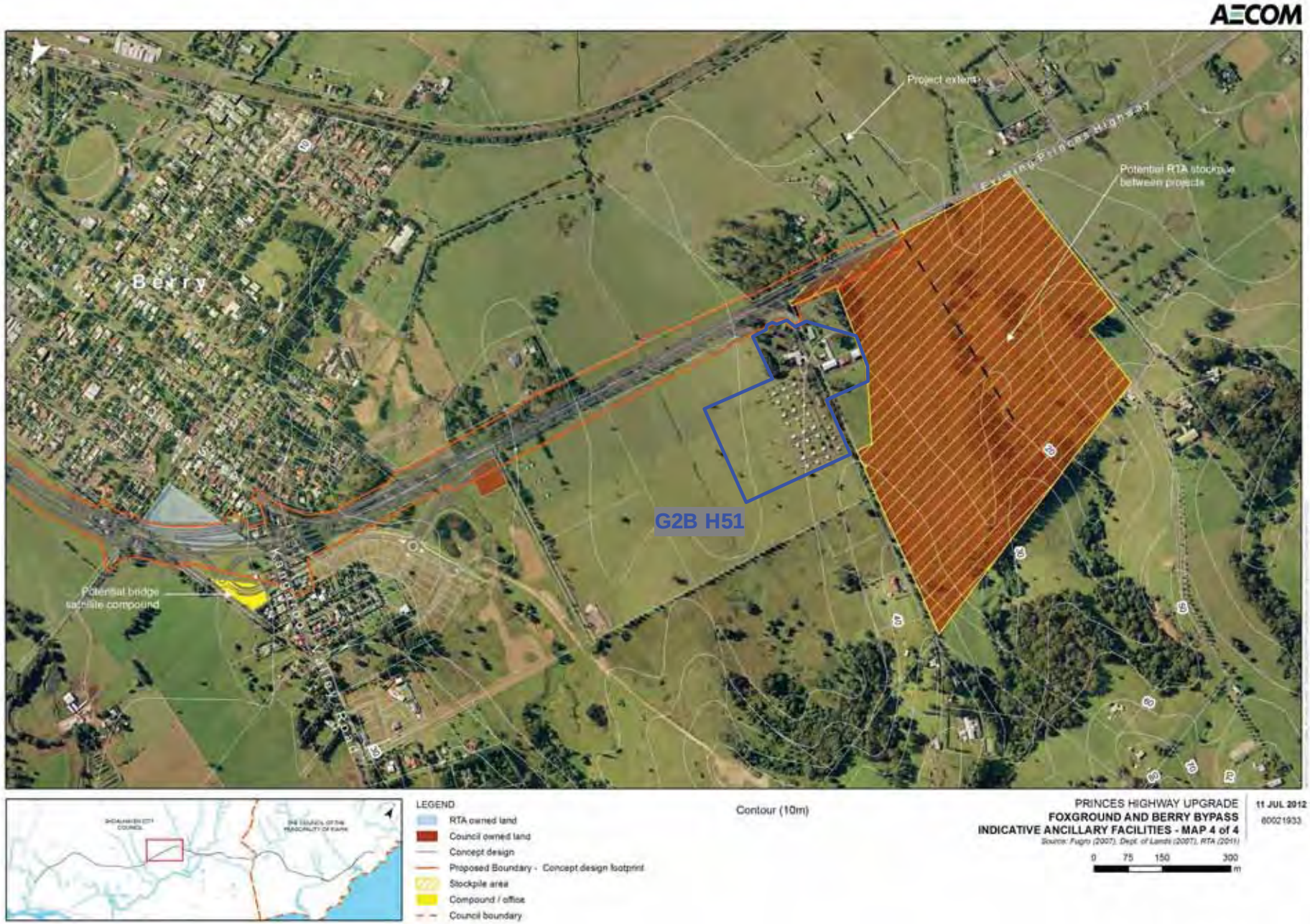
0 100 200 400 m

Figure A.2 Site recordings relative to indicative ancillary areas




AECOM
Bridge satellite compound
Construction stockpile
Australian Paper Access Rd
G2B H24
Bridge satellite office
Access
LEGEND
RTA owned land
Council owned land
Concept design
Proposed Boundary - Concept design footprint
Stockpile area
Compound / office
Council boundary
Contour (10m)
PRINCES HIGHWAY UPGRADE
FOXGROUND AND BERRY BYPASS
INDICATIVE ANCILLARY FACILITIES - MAP 2 of 4
Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)
0 100 200 400 m
11 JUL 2012
60021933


AECOM
Site selected - operational stockpile
Temporary stockpile and backup office
Construction stockpile and site office
Berry sports and recreation grounds
G2B H49
LEGEND
RTA owned land
Council owned land
Concept design
Proposed Boundary - Concept design footprint
Stockpile area
Compound / office
Council boundary
Contour (10m)
PRINCES HIGHWAY UPGRADE
FOXGROUND AND BERRY BYPASS
INDICATIVE ANCILLARY FACILITES - MAP 3 of 4
Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)
0 75 150 300
m
11 JUL 2012
60021933


AECOM
Project extent
Existing Princes Highway
Potential RTA stockpile between projects
Berry
G2B H51
Potential bridge satellite compound
LEGEND
RTA owned land
Council owned land
Concept design
Proposed Boundary - Concept design footprint
Stockpile area
Compound / office
Council boundary
Contour (10m)
PRINCES HIGHWAY UPGRADE
FOXGROUND AND BERRY BYPASS
INDICATIVE ANCILLARY FACILITIES - MAP 4 of 4
Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)
0 75 150 300
m
11 JUL 2012
60021933

Appendix F

Artefact inventory from G2B H14 test pit excavations

Artefact inventory from G2B H14 test pit excavations

Key to abbreviations:

C	Cylindrical
D	Diameter
Deco	Decoration
EW	Earthenware
F	Flat
H	Height
L	Length
M	Melted
O	Octagonal
RD	Rim diameter
sh	Shoulder
TRF	Transfer
W	Width

F.1 G2B H14 Ceramics catalogue

Cat	Square	Context	Ware	Deco	Form	Part	No	Weight	Description
1012	A-C64	22	Stoneware	Brown Glaze	Bottle	body	1	10.3	Black TRF label: 'THIS BOTTLE IS'.
1011	B100	41	Porcelain		Insulator	rim-sh	5	23.8	RD=2.5".
1013	B-C64	22	Porcelain		Cup	body	1	2.3	
1014	B-C64	22	Stoneware	Brown Glaze	Bottle	Finish	1	5.3	Crown type finish on a Ginger beer bottle.
1015	B-C64	22	Stoneware	Brown Glaze	Bottle	body	6	17.1	Black TRF label: 'Y O' in circular field.
1002	C50	42	Ew		Plate	sh	2	12	
1007	C64	22	Stoneware	Brown Glaze	Bottle	Finish	4	15.1	Crown type finish on a Ginger beer bottle, BD=3/4".
1008	C64	22	Stoneware	Brown Glaze	Bottle	body	7	55	Black TRF label: star then 'L' and also 'LO' all in a circular field.
1010	C79	32	Ew	Black TRF	Cup	body	1	1.2	Partial pattern.
1016	D100	27	Porcelain	Grey glaze	Insulator	whole	1	275	RD=3.25", base D=1.75", H=3.25". Inner rim D=2". The inside features a threaded socket where the insulator would be attached. Around the middle of the insulator is a furrow where copper wire is attached.
1001	F20	9	Ew	Banded Blue	Plate	rim-sh	1	11.1	RD=9".
1003	F39	8	Stoneware	Brown Glaze	Pipe	body	1	470.3	D=5.5"
1004	F39	14	Stoneware	Brown Glaze	Pipe	body	5	308.7	D=5.5"
1005	F39	14	Porcelain		Unk	body	1	0.4	
1006	F39	14	Stoneware	Brown Glaze	Unk	Corner	1	13.6	Corner of an octagonal shaped item? Scuffed.
1009	F39	14	Stoneware	Brown Glaze	Pipe	body	2	767.7	D=5.5"
						Total	40	1988.9	

F.2 G2B H14 Glass catalogue

Cat	Square	Context	Form	Shape	Part	Colour	Tinge	No	Weight	Description
2061	A-C64	22	Bottle	C	body	amber		2	1.1	Embossed label: 'M'.
2062	A-C64	22	Bottle	C	base	amber		1	0.6	Mould made - Resting point seam.
2063	A-C64	22	Bottle	C	body	clear		3	4.0	Orange peel striations.
2069	A-C64	22	Lamp	C	sh	clear		1	0.5	
2070	A-C64	22	Bottle	C	body	green	olive	2	3.0	Orange peel striations.
2067	B100	40	Bottle	C	sh	clear		1	2.4	Embossed deco (sh): horizontal rib. Orange peel striations.
2009	B61	30	Bottle	C	sh	amber		1	4.8	Mould made - vertical seam.
2010	B61	30	Bottle	C	sh	amber		1	2.3	Orange peel striations
2023	B61	30	Bottle	C	sh	clear		1	9.2	Applied - vertical striations.
2024	B61	30	Bottle	C	body	clear		1	8.8	Embossed label: partial.
2025	B61	30	Bottle	C	sh	amber		2	5.2	Embossed label: 'TL'.
2041	B95	33	Bottle	C	body	clear		3	20.2	Embossed label: 'OOL'. Embossed deco: horizontal rib.
2042	B95	33	Bottle	C	body	clear		2	6.5	Machine made.
2071	B-C64	22	Bottle	C	body	green	olive	1	3.2	Orange peel striations and blisters.
2072	B-C64	22	Window	F	body	clear		1	2.9	Thickness = 2.2mm.
2002	C110	1	Bottle	C	sh	amber		1	1.1	Orange peel striations
2033	C24	43	Bottle	C	body	amber		1	5.3	Orange peel striations
2034	C24	43	Bottle	C	finish	clear		3	17.4	Machine made external screw thread, BD=2".
2046	C50	42	Bottle	C	sh	green	olive	1	3.1	Orange peel striations.
2045	C60	2	Bottle	C	body	clear		10	4.8	Orange peel striations.
2027	C60	7	Window	F	body	clear		2	0.9	Thickness = 5.7mm. Car window?
2028	C60	7	Bottle	C	sh	amber		2	24.0	Machine made.

Cat	Square	Context	Form	Shape	Part	Colour	Tinge	No	Weight	Description
2039	C60	10	Bottle	C	body	amber		1	5.6	Orange peel striations.
2040	C60	10	Bottle	C	sh	clear	green	18	80.8	Mould made - two piece. Embossed labels: (sh) '& ICE' (body) 'E PROPE'.
2047	C61	12	Bottle	C	sh	amber		10	38.1	Mould made - vertical seam. Applied.
2048	C61	12	Bottle	C	sh	amber		2	6.3	Embossed label: 'OF'. Orange peel striations.
2049	C61	12	Bottle	C	whole	clear		24	50.5	Fragmented modern machine made bottle with external screw thread finish, BD=1.5". Has printed expiry date on sh.
2050	C61	12	Window	F	body	clear		1	0.8	Thickness = 5.7mm. Car window?
2016	C70	3	Bottle	C	body	clear		1	1.6	Orange peel striations
2017	C70	3	Window	F	body	clear		1	0.6	Thickness = 5.7mm. Car window?
2043	C70	4	Bottle	C	sh	amber		1	0.7	Embossed deco: four lines of dots. Orange peel striations.
2044	C70	4	Window	F	body	clear		2	2.3	Thickness = 5.7mm. Car window?
2054	C79	32	Bottle	C	body	clear		1	8.8	Machine made. Embossed label: 'THIS BOTT'/'RAN'. Embossed deco: horizontal rib.
2068	C79	32	Bottle	C	sh	clear		1	1.0	Embossed deco: raised grid pattern. Orange peel striations.
2074	C80	2	Window	F	body	clear		1	0.5	Thickness = 5.7mm. Car window?
2005	C80	28	Bottle	C	body	green	olive	1	6.4	NW Quad. Orange peel striations.
2026	C95	32	Bottle	O	base	clear		15	120.6	Machine made, D=2.25". Embossed labels: (body) 'GE' 'GILD' and other partial segments.
2031	C95	?	Bottle	C	body	clear		2	1.2	Orange peel striations.
2032	C95	?	Bottle	C	sh	clear		1	14.1	Mould made - vertical seam.
2008	D100	27	?	M	?	green		10	47.1	Fire damaged - melted.
2029	D100	27	?	M	?	green		2	10.5	Fire damaged - melted.
2030	D100	27	Bottle	C	body	green	olive	2	10.1	Orange peel striations and blisters.

Cat	Square	Context	Form	Shape	Part	Colour	Tinge	No	Weight	Description
2073	D100	27	?	M	?	green		8	46.4	Fire damaged - melted.
2006	E100	21	?	M	?	green		1	8.4	Fire damaged - melted.
2007	E100	21	Bottle	C	sh	amber		1	0.7	Orange peel striations
2004	F20	2	Bottle	C	body	clear		1	0.9	Orange peel striations
2064	F20	2	Bottle	C	body	green	olive	1	1.1	Orange peel striations. Scuffed.
2065	F20	2	Window	F	body	clear		1	1.0	Thickness = 2.0mm
2066	F20	2	Bottle	F	sh	clear	green	1	6.0	Embossed deco (sh): two rows of dots. Orange peel striations. Scuffed.
2003	F20	9	Bottle	C	body	green	light	1	8.9	Orange peel striations
2015	F20	9	Bottle	C	body	amber		1	1.6	Orange peel striations
2018	F20	9	Bottle	C	body	clear		1	4.6	Mould made - vertical seam.
2019	F20	9	Bottle	C	sh	clear		1	1.1	Moulded deco: horizontal ribs.
2035	F20	9	Bottle	C	push up	clear	green	1	14.7	Embossed maker's mark: hexagon with starburst in centre. Scuffed.
2036	F20	9	Bottle	F	sh	green	olive	2	3.2	Applied - vertical striations. Case bottle.
2037	F20	9	Bottle	O	cr	clear	green	1	3.4	Orange peel striations.
2038	F20	9	Bottle	C	body	clear		1	0.1	Orange peel striations.
2001	F20	15	Bottle	C	sh	green	light	1	6.2	Scuffed
2011	F20	15	Bottle	C	base	clear		1	0.8	Orange peel striations
2012	F20	15	Bottle	C	sh	clear		1	0.7	Orange peel striations
2013	F20	15	Bottle	C	base	green	light	1	10.7	Rounded heel, high conical push up, D=3". Scuffed.
2014	F20	15	Bottle	C	sh	green	light	2	2.9	Orange peel striations
2075	F30	6	Bottle	C	body	amber		1	9.2	Orange peel striations.
2020	F31	13	Bottle	F	body	clear	green	1	3.0	Orange peel striations
2021	F31	13	Bottle	C	body	amber		1	0.7	Mould made - vertical seam.
2022	F31	13	Bottle	C	sh	amber		1	0.9	Moulded deco: double line of dots.

Cat	Square	Context	Form	Shape	Part	Colour	Tinge	No	Weight	Description
2051	F39	8	Window	F	body	clear		1	0.8	Thickness = 5.7mm. Car window?
2052	F39	8	Bottle	C	sh	clear		1	8.5	Applied - vertical striations.
2053	F39	8	Bottle	F	finish	amber		6	27.4	Machine made external screw thread, BD=11/16". Embossed label (body): partial.
2058	F39	14	Bottle	C	base	green	olive	1	18.5	Heel seam, medium push up, D=2.5". Scuffed.
2059	F39	14	Bottle	C	sh	green	light	2	3.4	Scuffed
2060	F39	14	Bottle	F	body	amber		1	1.5	Orange peel striations.
2055	F40	5	Bottle	C	body	amber		1	1.6	Orange peel striations.
2056	F40	5	Window	F	body	clear		7	3.4	Thickness = 5.7mm. Car window?
2057	F40	5	Bottle	C	body	clear		1	0.8	Orange peel striations.
							Total	194	742.0	

F.3 G2B H14 Miscellaneous catalogue

Cat	Square	Context	Material	Function	Part	No	Weight	Description
3001	C60	10	Coke			1	2.2	Fragment of coke or carbon?
3002	F39	8	Mortar			1	10.6	Fragment of white mortar adhered to an unknown substance.
3003	F40	5	Plastic	Band	segment	1	0.2	White/grey. W=5/16".
3004	E64	16	Plastic	Cap	rim	1	0.2	Blue screw on cap with vertical fluting on outside.
3005	F30	2	Rubber	Tire Tread	Tread	1	5.2	
3006	B100	40	Wood			2	14.2	Lengths of natural wood.
3007	F30	11	Brick	Brick	edge	1	205.8	H=2+3/4".
3008	C79	32	Rubber	Tire Tread	edge	3	8.9	Engraved lines.
3009	F20	18	Brick	Brick	corner	1	32.9	
3010	B-C64	22	Plastic	Wire	Casing	1	0.4	Red wire casing D=1/16".
3011	D100	27	Wood			1	3.1	Length of natural wood.
3012	D100	27	Charcoal			1	22.3	
3013	C50	32	Brick	Brick	end	1	712.5	Hand made. H=2.5".
3014	C50	32	Brick	Brick	body	1	70.0	
3015	F20	18	Charcoal			3	33.0	
3016	E100	21	Charcoal			1	3.0	Sample 1
3017	F30	6	Brick	Brick	corner	2	48.4	Handmade.
3018	D80	32	shell	Jewellery	whole	1	5.0	Ground pendant L=1.25", W=1/2" with one rounded end and one flat end. The flat end has a drill hole, D=1/8", L=1/4" for attachment. Could have been from an earring or a necklace.
					Total	24	1177.9	

F.4 G2B H14 Metal catalogue

Cat	Square	Context	Element	Form	Part	No	Weight	Description
4005	A-C64	22	Lead/copper	Pipe	Lengths	2	2.3	Squashed. Lead pipe casing and red plastic casing for copper wire? Lead casing D=1/8".
4006	A-C64	22	Lead/Brass	Pipe	Length	1	25.2	Lead casing for a brass wire which also has a cotton threaded cover. D=3/8".
4008	A-C64	22	Lead	Pipe	Length	1	7.5	Squashed and bent with a protective white coat. D=1/8".
4007	B100	41	Brass	wire	Lengths	4	2	D=1/32". From ceramic insulator?
4001	B95	33	Iron	Bracket	half	1	24.5	Very corroded, bracket type clasp semi circular in shape with flat end. Perhaps with a nail or bolt still attached.
4009	B-C64	22	Lead/Brass	Pipe	Lengths	2	40.7	Lead casing for a brass wire which also has a cotton threaded cover. D=3/8".
4002	C64	22	Lead	Pipe	Lengths	4	32.2	Squashed and bent. Diameter between 1/8" and 3/16". Has a white protective coat.
4003	C64	22	Lead	slag		1	3.5	Fire damaged - melted blob.
4012	C64	22	Iron	Horseshoe	half	1	90.6	Very corroded. L=5".
4010	C95	32	Iron	Hinge	half	1	664.6	Very corroded. L=7.5", W=1.25".
4015	D100	27	Iron	washer	whole	1	51.1	Very corroded. D=1.75".
4016	D100	27	Iron	Bolt	shaft-point	1	2.1	Very corroded. Threaded end.
4017	D100	27	copper	wire	lengths	7	8.3	Original attached to insulator. D=1/8".
4004	F20	2	Iron	Nail	shaft-point	4	28.8	Very corroded. These could be wire nails or simply lengths of wire.
4013	F20	2	Iron	Bolt	whole	1	36.1	Very corroded, L=2.5". Has threaded end.
4014	F20	2	Iron	washer	whole	1	8.7	Very corroded. D=1".
4011	F20	9	Iron	Nail	Head-shaft	1	6.1	Very corroded. Probably a wire nail.
4018	F30	6	Brass	?	edge	2	0.3	Very thin circular edges of some object. Edge features an embossed band of dots around it. Could be from some form of jewellery or a cog from a watch?
					Total	36	1034.6	

Appendix G

Detailed descriptions of field recordings

Detailed descriptions of field recordings

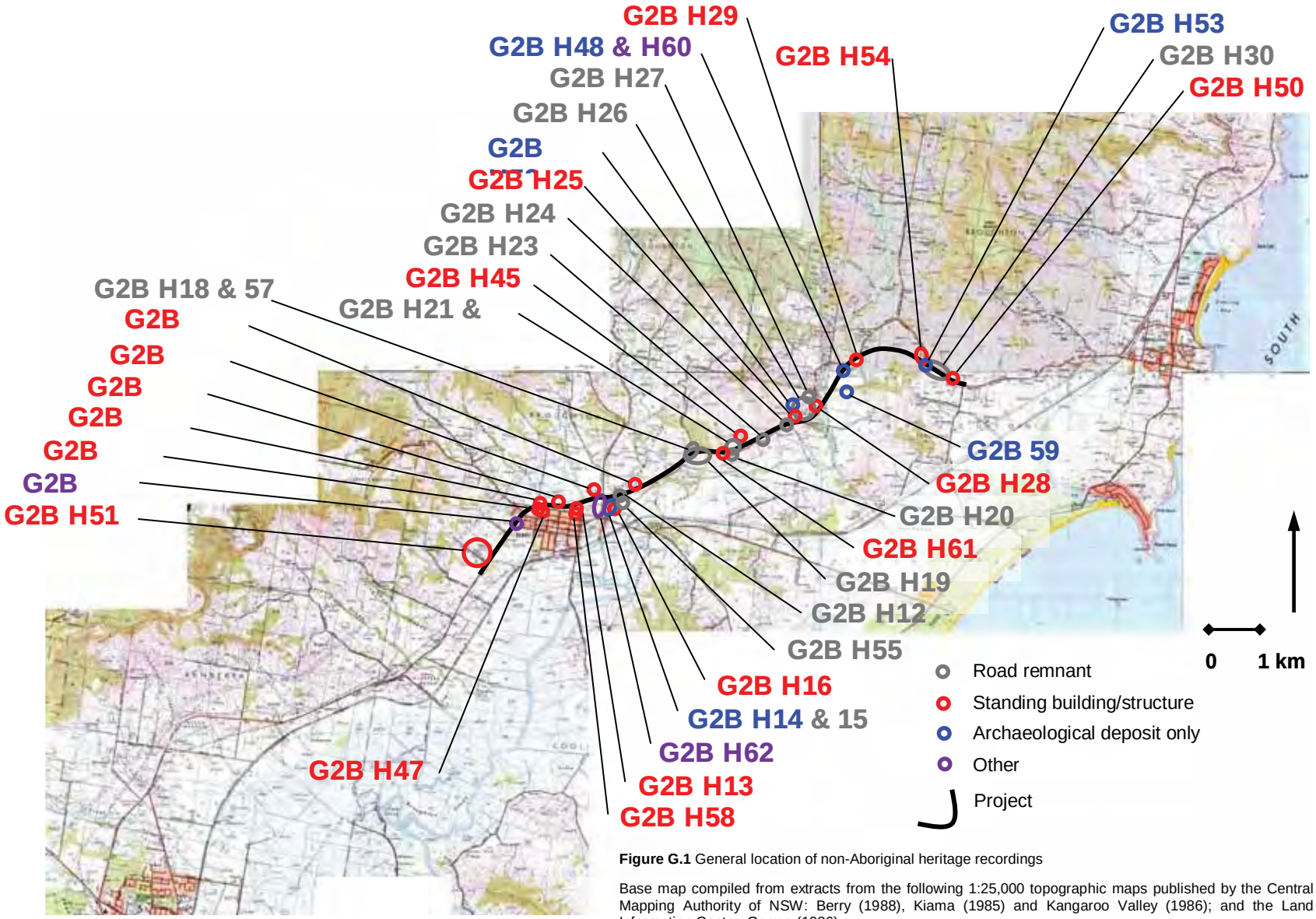


Figure G.1 General location of non-Aboriginal heritage recordings

Base map compiled from extracts from the following 1:25,000 topographic maps published by the Central Mapping Authority of NSW: Berry (1988), Kiama (1985) and Kangaroo Valley (1986); and the Land Information Centre: Gerroa (1986).

G.1 Nineteenth century road remnants

Recording ID: G2B H19		**GDA Map Reference:**	**291567.6150828 to 291987.6150902**
Name/Description:	**Remnant of Berry Estate road (c.1858 – 1870s)**	*Cadastral Location*:	Lot 13 DP1098617 Lot 4 DP801512
		Street address:	A200B Princes Highway & A350 Princes Highway Berry
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	Road remnant is situated along the crest of a low spurline, aligned northeast – southwest, which descends off the Broughton Creek Broughton Mill Creek watershed (at SW end), to the northeast. Both ends of the remnant meet the easement of the current highway, to either side of its intersection with Tindalls Lane.
Description/fabric:	This site consists of a remnant and straight section of former road platform approximately seven to eight metres wide. The platform is discernible through slight changes in ground surface relief, and in some places has a faint ditch and/or bank along its margins. The platform can be best discerned in the Lot containing forest regrowth at the eastern end of the remnant. Aerial photography is required to trace the alignment through the adjacent pasture. The nature of any subsurface evidence for the road is not known.
Dimensions:	Remnant road alignment is approximately 430 metres long and up to 10 metres wide, and aligned 82 degrees (grid north).
Physical condition:	The surface evidence for the road remnant is mostly vestigial. The surface evidence for this ground feature has been substantially impacted by ploughing, tilling and other agricultural processes.
Integrity:	This remnant has been impacted by a later nineteenth century road platform at its western end (G2B H18), and elsewhere by ploughing/tilling, fencing and tree regrowth. Although these impacts have reduced the clarity and definition of the site, its characteristics where discernible are likely to relate to the original road platform.
Associated features:	A remnant portion of a later nineteenth century road platform (G2B H18) is situated at the western end of this remnant.
Current use:	Lot 13*:* Grazing pasture grassland, being part of an active dairy farm, possible periodic cropping. Lot 4: Rough grazing, regenerating low forest.
Heritage listings:	no current listings

Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).
2. The nature and form of the remnant.
3. The association (via proximity or alignment) of the remnant to contemporary occupation or service features.
4. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).

Despite pressure from residents and Alexander Berry to extend the road formalised in 1834 between Appin and Saddleback Mountain, to the Shoalhaven, little government action was forthcoming. In 1856, Surveyor Shone was required to mark a line from Gerringong to Broughton Valley and to report on the expediency of extending the line to Bomaderry. Following further inaction, Alexander Berry took the initiative, and privately constructed a road across his estate lands from Gerringong to Broughton Creek (Berry) and later to Bomaderry by 1858 (JME 1951:81; Cousins 1948:105).

It is this private road that is presumably shown on an 1866 map of the County of Camden. The Berry Estate road was distinctive in its use of long straight sections, which often traversed steep spurs and ridges without apparent regard for the consequentially steep gradients. The straight and sometimes steep nature of the road may be explained by:

- The need to minimise length and consequential costs.
- Pressure to establish a road link in a minimal time period.
- The absence of cadastral or land ownership limitations which would otherwise require deviations and bends.
- The predominant early use of bullock teams to convey produce, and thus a greater tolerance of moderate gradients.

On the 9th August 1858, the *Illawarra Mercury* reported that a road was to be proclaimed from Gerringong to the head of Broughton Creek. It was to be maintained at the expense of the parishes which it traversed.

In the period between Berry's original construction of the estate road and the 1890s, the further development of the road by the local Councils resulted in a longer and more angular alignment, involving switch-backs and deviations around spurs. The elaboration and revision of Berry's originally straight alignments appears to have been a consequence of establishing more gradual grades, suitable for horse drawn vehicles, and complying with various farm boundaries and related cadastre. By this time, most of the latter were now freehold title following the break up and sale of the Berry Estate.

Figure G.2 General view across road remnant (approximate alignment marked in yellow), looking SW

Figure G.3 Road remnant visible on 1958 aerial photo (outlined in yellow), (NSW 699-5032, SH.I Dapto-Ulladulla Run GK11 23/07/58)

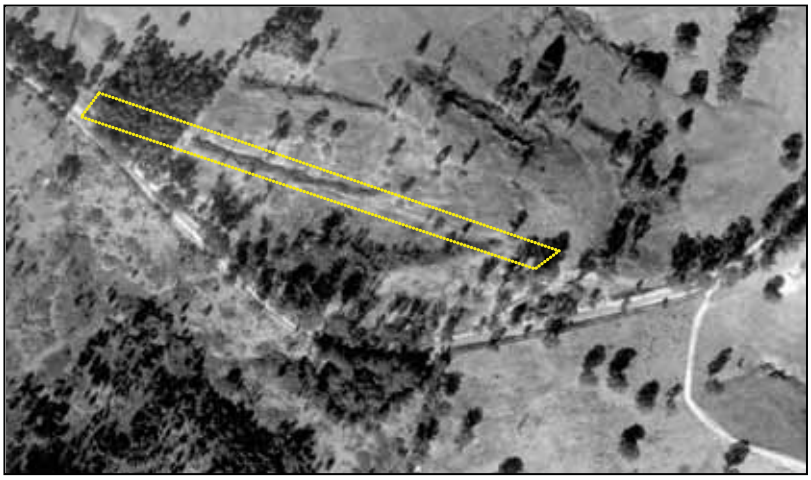


Figure G.4 Aerial image (2006) of area of road remnant (outlined in yellow), in 2006 (Google Earth Pro 2011)

Figure G.5 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

Recording ID: G2B H22		**GDA Map Reference:**	**292713.6151056 to 292596.6151024 to 292425.6150991 to 292296.6150888**
Name/Description:	**Remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*: Street address:	Lot 12 DP1098617 A371 Princes Highway Berry
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	Road remnant consist of a traverse across the crest and upper and midslopes to either side of a low spurline, aligned northwest – southeast, and forming part of the lower northern fall of the Broughton Creek valley. The remnant is truncated at either end by the current highway which diverges up to 60 metres downslope of the remnant alignment.
Description/fabric:	This site consists of a 460 metre road alignment in three angled sections. The middle section, which traverses east facing upper slopes and the crest is 172 metres long, and contains 110 metres of relatively well defined platform associated a minor cutting, approximately seven to eight metres wide. Elsewhere the road platform is discernible through slight changes in ground surface relief, and traces of the side ditches. The nature of any subsurface evidence for the road is not known.
Dimensions:	Remnant road alignment has the following approximate sections (east to west): 120 metres 225 degrees (grid north) 172 metres 261 degrees 168 metres 233 degrees
Physical condition:	The surface evidence for this road remnant ranges from vestigial to relatively distinct shallow surface relief and upslope cutting. The sections either side of the middle have become indistinct through ploughing, tilling and forest regrowth (western section).
Integrity:	The middle section of this remnant has been kept open through modern use as a farm track. Despite this, its characteristics are likely to relate to the original road platform. The remaining sections are vestigial.
Associated features:	A remnant and incised portion of a later nineteenth century road platform (G2B H22) is situated immediately downslope of the middle section of this remnant.
Current use:	A rough farm track along the middle section is still being used for access across enclosed pastures. The remaining sections support agricultural grassland and regenerating forest.
Heritage listings:	Included within property definition for Glenvale homestead on Shoalhaven LEP (as amended) Schedule 7, but not specifically identified.

Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).
2. The nature and form of the remnant.
3. The association (via proximity or alignment) of the remnant to contemporary occupation or service features.
4. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).

Refer also section in G2B H19 for general historical background

Figure G.6 General view along road remnant from near eastern end (approximate alignment marked in yellow), looking W

Figure G.6 Road remnant visible on 1958 aerial photo (outlined in yellow), (NSW 699-5031, SH.I Dapto-Ulladulla Run GK11 23/07/58)

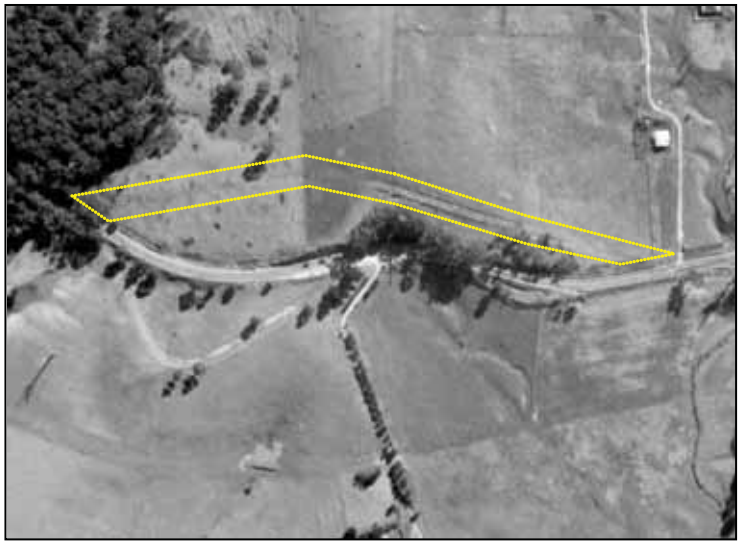


Figure G.8 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.9 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

Recording ID: G2B H23		**GDA Map Reference:**	**293162.6151296 to 292911.6151149**
Name/Description:	**Probable remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*: Street address:	Lot 12 DP1098617 A371 Princes Highway Berry
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	Road remnant is a straight traverse across both sides and crest of a low spurline, aligned north – south, and forming part of the lower northern fall of the Broughton Creek valley. The current highway alignment connects with either end of the remnant and loops around to the south, forming a more gradual and consistent vertical alignment.
Description/fabric:	This site consists of a remnant and straight section of former road platform and associated side ditches approximately 10 metres wide. The ditches to either side of the platform are discernible through slight changes in ground surface relief, and the colour and height of the grass cover, depending on light and growth conditions. This feature is best seen from aerial photography. The nature of any subsurface evidence for the road is not known.
Dimensions:	Remnant road alignment is approximately 320 metres long and up to 12 metres wide, and aligned 61 degrees (grid north). The road platform ranges in width from seven to eight metres.
Physical condition:	This is the best and longest conserved section of the road where there are no sections of cutting or benching to indicate the alignment. It is probable that tilling and cropping has reduced the original relief and definition of the feature. One fence line crosses the feature near the spur crest.
Integrity:	Apart from some impact from possible tilling or ploughing, this remnant appears to conserve characteristics which are likely to relate to the original road platform.
Associated features:	-
Current use:	Grazing pasture grassland
Heritage listings:	Included within property definition for Glenvale homestead on Shoalhaven LEP (as amended) Schedule 7, but not specifically identified.

Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The nature and form of the remnant.
2. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).
3. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).

Refer also section in G2B H19 for general historical background

Figure G.10 Road remnant visible on 1958 aerial photo (outlined in yellow), (NSW 699-5029, SH.I Dapto-Ulladulla Run GK11 23/07/58)

Figure G.11 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.12 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

Recording ID: G2B H27		**GDA Map Reference:**	**293988.6152199 to 293974.6152006 to 293742.6151753**
Name/Description:	**Remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*:	Lot 2 DP593476 Lot 1 DP919179
		Street address:	A441 Princes Highway & A540 Princes Highway Broughton Village
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	Road remnant is situated at the southern margin of Broughton Village and traverses two minor spurs, separated by a minor gully, and a minor tributary stream and its associated flats. The spurs are aligned northwest – southeast and form part of the lower northern fall of the Broughton Creek valley. The remnant is situated to the west of the current highway, adjacent to a section known locally as "the big dipper".
Description/fabric:	This site consists of three straight sections of road platform separated by two sharp corners. The net length of remnant is approximately 550 metres. The northern section is poorly defined and a modern farm track currently follows this alignment. The middle section is clearly discernible due to cutting and benching, and descends (SW) to a creek crossing which has been modified by a subsequent (and now disused) highway alignment (G2B H26) and later realignments of the creek bed. The southernmost section of the remnant is vestigial only, with slight ground relief indicating side ditches. The nature of any subsurface evidence for the road is not known.
Dimensions:	The lengths and alignments are, from north to south: 190 metres, 185 degrees (grid north); 260 metres, 232 degrees; and 100 metres, 203 degrees. The total length of the remnant road alignment is approximately 550 metres long. The width of the platform and associated earth works varies from eight to 15 metres.
Physical condition:	The surface evidence for this road remnant is variable and ranges from shallow surface relief to a defined earthen platform bordered by defined slope cuttings or benching. The middle portion is well preserved and clearly discernible, the northern and southern sections are vestigial.
Integrity:	The alignment has been impacted by on-going farm use as a vehicle track (this has also kept the track clear of vegetation), creek bank erosion, probable ploughing and tilling (especially on the creek flats), subsequent construction of a later nineteenth century highway platform (which re-uses part of the alignment and associated creek crossing). Two fence lines cross the alignment. The northern section may have little remaining original evidence, given its vestigial condition prior to its current use as a farm track. Despite these impacts, this remnant includes the best and most representative surviving cut and benched section, and the best interpretative context.

Associated features: Integral to this interpretation and historical context of this feature is a subsequent highway alignment (G2B H26), which superseded the original road, and which probably dates from the 1870s or 1880s. It was superseded in the 1930s by the current highway. The 1870s-80s alignment is situated downslope of the middle section of the original Berry Estate road, and then joins and overlays the platform near the southern end of the middle portion, including the creek crossing. It forms a tight bend just south of the creek crossing and this was known as "Binks Corner" after the owners of the property (then and now).

Immediately to the west of this tight corner there was formerly situated a Berry estate tenant farm, occupied in the 1890s by a "Mrs Wiley" (G2B H52).

The Sedgeford homestead (G2B H25) is a post Berry Estate homestead, in a similarly original association with the later highway alignment (G2B H26). All of these recordings form a complex, which, as a group have value in understanding and interpreting the evolution of the highway, its various alignments, and its interrelation with adjoining land holdings and homesteads.

Current use: The northern and middle sections are being used as farm tracks, for access to and enclosed pastures.

Heritage listings: no current listings

Historical Background/Interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).
2. The nature and form of the remnant.
3. The association (via proximity or alignment) of the remnant to contemporary occupation or service features.
4. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).

Refer also section in G2B H19 for general historical background

Figure G.13 General view, looking NW towards road remnant (approximate alignment marked in yellow, later highway alignment (G2B H26 shown in blue)

Figure G.14 Closer view of best preserved, cut and benched, middle section of the remnant road (alignment indicated by yellow dotted line), looking W.

Figure G.15 Road remnant visible on 1958 aerial photo (outlined in yellow), A later nineteenth century highway alignment, including "Binks Corner" is shown in blue (NSW 699-5028, SH.I Dapto-Ulladulla Run GK11 23/07/58)

Figure G.16 Aerial image showing road remnant (outlined in yellow) in 2006. A later nineteenth century highway alignment, including "Binks Corner" is shown in blue (Google Earth Pro 2011)

Figure G.17 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

Recording ID: G2B H30		**GDA Map Reference:**	**296738.6152431 to 296277.6152706**
Name/Description:	**Remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*:	Lot 10 DP857480 Lot 1 DP1014800
		Street address:	- Toolijooa
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting: Road remnant is situated along the crest of a prominent spurline which forms part of the eastern fall of Toolijooa Ridge. The spurline is aligned northwest – southeast. The eastern end of the remnant joins the current highway easement approximately 270 metres west of its intersection with Toolijooa Rd. The road remnant is located to the south of the current highway, and always situated on the crest of the spur, which forms an extended shoulder formation, after a relatively steep ascent at the eastern end.

Description/fabric: This site consists of two sections of road platform, joined by a gentle curve. The net length is approximately 530 metres. The best defined section is on the higher gradient slope at the eastern end, where side ditches and a distinct (earthen) road platform is evident. A rough avenue of Eucalyptus trees survives on either side of this section, for a distance of approximately 50 metres. The trees appear to be too young and low in height to be original road verge vegetation. A low cut along the upslope side of the road, (of up to 0.4 metres) is evident at the eastern end of the shoulder, and along the upper portion of the slope to the east. The middle and western portions of the remnant alignment are less distinct but include discontinuous, low relief, sections of side ditching and earth platform.

To the west of the fence line, which marks the current western end of this recording, there is a distinct road alignment within a narrow cutting (approximately 0.5 metres deep) which has been excavated into a stone rubble rich substrate. The alignment of this platform probably follows the original road alignment, and joins a modern sealed driveway 10 metres west of the fence line. It is thought likely that the excavation in this section is a more recent feature, but an original age cannot be fully discounted.

The nature of any subsurface evidence for the road is not known.

Dimensions: The curved alignment can be approximated by two lengths: (eastern end) 160 metres 96 degrees (grid north); (middle and eastern portions) 370 metres, 313 degrees. The width of the platform and associated earth works varies from 8 to 16 metres. The platform width ranges from 7 to 8 metres.

Physical condition: The surface evidence for this road remnant is variable and ranges from shallow surface relief to a defined earthen platform bordered by defined slope cuttings and side ditches. The eastern portion is well preserved and clearly discernible, the middle and western sections are less distinct and has been impacted in places by tracks created by farm vehicles. One fence line crosses this alignment.

Integrity: The alignment has been impacted by erosion, and by on-going farm use of informal tracks that cross or follow the original platform. The impact of ploughing and tilling appears to be limited. Overall this site displays minimal disturbance from subsequent use as a farm track or subsequent road development. The features of this site are likely to relate to the original road platform.

Associated features:	Thirty metres to the west of this site is a low linear mound of rock rubble (basaltic bedrock) which runs adjacent and parallel to the northern side of a modern sealed driveway which follows the alignment of the original Berry estate road. This feature forms part of recording G2B H53, the site of a former Berry Estate tenant farm) however its origin and relationship to the roadway is not clear. It may be the remains of an agricultural dry stone wall, the residue from the demolition of a former Berry Estate tenant farm, or alternatively, it may be a waste pile of excavated rock created during the late nineteenth century construction of the current highway alignment 30 metres downslope.
Current use:	Grazing pasture grassland.
Heritage listings:	no current listings

Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate Road is based on the following reasons (in order of importance):

1. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).
2. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).
3. The nature and form of the remnant.

Refer also section in G2B H19 for general historical background

Figure G.18 General view of eastern end of remnant, looking NW (approximate alignment marked in yellow), Toolijooa Rd in foreground

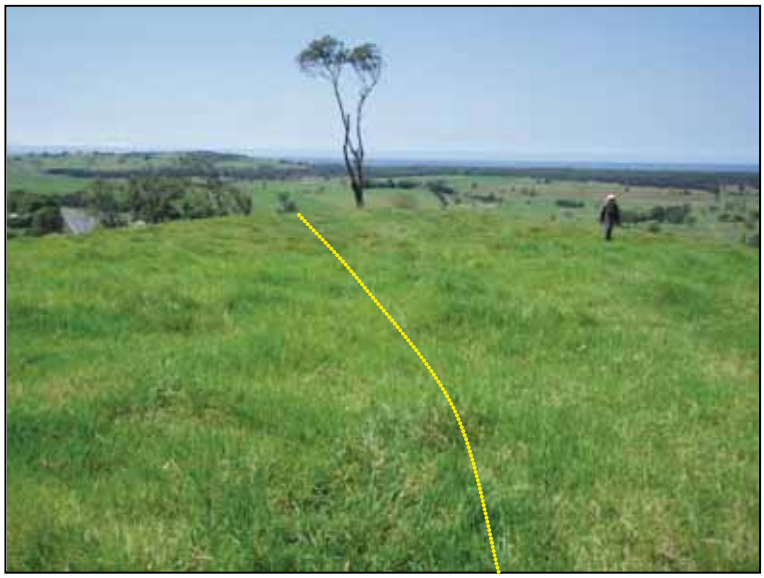


Figure G.19 View looking SE across crest of spur with remnant road platform in foreground (approximate alignment marked in yellow)

Figure G.20 View, looking E towards Toolijooa Rd intersection, along remnant road platform at eastern end of site, Note tree avenues and ditches on either side (approximate alignment marked in yellow)

Figure G.21 View of remnant road section where side ditches are evident , looking NW

Figure G.22 Road remnant visible on 1958 aerial photo (outlined in yellow), A later nineteenth century highway alignment, including "Binks Corner" is shown in blue (NSW 699-5028, SH.I Dapto-Ulladulla Run GK11 23/07/58)

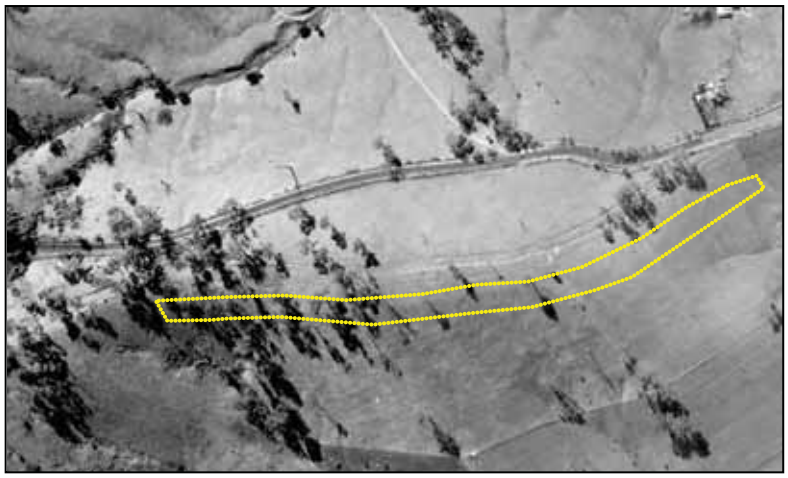


Figure G.23 Aerial image of area of road remnant (outlined in yellow), in 2006. A later nineteenth century highway alignment, including "Binks Corner" is shown in blue (Google Earth Pro 2011)

Figure G.24 Extract from 1839 (and later amendments), Crown Plan 56-672, showing alignment of Berry Estate road and later 1870s – alignment (G2B H30 section shown by dotted blue line overlay)

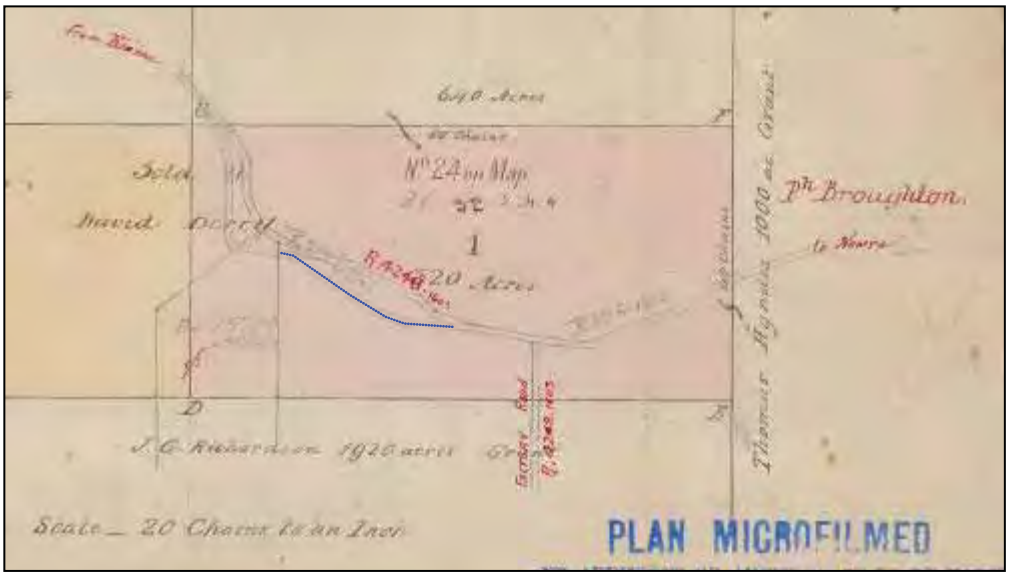
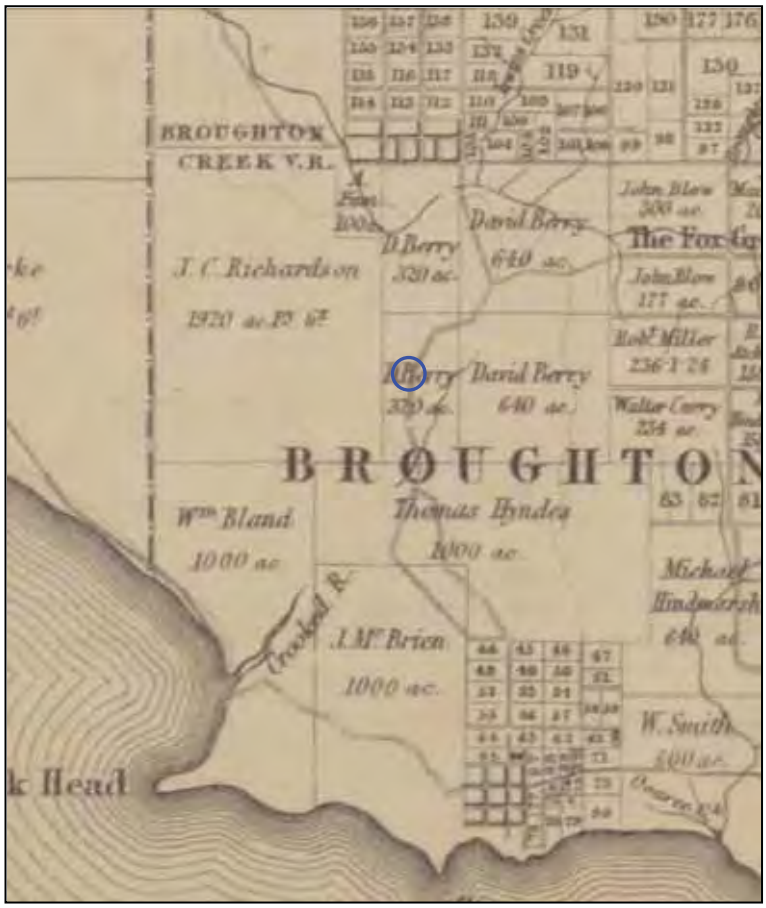


Figure G.25 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))



Recording ID: G2B H55		**GDA Map Reference:**	**290246.6149973 to 290172.6149916**
Name/Description:	**Remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*: Street address:	Lot 3 DP 1081231 A40A Princes Highway Berry
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	The road remnant is situated 500 metres east of the Broughton Mill Creek bridge along the current highway, and between 10 and 20 metres to the south of the edge of the cutting batter opposite the wayside stop. The remnant is located along the crest and upper slopes of a descending spurline which forms the watershed between Broughton and Broughton Mill Creeks. This watershed is aligned northeast - southwest.
Description/fabric:	This site consists of a remnant and straight section of former road platform approximately 7 to 8 metres wide. The upslope (northern) side of the remnant is defined by varying degrees of shallow cutting into the hill slope, with corresponding benching evident on the downslope side. . The nature of any subsurface evidence for the road is not known.
Dimensions:	Remnant road alignment is approximately 100 metres long and up to 10 metres wide, and aligned 233 degrees (grid north).
Physical condition:	The surface evidence for this road remnant consists of relatively distinct ground surface relief, However there has been a degree of erosion in the past across the inclined platform and along the ditch on the upslope side of the platform. The erosion hazard of run-off has been managed by the excavation of a number of channels from the ditch across the platform and downslope. This has significantly impacted the road remnant
Integrity:	Although this remnant is easily discerned due to the significant relief of its features, the integrity of the site has been substantially reduced due to the construction of side drains to control run-off.
Associated features:	Archaeological deposits (G2B H14) associated with the original and pre 1950s highway alignment, situated 100 metres further to the west.
Current use:	Grazing pasture grassland
Heritage listings:	no current listings

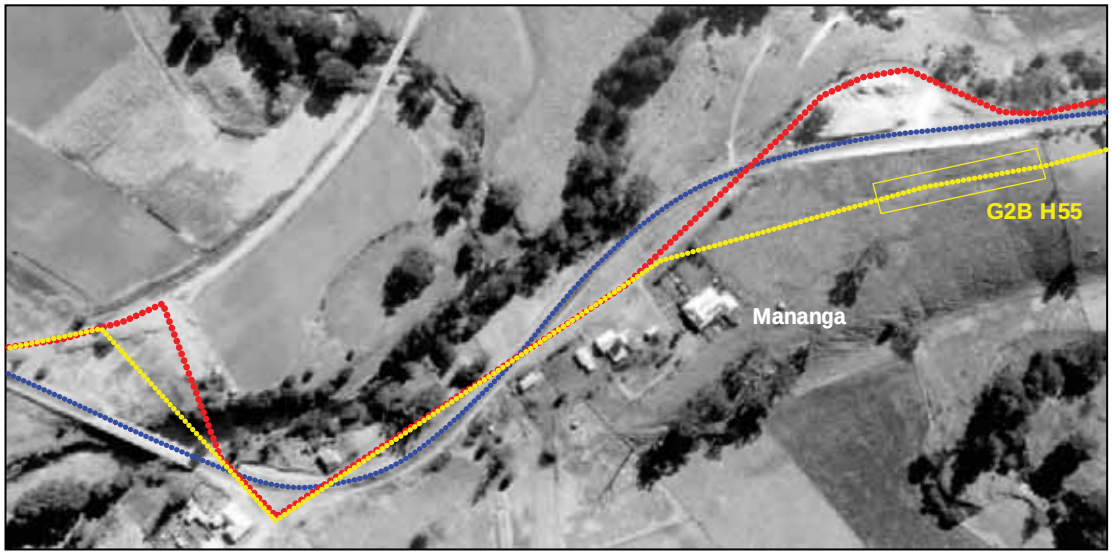
Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).
2. The nature and form of the remnant.
3. The association (via proximity or alignment) of the remnant to contemporary occupation or service features.
4. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).

It remains possible that this road remnant relates to a later period, conceivably for farm access after the 1950s re-alignment of the northern highway approach into Berry. The main reasons for discounting a later origin are:

- The form of the road (a platform with prominent side ditches), which matches the other estate road remnants.
- And the fact that the north eastern portion of the fenced front yard of the current *Mananga* homestead (built 1894) superimposes the original road platform. This strongly suggests that the remnant not only predates the current *Mananga*, but also the 1880s-1950s highway alignment to which the front yard enclosure relates (Figure G.26).



Original alignment - 1870s (refer Figure 4.10)

Alignment 1880s – 1950s (refer Figure 4.11 & 4.19)

Alignment mid 1950s - present

Figure G.26 Extract from 1958 aerial photograph showing northern highway entrance to Berry, with coloured overlays of current and previous highway alignments. Note the alignment of the Mananga homestead with the 1880s – 1950s alignment and the superimposition of the Mananga front yard over the original 1870s alignment. This strongly suggests that the G2B H55 road remnant relates to the original Berry Estate road which was constructed in 1856.

Refer also section in G2B H19 for general historical background

Figure G.27 Road remnant visible on 1958 aerial photo (outlined in yellow), (NSW 699-5036, SH.I Dapto-Ulladulla Run GK11 23/07/58)

Figure G.28 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.29 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

G.2 Twentieth century highway remnants

Recording ID: G2B H12		**GDA Map Reference:**	**290206.6149987 to 290097.6149908**
Name/Description:	**Remnant section of Princes Highway (Stewarts Hill, way-side stop)**	*Cadastral Location*:	Highway easement
		Street address:	- Berry
Item/Site Type:	Twentieth Century Highway Remnant		

Context/setting:	This remnant is located 460 metres east of the Broughton Mill Creek bridge, on the north side of the current highway, and located on the north side of the prominent spurline which forms the watershed between Broughton Mill and Broughton Creeks.
Description/fabric:	Bitumised highway platform in the form or a large curved loop. The downslope side of the platform is very steep and may have been built up with fill. Wooden post and wire mesh fencing along the downslope side of the platform may date from the 1950s. The inside of the loop formerly consisted of the natural northern upper slopes of the spurline. This has been quarried away during the construction of the current highway alignment. Until recently this area was used both as a materials and gravel dump for the highway, and an informal rest area. The whole area has recently been landscaped and developed as a way-side stop. Two memorial sculptures representing David and Alexander Berry have been installed as part of this re-development.
Dimensions:	170 x 40 metres
Physical condition:	The basic supporting earthworks and associated platform are in good condition. Apart from some remnant road side fencing, there is no original road furniture or other surviving features.
Integrity:	This remnant has little integrity as a 1950s highway corridor, due to quarrying impact from the adjacent 1950s highway upgrade, and the subsequent use of the area as a works area and materials dump.
Associated features:	A well preserved section of 1950s highway carriageway, also isolated by the 1950s upgrade, is located 40 metres to southwest, on the opposite side of the current highway (G2B H15).
Current use:	Landscaped way-side stop and commemorative sculpture area.
Heritage listings:	no current listings

Historical background/interpretation:

This remnant follows the 1870s to 1950s alignment of the Princes Highway. It ceased to form part of the active carriageway in the mid 1950s when the current highway alignment into Berry was constructed.

The first Edition Berry 1:25,000 topographic map shows the area as a picnic area.

Figure G.30 View showing the road corridor in the area of G2B H12 in the late 1890s, looking SW "Town of Berry from Stewarts Hill" Government Printing Office , 1898 (State Library of NSW d1_12472r.jpg; also Wollongong Library)

Figure G.31 View showing the road corridor in the area of G2B H12 in the late 1930s, looking SW "View of the town of Berry" (State Records of NSW 1937. 12932-a012-a012X2448000124.jpg)

Figure G.32 1949 aerial view of road remnants G2B H12 and G2B H15 (SVY552/NOWRA Run2(155-166) 4/4/1949)

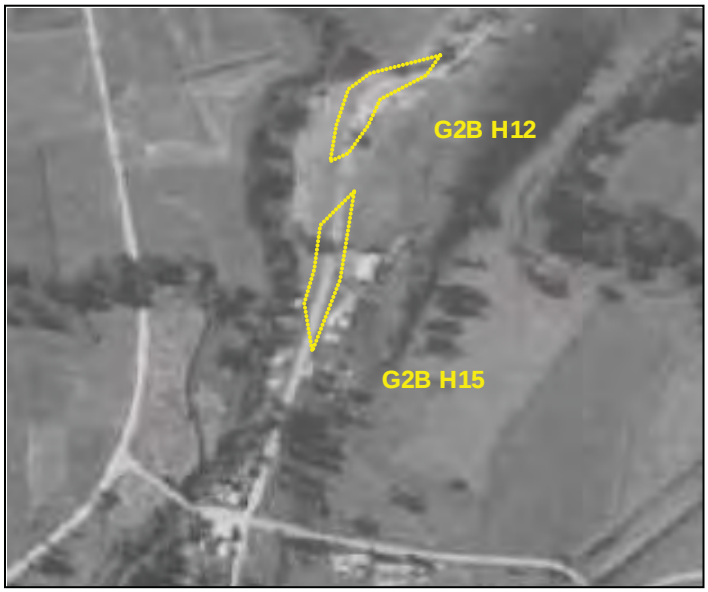


Figure G.33 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

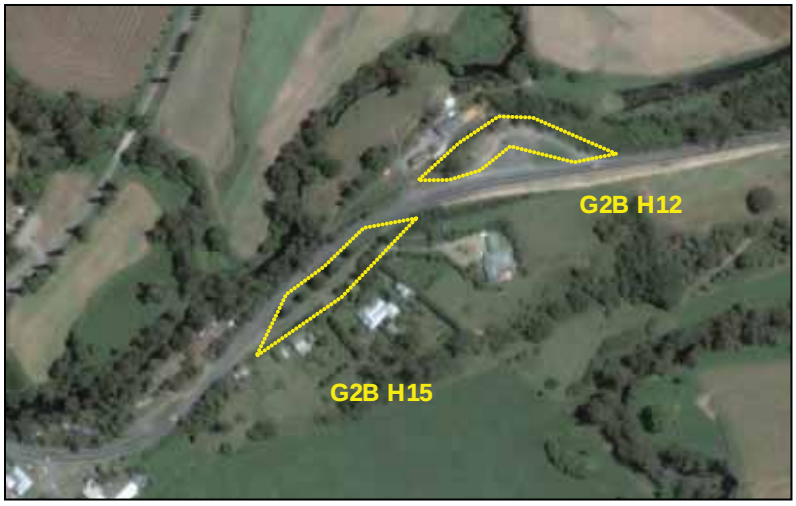


Figure G.34 Extract from 4th edition parish map of Coolangatta (cancelled 1928), showing location of G2B H12 and G2B H15

Recording ID: G2B H15		**GDA Map Reference:**	**290085.6149872 to 290020.6149720**
Name/Description:	**Remnant section of (mid 1950s) Princes Highway (Adjacent to *Mananga* homestead)**	*Cadastral Location*: *Street address:*	Highway easement - Berry
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located 460 metres east of the Broughton Mill Creek bridge, on the north side of the current highway, and located on the north side of the prominent spurline which forms the watershed between Broughton Mill and Broughton Creeks.
Description/fabric:	Bitumised highway platform, around 4.5 metres wide, with a net width, including gravelled shoulders of around 7.5 to 8.0 metres. The remnant is 195 metres long and is truncated by the current highway at either end. The remnant is slightly curved to the east, but in general is aligned at 26 degrees (to true north).
Dimensions:	195 x 15 metres
Physical condition:	The remnant is in good condition. For the majority of its length, the sealed road surface appears complete and in good repair and has probably been maintained and renewed post 1950s. At its northern and southern ends the roadway has been impacted by has construction of the current highway alignment. A spoil pile blocks use of the northern extent of the remnant, just after the northernmost driveway. At the southern end, access onto the current highway is maintained and possibly the original bitumen surface remain visible and has been eroded and patched due to side drainage and potholing. An avenue of five deciduous trees have been planted along the western side of the remnant (sometime between 1972 and 1986), between the remnant and the current highway.
Integrity:	This remnant retains many features of the 1950s highway easement, including an original configuration of road platform, shoulders and verge. Also original is the relationship between the roadway and adjacent Lot access and boundaries.
Associated features:	A highly modified section of 1950s highway carriageway, also isolated by the 1950s upgrade, is located 40 metres to northeast, on the opposite side of the current highway (G2B H12) and is now used as a wayside stop.
Current use:	Vehicle access to adjacent Lots.
Heritage listings:	no current listings

Historical background/interpretation:

This section of the highway was bypassed by the current highway alignment which was constructed in 1955 and apart from resurfacing appears not to have been modified since that time. It is currently used to access adjacent residential and agricultural lots on its eastern side. The alignment of this road remnant was formalised in the 1880s.

Recording ID: G2B H15

Remnant section of Princes Highway (Adjacent to Mananga HS)

Figure G.35 General view of remnant (to right of current highway) looking N

Figure G.36 General view of remnant (on left) looking S

Figure G.37 1949 aerial view of road remnants G2B H12 and G2B H15 (SVY552/NOWRA Run2(155-166) 4/4/1949)

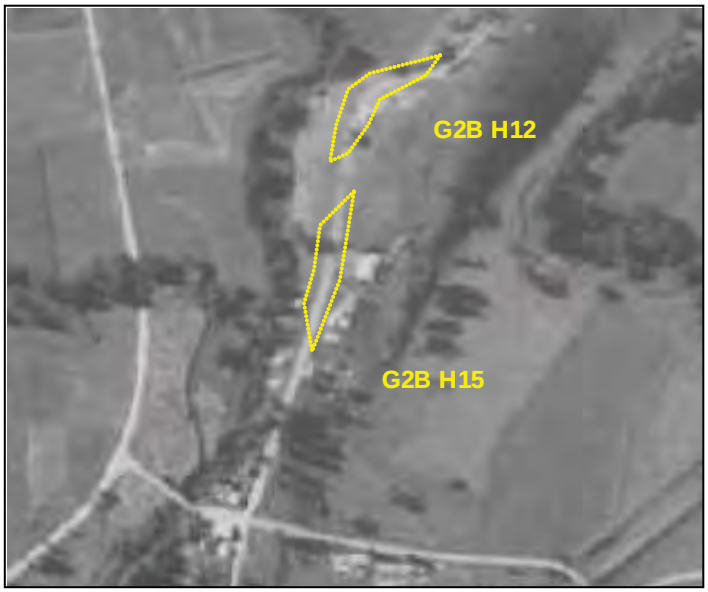


Figure G.38 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

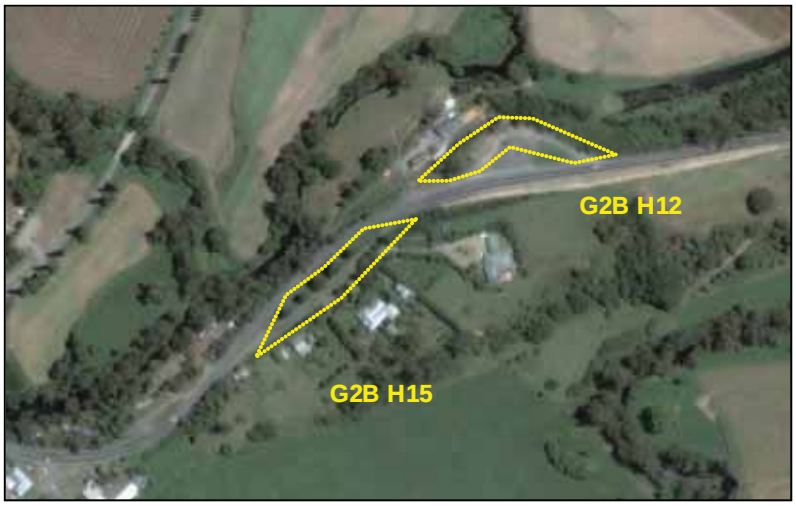


Figure G.39 Extract from 4th edition parish map of Coolangatta (cancelled 1928), showing location of G2B H12 and G2B H15

Recording ID: G2B H18		**GDA Map Reference:**	**291610.6150911 to 291500.6150827**
Name/Description:	**Remnant section of mid 1930s Princes Highway(Close to Tindalls Lane Int.)**	*Cadastral Location*: *Street address:*	Lot 14 DP1098617 A200B Princes Highway Broughton
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located on the east side of the current Princes Highway, 25 metres west of the intersection with Tindalls Lane. It is situated on the crest of a low but prominent spurline which forms the watershed between Broughton Mill and Broughton Creeks.
Description/fabric:	An indistinct earthen road platform, around eight metres wide, consisting of an angled alignment or corner (150°), with a net length of approximately 150 m. The remnant has been truncated by the current highway easement at both ends. The platform is discontinuously defined by low relief traces of shallow ditches and embankments. Dense grass cover prevented an assessment of any surviving road surface or treatment.
Dimensions:	150 x 25 metres, southern section: 70 metres, 66 degrees (true north), 80 metres, 39 degrees
Physical condition:	The remnant is in poor condition. The remnant is indicated only by low relief and indistinct ground relief. The establishment of pasture grasses and probable ploughing/tilling, has apparently reduced surface relief and removed other potential surface features.
Integrity:	This remnant is indistinct and eroded and has been impacted by subsequent agricultural use. Its remaining features are likely to relate to a mid 1930s highway platform.
Associated features:	Another 1930s remnant of a sharp corner is situated 25 metres to the northeast on the opposite side of the current highway (extending northeast from the Tindalls Lane intersection with the highway (G2BH57).
Current use:	Agricultural pasture grassland.
Heritage listings:	no current listings

Historical background/interpretation:

This highway section was bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s. The sixth edition of the parish map for Broughton (1916, cancelled 1938) notes that this road remnant was resumed as severed land in August 1936 (Figure G.41).

Figure G.40 General view, looking E, across the southern portion of the road remnant (foreground), (approximate alignment marked in yellow), .

Figure G.41 Extract from Sixth edition of parish map of Broughton (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901), showing resumption of severed land at G2B H18 (blue circle) in Aug 1936 (map reference note 23)

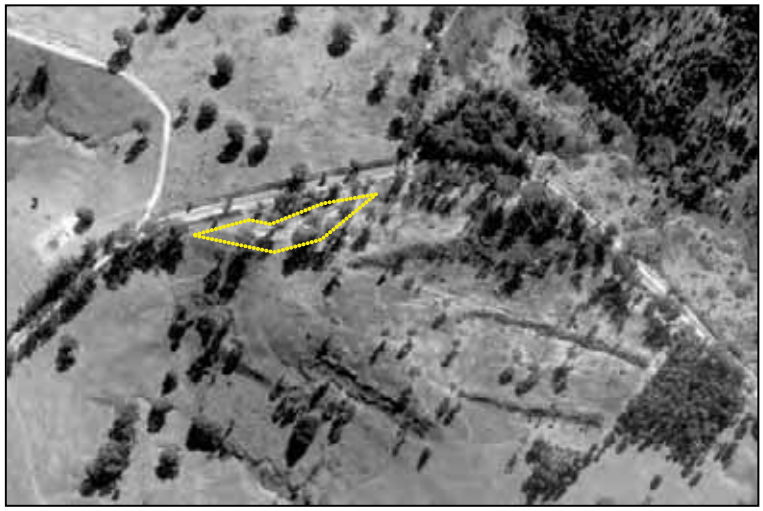


Figure G.42 1958 aerial image of area of road remnant G2B H18 (outlined in yellow) (SHI Dapto-Ulladulla Run GK11 699-5032, 23/07/1958),

Recording ID: G2B H20		**GDA Map Reference:**	**292460.6150870 to 292324.6150850**
Name/Description:	**Remnant section of late 1930s Princes Highway**	*Cadastral Location*: *Street address:*	Lot 4 DP801512 A350 Princes Highway Broughton
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located on the south side of the current Princes Highway, 715 metres east of the intersection with Tindalls Lane. It is situated on the upper slopes and crest of a low spur which is aligned northeast-southwest. The spur forms part of the lower slopes of the southern fall of the Broughton Creek valley.
Description/fabric:	A distinct earthen road platform, around eight metres wide, consisting of an angled alignment or corner (150°), with a net length of approximately 195 m. The remnant has been truncated by the current highway easement at both ends. The platform is discontinuously defined by low relief traces of shallow ditches and embankments. The platform has been used as a farm track since it was bypassed by the current highway alignment. This has involved maintenance and the application of gravels. Dense grass cover prevented an assessment of any surviving road surface or treatment.
Dimensions:	150 x 25 metres, southern section: 70 metres, 66 degrees (true north), 80 metres, 39 degrees
Physical condition:	The remnant is in reasonable condition. The remnant is indicated by more recently applied surface gravels and by low and often indistinct ground relief. The establishment of pasture grasses and probable ploughing/tilling, has apparently reduced surface relief and removed other potential surface features.
Integrity:	This remnant remains distinct but eroded and has been impacted by subsequent agricultural use. The recent construction of a bitumen driveway for an adjacent new homestead development has reused a portion of the platform. The remaining features are likely to relate to a mid 1930s highway platform.
Associated features:	Another 1930s remnant of a sharp corner is situated 50 metres to the northeast on the opposite side of the current highway (G2BH21).
Current use:	Agricultural pasture grassland, and modern driveway.
Heritage listings:	no current listings

Historical background/interpretation:

This highway section was bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s. The seventh edition of the parish map for Broughton (1938 cancelled 1959) notes that this road remnant was resumed as severed land in August 1938 (Figure G.45).

Figure G.43 1958 aerial image of area of road remnant G2B H20 (outlined in yellow) (SHI Dapto-Ulladulla Run GK11 699-5031, 23/07/1958)

Figure G.44 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.45 Extract from Seventh edition of parish map of Broughton (1938, cancelled 1959, Parish Map Preservation Project ID no. 10354001), showing resumption of severed land at G2B H20 (blue circle) in Aug 1938 (map reference note 36)

Recording ID: G2B H21		**GDA Map Reference:**	**292567.6150985 to 292492.6150957**
Name/Description:	**Remnant section of late 1930s Princes Highway**	*Cadastral Location*: *Street address:*	Lot 12 DP1098617 A371 Princes Highway Broughton
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located on the north side of the current Princes Highway, 920 metres east of the intersection with Tindalls Lane. It is situated on the upper slopes and crest of a low spur which is aligned northeast-southwest. The spur forms part of the lower slopes of the northern fall of the Broughton Creek valley.
Description/fabric:	A distinct earthen road platform, aligned in a sharp roughly 90 degree bend, around eight metres wide, and bordered on its upslope side by an excavated, steeply inclined embankment up to three metres high. The net length of the road alignment is 120 metres. The nature of the road surface or pavement is not known due to the degree of leaf litter and spoil that was present at the time of survey. The remnant has been truncated by the current highway easement at both ends. Sapling regrowth and extensive establishment of woody weeds has occurred across the remnant and its immediate area.
Dimensions:	130 x 40 metres: the alignment consists of two continuous lengths: the western section is around 43 metres and aligned 12 degrees (true north), the eastern section is around 78 metres and aligned 94 degrees.
Physical condition:	The ground relief of the remnant remains distinct, though the embankment has been impacted by collapse and erosion in some places. The platform is obscured by sapling regrowth and woody weeds.
Integrity:	This remnant demonstrates to some degree the construction standards and tolerances of a main road corridor from the first half of the twentieth century. The eroded and revegetated condition of this remnant substantially obscures access and interpretation of these traits. Dumping of spoil and excavation associated with the modern adjacent highway, has impacted the southern margin of the site.
Associated features:	A 1930s remnant of a less sharp corner (previously continuous with G2B H21) is situated 50 metres to the southwest on the opposite side of the current highway.
Current use:	Rough bush grazing.
Heritage listings:	Included within property definition for Glenvale homestead on Shoalhaven LEP (as amended) Schedule 7, but not specifically identified.

Historical background/interpretation:

This highway section was presumably bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s, at the same time as the bypass of G2B H20 (c1936). The seventh edition of the parish map for Broughton (1938, cancelled 1959) does not show this remnant or indicate its severance (Figure G.45). The earlier carriageway is however shown on the previous edition along with an indicative upgraded alignment (Figure G.48).

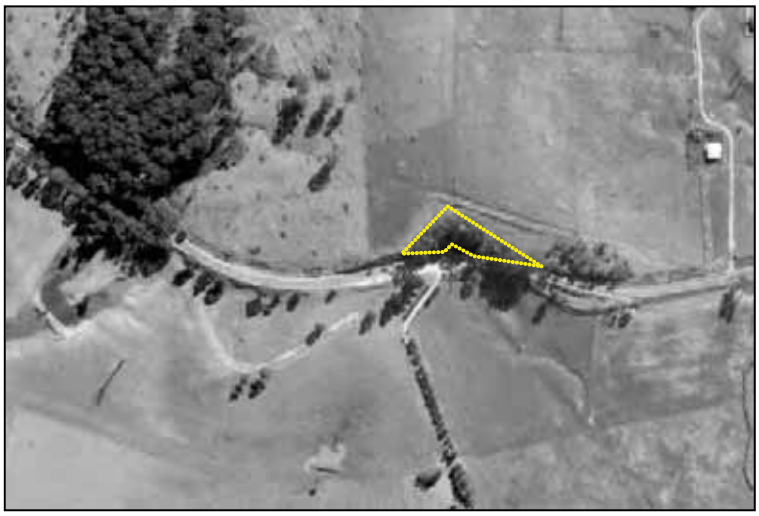


Figure G.46 1958 aerial image of area of road remnant G2B H21 (outlined in yellow) (SHI Dapto-Ulladulla Run GK11 699-5031, 23/07/1958)

Figure G.47 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.48 Extract from Sixth edition of parish map of Broughton showing the G2B H21 portion of highway (blue circle) and an adjacent upgraded alignment (reference note 24, resumed and gazetted public road Dec 1936 (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901)

Figure G.49 View of the G2B H21 platform and cutting looking N from the western end of the remnant. Note thick understory growth and sapling regrowth.

Recording ID: G2B H24		**GDA Map Reference:**	**to 293535.6151482 293405.6151406**
Name/Description:	**Remnant section of 1930s Princes Highway**	*Cadastral Location*: *Street address:*	Princes Highway easement - Broughton
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located on the south side of the current Princes Highway, 1.9km east of the intersection with Tindalls Lane. It is situated on the upper slopes and crest of a low spur which is aligned northwest-southeast. The spur forms part of the lower slopes of the northern fall of the Broughton Creek valley.
Description/fabric:	This site consists of the alignment of the former highway which forms a long loop, following the contour around the crest of the spur. The net length of the remnant was 210 metres. The original level and road platform and is now obscured by fill which has been levelled across the area circumscribed by the former road loop. The nature of the road surface or pavement is not known. The remnant has been truncated by the current highway easement at both ends. The area is currently used for the storage and sorting of road works spoil.
Dimensions:	180 x 30 metres
Physical condition:	There is little evidence of the original road platform or associated earth works. The majority of the alignment and the adjacent upslope area has been filled and levelled for use a materials storage area.
Integrity:	This site has little integrity.
Associated features:	-
Current use:	Road side maintenance materials storage and sorting area.
Heritage listings:	No current listings

Historical background/interpretation:

This highway section was bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s (Figure G.52).

Figure G.50 1958 aerial image of area of road remnant G2B H24 (outlined in yellow) (SHI Dapto-Ulladulla Run GK10 697-5105, 10/07/1958)

Figure G.51 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.52 Extract from Sixth edition of parish map of Broughton showing the G2B H24 portion of highway (blue circle) and an adjacent upgraded alignment (reference note 24, resumed and gazetted public road Dec 1936 (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901)

Figure G.53 View of the G2B H24 area, looking SW, note filling and levelling across site

Recording ID: G2B H26		**GDA Map Reference:**	**293839.6151602 to 293836.6151654 to 293701.6151821 to 293775.6151840 to 293835.6151882 to 293982.61521937 to 294008.6151962**
Name/Description:	**Remnant section of 1930s Princes Highway ("Bink's Corner")**	*Cadastral Location*:	Lot 1 DP450081
		Street address:	A540 Princes Highway Broughton Village
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting: Road remnant is situated at the southern margin of Broughton Village and traverses the northeast facing slopes of a prominent spurline and the southwest and southeast facing basal slopes of a minor spur. The road platform crosses a minor creekline at its northern end, and a larger creek between the two spurs. The spurs are aligned northwest – southeast and form part of the lower northern fall of the Broughton Creek valley. The remnant is situated to the west of the current highway, adjacent to a section known locally as "the big dipper"

Description/fabric: This site consists of a remnant road platform which descends into and climbs out of a small valley via slope traverses angled obliquely across the contours. The net length of remaining alignment is around 612 metres. The overall alignment forms a sharp 'V' pointing up valley (west), with a tightly rounded corner turning 60 degrees. During the active use of this alignment as the Princes Highway, this corner was known as "Bink's Corner", after the family which owned (and still own) the property. The platform is easily discerned and variously recessed, cut and benched across the slopes. Side ditching is present in places. It is not known if culverts are associated with the creek crossings. The nature and condition of any surviving road surface is not known. The remnant is truncated at both ends by the current highway.

The platform continued to be used as a farm track following its resumption in 1936. The northern road portion, north of the larger creek crossing, is now overgrown and the southern portion, although clear, is no longer favoured as a through-track.

Dimensions: The area within which the remnant occurs covers approximately 430 x 195 metres. The width of the platform ranges from between 6 and 8 metres. The maximum width of platform and side earthworks (ditches, embankments etc) is around 16 metres. The alignment of the remnant platform can be simplified into the following intervals (south to north):

52 metres, 25° (grid north)
216 metres, 358°
83 metres, 79°
75 metres, 55°
55 metres, 71°
41 metre, 41°

Physical condition: This remnant is in relatively good condition, with the ground relief of the platform, and associated cuttings, ditches and embankments still clearly evident. There is some sapling regrowth across the platform in the northern section, and there may have been erosion of the platform in the area of the creek crossings. A number of current or former fence lines cross the platform.

Integrity:	This remnant does not appear to have been significantly modified since its resumption, or as a result of low key use as a farm track. Its form and character relate to the tolerances and maintenance of a 1930s active highway. The remnant follows that of a surveyed line which dates from the 1870s to 1880s.
Associated features:	A remnant of the earlier Berry Estate road (G2B H27), constructed in 1856 and which was replaced by this road, crosses this alignment twice and occurs in close association with it. The G2B H26 highway remnant forms part of a complex of recordings which, as a group, have value in understanding and interpreting the evolution of the highway, its various alignments, and its interrelation with adjoining land holdings and homesteads. These recordings are: • G2B H27 remnant section of 1856 Berry Estate Road • G2B H26 remnant section of 1870s – 1930s Highway ("Binks Corner") • G2B H25 *Sedgeford* homestead
Current use:	Agricultural pasture grassland
Heritage listings:	no current listings

Historical background/interpretation:

Based on County and parish mapping, this remnant follows a highway alignment which became established in the 1870s or 1880s and replaced the 1856 Berry Estate road. It was bypassed in 1936.

Bink's Corner was the location of a fatal car accident in 1935, one year prior to its upgrade. David Mahlon Cowlishaw, 20, son of Dr. and Mrs Leslie Cowlishaw of Lindfield, was killed on the 28 January 1935, when his car overturned at Bink's corner. "The car had just passed the property of Mr A.N. Binks, MLC, when it swerved and overturned. It rolled over and finally came to a standstill with its four wheels in the air". The press report of the incident paper noted that "The scene of the accident is a recognised danger spot" (Sydney Morning Herald 30 January 1935, p14).

At the subsequent inquest the Coroner, Mr Reuben King, found that

> "the accident was due to the rough and dangerous turn there, and that the danger attached to the turn as not and is not sufficiently indicated by the authorities in charge of the section of the Princes Highway".

Dr Cowlishaw stated at the inquest that

> "There is no warning to an approaching driver that it is a danger spot… The white stones are neglected and covered with dust… I would like the attention of those in charge of the road to be directed to its state. It cannot do my boy any good now, but may prevent loss of life to others if it is remedied".

Constable A.W. Wright stated that

> "the only warning to motorists was big stones at the edge of the curve, but they were dust covered and overgrown with weeds and grass and could not be seen on a dark night. His predecessor, Constable Brogan, had crashed at the spot, and was off duty two months" (Sydney Moring Herald 4 February 1935, p9).

It seems likely that the upgrade of the highway the following year may well have been prompted, or was at least strongly supported by the Coroners findings. This event and its location, are representative of several dominant themes in the development of the highway – the interplay between resourcing road maintenance and the safety of its users, the interrelation between highway design and need to increase user safety, and the pressure created by fatal accidents to upgrade the highway.

Figure G.54 View, looking NW from the upgrade alignment towards G2B H26 road remnant (yellow dotted line), Berry Estate road (G2B H27) in blue)

Figure G.55 View of northern portion of road remnant (approx. alignment marked in yellow), looking N

Figure G.56 View looking SW, showing well benched platform in right foreground and more distant alignment on southern side of valley (mid distance) (approx. alignment marked in yellow)

Figure G.57 Road remnant visible on 1958 aerial photo (outlined in yellow), The alignment of the earlier Berry Estate road is shown in blue (NSW 699-5028, SH.I Dapto-Ulladulla Run GK11 23/07/58)

Figure G.58 Aerial image showing road remnant (outlined in yellow) in 2006. The alignment of the earlier Berry Estate road is shown in blue (Google Earth Pro 2011)

Figure G.59 Extract from 1890s map of the northern Berry Estate, showing the remnant alignment (blue line) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

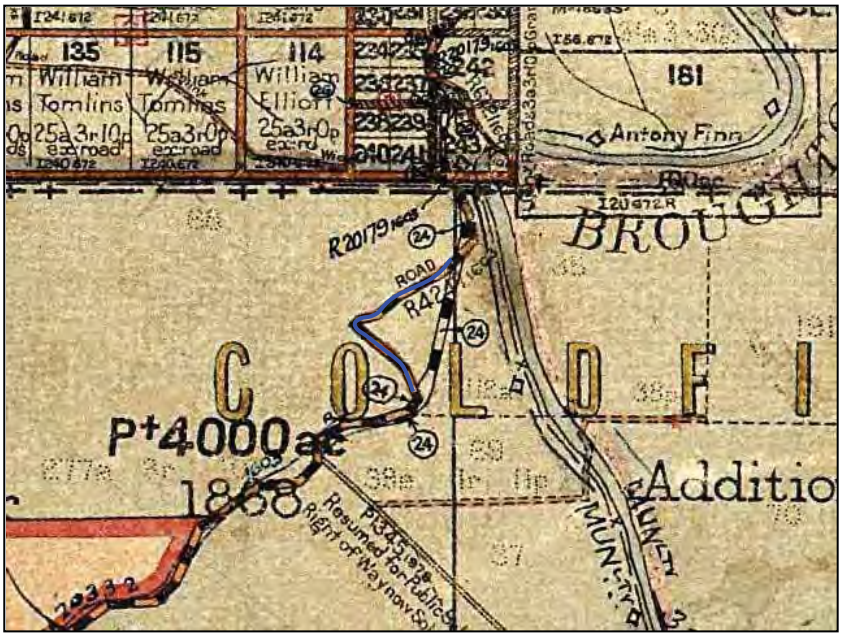


Figure G.60 Extract from Sixth edition of parish map of Broughton showing the G2B H26 portion of highway (blue line), (reference note 24, resumed and gazetted public road Dec 1936 (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901)

Figure G.61 "Binks Corner - old abandoned roadway 1937". This photo was taken looking SW and downslope towards the main creek crossing. (State Library of NSW d1_27130r)

Recording ID: G2B H57		**GDA Map Reference:**	**291610.6150911 to 291500.6150827**
Name/Description:	**Remnant section of mid 1930s Princes Highway** (**Tindalls Lane Int.)**	*Cadastral Location*: *Street address:*	Lot 14 DP1098617 A200B Princes Highway Broughton
Item/Site Type:	Twentieth Century Highway Remnant		

Context/setting:	This remnant is located on the north side of the current Princes Highway, immediately east of the intersection with Tindalls Lane. It is situated on the north facing, upper slopes of a low but prominent spurline which forms the watershed between Broughton Mill and Broughton Creeks.
Description/fabric:	An overgrown and indistinct earthen road platform, around 6-7 metres wide, consisting of a 'dog leg' angled corner, with a net length of approximately 125 metres. The remnant has been truncated by the current highway easement at both ends, and encroached upon by a turning circle platform on Tindalls Lane (NOHC 2005). The platform is recessed up to 30 centimetres into the ground discontinuously across its length. A low density scatter of mid twentieth century glass and ceramic fragments are associated with the platform. Dense forest litter and grass prevented an assessment of any surviving road surface or treatment.
Dimensions:	90 x 50 metres
Physical condition:	The remnant is in poor condition. The section closest to Tindalls Lane has been encroached upon by the recent construction of a turning bay. Clearance of the eastern gas pipeline easement has also impacted upon another section. Forest regrowth is now obscuring the platform and its edges.
Integrity:	This remnant is indistinct and overgrown and has been impacted by subsequent easement construction and road works. Its remaining features are likely to relate to a mid 1930s highway platform.
Associated features:	Another 1930s remnant of a sharp corner is situated 25 metres to the southwest on the opposite side of the current highway (G2BH18).
Current use:	Rough forest grazing.
Heritage listings:	no current listings

Historical background/interpretation:

This highway section was bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s. The sixth edition of the parish map for Broughton (1916, cancelled 1938) notes that this road remnant was resumed as severed land in August 1936 (Figure G.63).

Figure G.62 General view, looking SW, showing edge of recessed remnant road platform (foreground), (approximate alignment marked in yellow) (photo: Dec 2005)

Figure G.63 Extract from Sixth edition of parish map of Broughton (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901), showing resumption of severed land at G2B H57 (blue circle) in Aug 1936 (map reference note 23)

Figure G.64 1958 aerial image of area of road remnant G2B H57 (outlined in yellow – note that outline shows full extent of remnant as of 1958, current remnant has been reduced in size by eastern gas pipeline and turning bay on Tindalls lane) (SHI Dapto-Ulladulla Run GK11 699-5032, 23/07/1958)

G.3 Standing buildings and structures

Recording ID: G2B H10 **GDA Map Reference: 288592.6149727**

Name/Description:	**Cottage**	*Cadastral Location*:	Lot 1 DP22828
		Street address:	72 North St Berry
Item/Site Type:	Early twentieth century cottage		

Context/setting:	This building is situated on an urban lot on the south side of North Street, Berry. The lot is situated immediately southeast of, and opposite, the T-intersection of Rawlings Lane and North Street. The lot is situated on relatively level ground, around 80 metres northeast of Town creek, a small tributary which traverses diagonally across the Berry township area.
Description/fabric:	This is a modified example of a small workers cottage with a central gabled roof, aligned east-west, (parallel to the road), and with adjoining rooms covered by lower pitched roofs on the northern and southern sides. The front room was formerly an open veranda now enclosed. Similarly a skillion roof abutting the eastern side wall may originally have been an open verandah. The rear roof fall may cover both original back rooms and later additions. The house, was probably originally clad with horizontal wooden weatherboards, and has now been re-clad with wide synthetic cladding. The roof is corrugated iron. All visible windows are of modern design and framing.
Dimensions:	The building has approximate dimensions of 10 x 12 metre
Physical condition:	The building is well maintained, but retains few original exterior materials or features. Interior not inspected.
Integrity:	Based on the exterior, this building has undergone considerable renovation and does not display appreciable integrity. Historical aerial photography indicates that this building was moved from an original location and moved to its current position in the 1950s (refer Figure G.69 below).
Associated features:	-
Current use:	Town residence
Heritage listings:	no current listings

Historical background/interpretation:

Inspection of early aerial photography reveals that this building was present at its current location in 1958, but absent nine years previously (Figure G.69). Given that the design of the building is typical of the early twentieth century, and not characteristic of the 1950s it is probable that it pre-dates this time and was moved to this location.

The 1958 aerial image suggests that at this time, there was a garage abutting its western side, and verandas were present along its southern and eastern sides, but absent along the front (Figure G.68).

Recording ID: G2B H10 **Victorian Cottage**

Figure G.65 General view of house, looking SE

Figure G.66 Detail of front of house, looking SE

Figure G.67 Detail of front of house, looking S

Figure G.68 1958 aerial image showing context of G2B H10 (SH.I Dapto-Ulladulla Run GK11 699-503 23/07/1958)

Figure G.69 (above) enlargement of 1949 aerial image showing absence of G2B H10 building at this time (red area) (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949)

Figure G.70 Enlargement of 1958 aerial image shown at top, (area indicated in blue) showing detail of building configuration

Recording ID: G2B H11 **GDA Map Reference: 288638.6149772**

Name/Description:	***GlenDevan***	*Cadastral Location*:	Lot 3 DP206971
		Street address:	77 North St Berry
Item/Site Type:	Federation House		

Context/setting:	This building is situated on a large allotment on the north side of North Street, Berry, 35 metres east of its intersection with Rawlings Rd. The lot is situated on relatively level ground, around 120 metres northeast of Town creek, a small tributary which traverses diagonally across the Berry township area.
Description/fabric:	An asymmetrical Federation style weatherboard house with a mature garden. The house a pyramidal roof, partial verandas around all four sides, two tall chimneys, and perhaps four original rooms (now five excluding former verandas). One front room (to the left of the entrance) projects forward with no veranda and front facing projecting gable. Verandas remain partially open on southern, eastern and northern sides, but are enclosed on N and w sides. Some changes to internal walls and room enlargements appear to have occurred towards the back of the house. A kitchen block (with external chimney) originally separate from house, is now attached at NW end. Some renovations are thought to have been conducted around 1910, based on fittings/windows associated with enclosed verandas. All doors in original building and associated frames are thought to be made of red cedar. A separate shed, (NW of house) was a tractor shed, when Gardner bought the property. It, included a laundry with an old copper.
Dimensions:	The house is approximately 19 x 19 metres in area. The grounds and garden occur within an approximate enclosed area of 55 x 40 metres.
Physical condition:	The house and grounds are in good condition and well maintained. The iron on the roof was replaced around 2004.
Integrity:	The building retains many original features, and an overall Federation character and structure. The additions do not significantly detract from the heritage value of the building, and are evidence of the changing circumstances and needs of the owners.
Associated features:	Grounds and garden
Current use:	Town residence
Heritage listings:	Shoalhaven Heritage Inventory No current statutory listings

Historical background/interpretation:

The following information is provided on the Shoalhaven Heritage Inventory (Shoalhaven City Council).

This house was built prior to 1894 when it is known that Dr Dawson and his family were in residence. Dr Cecil Lacy Dawson arrived in Berry from Pambula in 1894 and set up a surgery in the vacated office of surveyor John Ewing. He had married Mabel Wylde two years previously and they both raised a family of five children at this residence (Mabel b.1893, Mavis b.1896, Cecil b.1904, and twins Gilbert and Joyce b.1905). Dr Dawson died suddenly

on 21 September 1907 aged 44.

Mabel Dawson purchased the property from the Berry Estate on 4 February 1908 (formerly Lot 42 DP4497).

The property was sold to William Henry Shute and his wife Elizabeth and they farmed the land for many years prior to George Miller owning it. There were several tenants of the farm until it was then purchased by Mr and Mrs Arther Belling, themselves former tenants. At that time there was no garden only two flame trees. Mrs Belling sold the property to Mrs Judith Gardner.

The following information was kindly provided by Mrs Judith Gardner (pers. comm.. 18 March 2009).

Judith moved-in in 1989. She purchased the property from Mrs Kath Billings (brought up at Woodhill, now of Nowra).
Mrs Billings planted most of the garden.

Mrs Billings bought the property from George Miller in 1969.

The property was rented (from Miller) by the Gray family for an extended period of time, Sid Ray and his wife raised three children in the house.

Mr Miller bought the property from Mrs Dawson, (possibly a doctor). She is remembered as a cattle breeder and for importing breeds from England. When her husband died she returned to England. A number of articles, between 1907 and 1914, reporting the results of the Berry Agricultural show, mention a Mrs Dawson and a Dr Dawson in relation to prizes for cattle and horse events (c.f. Sydney Moring Herald 5 February 1914, p.5; 14 February 1911, p.6; 2 February 1907).

It is possible that Dawson built the house (others believe that it was built by Janet Bowden's uncle George).

A previous heritage assessment of this site has stated the age of its construction to be around 1894 when it formed part of the Berry Estate. It was considered to have historical significance at a local level as a representative example of accommodation constructed late in the history of the Estate (Conybeare Morrison & Partners 1999:27, refer also Peter Freeman Pty Ltd 1998).

Figure G.71 General view of front of *GlenDevan* Cottage, looking N

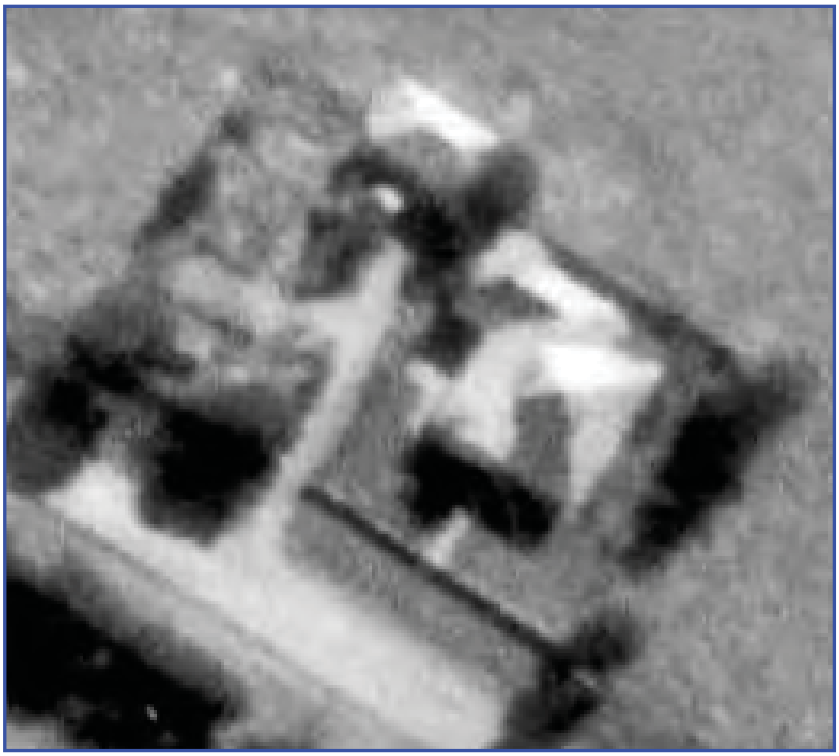
Figure G.72 Front view of *GlenDevan* Cottage, looking NE

Figure G.73 Detail of front of building, looking N

Figure G.74 1958 aerial image showing context of G2B H11 (SH.I Dapto-Ulladulla Run GK11 699-5038 23/07/1958)

Figure G.75 (above) enlargement of 1949 aerial image showing G2B H11 (red area) (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949)

Figure G.76 Enlargement of 1958 aerial image shown at top, (area indicated in blue) showing detail of building configuration



Recording ID: G2B H13 **GDA Map Reference: 289329.6149710**

Name/Description:	**Burnett Estate Overseer's Cottage**	*Cadastral Location*: *Street address:*	Lot 1 DP 973922 143 North St Berry
Item/Site Type:	Early twentieth century cottage		

Context/setting:	The cottage is situated on a large allotment on the north side of North Street, Berry, 410 metres east of its intersection with Woodhill Mountain Road. The cottage has been built on level ground around 140 metres south of Bundewallah Creek.
Description/fabric:	A basic and small, timber frame and horizontal weatherboard cottage, with a central gabled roof, aligned east-west, (parallel to the road). Adjoining rear rooms are covered by a lower pitched roof. A front veranda on the south side of the building, has been enclosed with weatherboarding and a continuous upper wall of eight window panels. Corrugated iron roof. Two slanting wooden frame and corrugated iron awnings are evident over windows on the west side of the building. (Interior not inspected).
Dimensions:	Cottage is approximately 12 x 6 metres.
Physical condition:	Good
Integrity:	Generally (apparently) in original condition except for the enclosure of the verandah.
Associated features:	-
Current use:	Private residence
Heritage listings:	Shoalhaven Heritage Inventory
	No current statutory listings

Historical background/interpretation:

The Shoalhaven Heritage Inventory includes the following information on this building (Shoalhaven Heritage Inventory – Shoalhaven City Council):

This land, formerly Lot 44, (together with Lots 41, 43 and 46, DP4497) was purchased from the Berry Estate in 1912 by Lady Alice Carruthers, wife of Sir Joseph Carruthers, KCMG, a solicitor of Sydney, and her sister Rhoda Burnett. Combined with other purchases by Alexander and Jane Maria Burnett (Lots 38, 39, 40, 45, 47 & 50, DP4497), these lands formed the Burnett family estate (Figure G.80). It appears probable that the G2B H13 cottage was constructed as an overseer's residence for the estate, around 1917. It was located 220 metres west of the main homestead, which was located where the tennis courts are now (Figure G.79).

From 1914 to 1921 the McGee family managed the Burnett property. They milked 80 cows of mixed varieties. There was an orchard with loquats and apples. Burnett visited regularly to pay the family and check the property. He paid Mr McGee six pounds per week out of which the two sons received 10/- each.

In 1946 a Mr Conway and his daughter Marcia were occupying the cottage. In June 1961, Eric Standen, a general carrier of Gerringong owned the property. In March of 1967 Henry (Harry) William Auld and his wife Phyllis (Mavis) purchased the property.

Figure G.77 General view of cottage looking NE

Figure G.78 Cottage looking N

Figure G.79 Comparison of 1958 and 2006 aerial images (SH.I Dapto-Ulladulla Run GK11 699-5038 23/07/1958; and Google Earth Pro 2011)

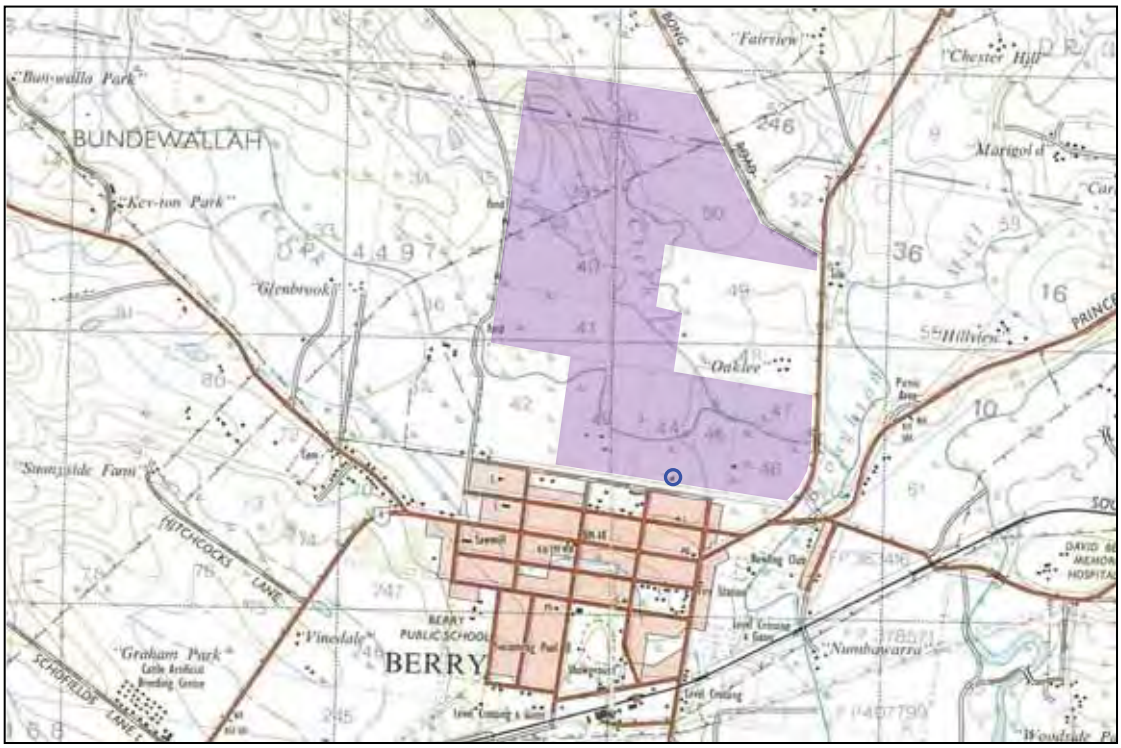


Figure G.80 Property holdings (purple) of the Burnett family (including Carruthers, nee Burnett). G2B H13 Cottage indicated by blue circle (information from Shoalhaven Heritage Inventory, base map: Berry 1:25,000 1st Ed, CMA 1970)

Recording ID: G2B H16 **GDA Map Reference: 290103.6149797**

Name/Description:	***Mananga* homestead complex Former Berry Estate Manager's Residence**	*Cadastral Location*:	Lot 101 DP1057897
		Street address:	A40 Princes Highway Berry
Item/Site Type:	Federation Queen Anne style homestead, associated outbuildings and grounds		

Context/setting: The homestead and attached land is situated on the crest and eastern fall of a low but locally prominent spurline shoulder which forms the watershed between the Broughton Creek to the east, and Broughton Mill Creek to the west. The homestead is situated 80 metres to the east of Broughton Mill Creek and is elevated approximately eight metres above the surrounding valley floor.

Description/fabric: Federation Queen Anne style weatherboard homestead – complex corrugated iron roof with decorative timberwork to gables (with Art Nouveau character), hipped skillion verandah returning to sides, timber posts and brackets. Verandas appear to have originally surrounded an original core building. An addition wing has been added to the north eastern corner of the building, sometime prior to 1949. A conservatory has been relatively recently added to the eastern side of the building.

The building is surrounded by a mature garden.

The homestead building is thought to be designed by noted Sydney architect Howard Joseland (1860-1930) (Peter Freeman Pty Ltd 1998).

The current property holding includes five outbuildings to the south of the current homestead, including a concrete silo, associated large iron sheds and disused milking bails. Eight outbuilding structures are visible on the 1958 aerial photo (Figures 6.91). Non-captioned photos in the Shoalhaven Heritage Inventory appear to show interior rendered walls (and/or ceilings) within an outbuilding, constructed using sawn timber studs filled in using multiple timber slats with applied plaster or render.

At the southern end of the property there are landform traces of the excavated trench through the spurline (now filled in for the Princes highway platform) which formed part of the infrastructure for the water race for the Berry Estate saw mill which dates from the 1830s. Immediately north of the race alignment is the location of the original Mananga homestead or cottage. This site is associated with some exotic plantings and mature trees. This site, together with the infilled mill race should be considered and managed as archaeological deposits.

Dimensions: Original building had approximate dimensions 24 x 18 metres. The additional wing on NE corner has approximate dimensions: 15 x 11 metre.

The current property attached with the homestead is approximately 250 x 118 metres in cross dimensions.

Physical condition: The homestead is in excellent and well maintained condition

The outbuildings appear to be in varying modes of low intensity use, storage or abandonment. There are corresponding states of condition ranging from good to poor.

Integrity:	Despite a latter additional wing to the north eastern corner, and recent addition of a conservatory adjacent to the eastern veranda, this homestead retains a high degree of integrity to its original period of construction. The interiors have been sensitively restored for use as holiday accommodation.
Associated features:	The Mananga homestead complex and attached property, forms an integral part of a suite of structures, features and archaeological deposits which constitute the remains of the focus of the Broughton Creek village (late renamed Berry) from the 1860s to the 1890s. Included in this suite are: • the Pulman Street Conservation area (situated mostly south of the intersection of Pulman St and the Princes Highway). • Constables Cottage. • Princes highway remnant (G2B H15) immediately adjacent to *Mananga*. • Remains of the Berry Estate saw mill water race (and associated mill and tannery sites). • Archaeological deposit (G2B H14) (adjacent to *Mananga*) comprising traces of former town structures on the west of the original highway alignment. • Remnant of Berry Estate Road (G2B H55), 120 metres north of the homestead.
Current use:	Private residence leased for holiday accommodation
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7 Royal Australian Institute of Architects 20th Century Register of Significant Buildings (no. 47022656) Shoalhaven Heritage Inventory

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Historical background/interpretation:

Mananga is reported to be an Aboriginal word meaning “by the water” (Shoalhaven Heritage Inventory).

The original 'Mananga Cottage' an Estate building, was built for William Stewart. William was an acquaintance of David Berry in Scotland and although, at first, settling further south of Berry, was enticed to come to Berry and help control the large David Berry Estate. Alexander Berry appointed William Stewart the first Commissioner of Peace for the district of Broughton on 8th April 1867.

William's brother, Donald Stewart, had arrived in Australia and went prospecting at the gold fields. Later he returned to Berry and became the first Post Master of Berry in 1861, the Post Office being at the Old Mananga Cottage. Upon the death of Donald in 1876, the post office moved to James Wilson’s store nearby on the intersection of the main road with Pulman Street (Lidbetter 1993).

John Stewart, son of William, came to Australia at the age of 19 years after finishing his studies in Scotland. He purchased the Mananga land following the break-up of the Berry Estate following the death of David Berry. It was John Stewart who built the existing "Mananga Homestead" in 1894. John was the first registered auctioneer in NSW and his office remains evident within the Homestead building. The firm of Stewart and Morton was formed in 1880 and operated till 1960 (http://www.stayz.com.au/31300)

Together with his father, William, John was involved in the formation of the Municipality of Broughton Creek and Bomaderry, the establishment of the local Agricultural Society, and the School of Arts.

John married Isabella Bryen and raised a family of six children, living first at the original homestead, and subsequently in the current homestead following 1894.

The Mananga homestead remained in the ownership of the Stewart family until 1992 (Lidbetter 1993).

The current *Mananga* homestead is thought to have been designed by Howard Joseland who designed many Federation buildings on the Berry Estate between 1883 and the early 1900s. This is supported by the resemblance of the timber featuring to similar elements on Bomaderry residences Greenleaves (1895) and Lynburn (1896), both designed by Joseland for the Berry Estate (Shoalhaven Heritage Inventory).

Joseland first worked for the Berry Estates in 1892, and married Blanche Augusta Hay at Coolangatta in 1897 (Chisholm 2011). Blanche was a half sister to John Hay (Sydney Morning Herald 12 Aug 1909 p8). John Hay (later Sir John Hay) was David Berry's first cousin once removed, and moved to Coolangatta in David Berry's declining years (he was born at Coolangatta) (Antill 1982). Upon David's death in 1889 John and his half brother took over the management of the estate. One third of the estate including Coolangatta was left to John, however as an executor (along with James Norton) he would eventually sell the land to meet the bequests of the will (Lidbetter 1993, Stephen 1969).

Figure G.81 *Mananga* and ground, looking NE (Photo: http://www.stayz.com.au/31300)

Figure G.82 *Mananga* looking NE (Photo: http://www.stayz.com.au/31300)

Figure G.83 Early photo of *Mananga* looking SE, possibly 1930s or 40s (Photo: courtesy of Royal Australian Institute of Architects Listing 4702265 Neg. no. SC336/1))

Figure G.84 View looking SE showing extension to NE corner of original building (Photo: http://www.stayz.com.au/31300)

Figure G.85 Internal view of a restored room in *Mananga* (Photo: http://www.stayz.com.au/31300)

Figure G.86 Detail of roadside boundary fence and entrance, looking E

Figure G.87 General view of the elevated spurline context of the *Mananga* homestead, looking NW from the creek flats of Broughton Creek and the railway (foreground)

Figure G.88 1999 image of the *Mananga* outbuildings and silo, looking S, (from Shoalhaven Heritage Inventory = Shoalhaven City Council)

Figure G.89 View of the 'old bails', the southernmost remaining outbuilding in the Mananga homestead complex, looking SE

Figure G.90 1949 aerial image, showing *Mananga* (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949)

Figure G.91 1958 aerial image showing *Mananga* (SH.I Dapto-Ulladulla Run GK11 699-5036 23/07/1958)

Figure G.92 Aerial image (2006) showing *Mananga* (Google Earth Pro 2011)

Figure G.93 View of spurline on which the current Mananga property is located, looking northwest.

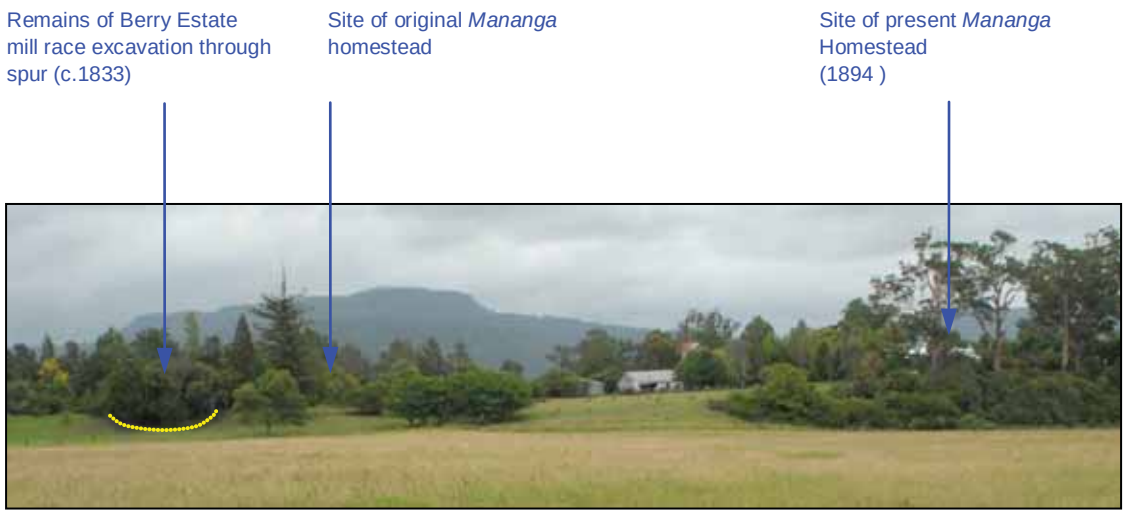

Figure G.94 Extract from 1890 survey map for the Kiama to Nowra railway, showing original *Mananga* homestead buildings (blue circle), also note Tannery buildings (Votes and Proceedings of the Legislative Assembly of NSW, 1890 session, Vol 6. Report of the Standing Committee on Public Works on the Kiama to Nowra Railway)

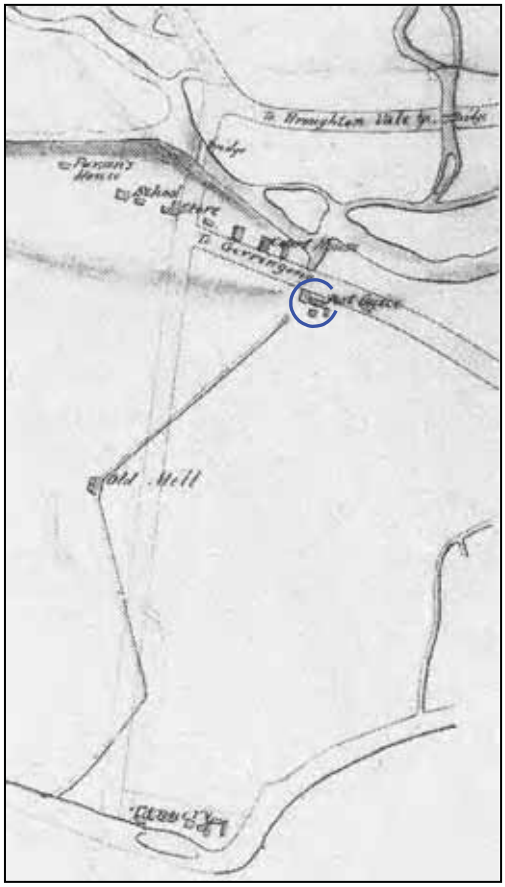

Figure G.95 Extract from early map of Broughton Creek Village area, probably 1870s, showing the original *Mananga* homestead (blue circle) as the Broughton Creek Post Office, and the alignment of the mill race and highway crossing adjacent to the homestead (Berry Museum n.d.: 15)

Recording ID: G2B H17		**GDA Map Reference:**	**290542.6150237**
Name/Description:	***Hillview* homestead** **Former Berry Estate Tenant Farm**	*Cadastral Location*: *Street address:*	Lot 31 DP840646 A111 Princes Highway Berry
Item/Site Type:	Nineteenth Century Homestead		

Context/setting: This homestead is situated on the north facing mid slopes of a prominent spurline which forms the watershed between the Broughton and Broughton Mill Creeks. The homestead is located 210 metres south of Broughton Mill Creek, and 52 metre north of the current Princes Highway.

Description/fabric: Vertical (sawn) slab homestead with hipped roof (corrugated iron) and five original rooms on an 'L' shaped plan with kitchen forming back wing. A lounge room (horizontal weatherboard) has been added to the NW corner of the kitchen, sometime prior to 1958. Other features include:

- Original verandas on SE and SW side of house, and eastern side of kitchen wing. West and east facing verandas have been infilled using (synthetic?) wide horizontal cladding, with aluminium framed windows. This treatment replaced an earlier partial infilling on the western veranda (refer Figure G.98).
- Vertical wall slabs have been sawn using a circular saw (Figure G.102).
- Exposed timber framing around external and internal doors, and some windows, with verticals extending to ceiling. The residents note that these timbers are made of hard wood and very hard.
- One original brick chimney on a formerly external wall of the kitchen, now enclosed by lounge addition (Figure G.105). An additional hearth and chimney is located on the west wall of the lounge addition.
- Central NW=SE aligned hall, extends at N end onto verandah along E wall of kitchen (Figure G.104).
- Small skillion roofed addition (horizontal weatherboards) to N end of lounge, on separate and lower level (Figure G.101).
- Rough sandstone wall foundations under original building, and stone pillars used under the lounge room addition (Figures 6.106 and 6.107).
- Two fig trees have been planted on the western side of the homestead and are now large and mature. They may date to the nineteenth century (Figures G.108 & G.116).
- A number of post 1960 plantings, including an Oak tree, are present between the homestead and the current highway. Although not part of the significant fabric of this site, these plants were planted by the late wife of the current owner and have great sentimental value.

- Many of the external windows appear to be too young for the building, and may have been replaced with their present wooden frame, single pane sash windows (some have two panes in the upper sash). This renovation may date to the 1920s or 30s, possibly at the same time as the addition of the lounge room. Two 2x6pane sash windows survive, one on the kitchen exterior wall, and one on a former western exterior wall now behind an enclosed verandah.

Outbuildings include a number of timber frame and corrugated iron sheds and a concrete silo. The largest and downslope shed is reported to have been disassembled and moved from Port Kembla where it had been used for processing immigrant workers after the war (pers. comm.. Keith Bowden 24/08/2011).

Dimensions: Original homestead 'L' configuration approximately 12.5 x 16.5 metres; with later additions, approximate maximum dimensions: 21 x 16 metres.

Physical condition: Very good and well maintained condition

Integrity: Despite replacement of many windows, the addition of a lounge room, and infilling of verandas the homestead retains its original configuration, basic structure, framing, and exterior slabs and weather bands. Many original details remain.

Associated features: -

*Current use:*Private residence and farmhouse

*Heritage listings:*no current listings

Historical background/interpretation:

An 1890s map of the northern portion of the Berry Estate (probably 1892, refer Graham 1998) shows a T. Courtney as the tenant farmer in residence. Four buildings in a diamond configuration are shown on the map, in the location of the current homestead complex (Figure G.114).

Based on similarities with the *Glenvale* homestead (G2B H45), notably the 'L' configuration of the homestead (a consequence of an adjoining rear kitchen wing), and similar (sawn) vertical slab walls it can be speculated that *Hillview* homestead is of a similar age, or possibly a little later - ie the 1860s or a little later.

The following information on some of the previous owners was kindly provided by the current owner Mr Keith Bowden (pers. comm. 17/02/2009 & 24/08/2011):

- The earliest owner known to him was Mick Keller, he was a "hoppy leg" fella, with a limp in one leg.
- Noel and Colin Cook, owned the first black and white heard of cows. Colin moved to Shellharbour around 60 years ago.
- Allan Blinkensopp.
- Mrs Birdsall bought the property off the Cooks (she was a McIntosh).
- Richardson from Albion Park (owned the property for only a short period of time, 3 to 4 months)
- Barma and Jessup.
- Keith Bowden bought the property off McIntosh 36 years ago (c.1975).
- The largest and downslope shed is reported to have been disassembled and moved from Port Kembla where it had been used for processing immigrant workers after the war.

Figure G.96 General context view of *Hillview* homestead group, looking SW

Figure G.97 View of *Hillview* homestead group, looking NE

Figure G.98 1959 photo of *Hillview* homestead group, looking NE , enlarged area shown in blue) (National Library of Australia photographer R.Reeves pic-vn4590232)

Figure G.99 View of western side of the *Hillview* homestead, looking NE

Figure G.100 View of eastern front corner and verandah of original homestead building

Figure G.101 View of back (northwest facing) portion of homestead, showing veranda infill and skillion additions, looking S

Figure G.102 Ceiling boards and exposed timber frame joinery and vertical slabs on wall and around four pane window (room over back stairway)

Enhanced detail showing circular saw marks on wall slabs

Figure G.103 Typical internal detail of exposed wall framing above door in central hall

Figure G.104 View along central hall toward front door, showing exposed framing around doors

Figure G.105 Internal view of kitchen wing, looking NW, note large kitchen hearth and chimney, Keith Bowden at table

Figure G.106 Rough sandstone wall foundations under original portion of homestead

Figure G.107 Sandstone pillars supporting later northwestern addition to homestead

Figure G.108 Detail of large fig trees planted along western side of homestead

Figure G.109 Context view of rear outbuildings, looking SE near Broughton Mill Creek bank

Figure G.110 Front of downslope shed, built using components from a Port Kembla shed used for processing immigrant workers

Figure G.111 Detail of internal wooden frame in downslope shed

Figure G.112 View of king truss used to support roof in downslope shed

Figure G.113 View of reused vertical wooden slabs and sawn horizontal boards within a smaller shed adjacent to the large downslope shed

Figure G.114 Extract from 1890s map of the northern Berry Estate, showing four buildings at the location of *Hillview* (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.115 Detail of 1958 aerial photo showing original 'L' configuration of homestead with addition of lounge room on northwestern corner

Figure 6.116 Extracts from 1958 and 2006 aerial photography showing little change in the number and configuration of buildings. Apart from the two fig trees, the garden development largely post dates 1960 (SH.I Dapto-Ulladulla Run GK11 699-5035 23/07/1958; Google Earth Pro 2006)

Recording ID: G2B H25 **GDA Map Reference: 293762.6151623**

Name/Description:	***Sedgeford* homestead and grounds**	*Cadastral Location*:	Lot 1 DP 593476
		Street address:	A495 Princes Highway, Broughton Village
Item/Site Type:	Early twentieth century homestead and garden		

Context/setting: Homestead and garden are located on the crest of a prominent spurline situated at the southern end of Broughton Village. The current Princes Highway forms the southern boundary of the item. A disused, pre 1936 highway alignment (G2B H26) forms the eastern boundary, and former 'front' of the property and garden.

Description/fabric: Federation weatherboard homestead, built 1902, sandstone footings, original home had veranda on three sides of house, verandas subsequently filled in on northern (side) and western (rear) sides.

One double fire place located on internal wall between north facing rooms.

Room walls originally had hessian lining with wall paper over the hessian.

Originally five bedrooms.

Hall includes original ceiling and wall.

Internal walls either use sawn vertical boards (approx. one foot wide), or horizontal boards (approx. seven inches wide).

All hardwood pit sawn off property.

Cypress or pine floor boards.

Verandas subsequently filled in on northern and western side.

New veranda added to southern side of house.

New Kitchen: sawn wooden frame with fibro cladding.

New back (western) entrance added in last 60 years.

One internal wall (NE front room) and two formerly external walls (northern veranda) removed, additional exterior doors added, esp. on S side of house, new kitchen building added to SW corner.

A separate cottage built in the 1980s uses recycled former building elements from the property, including vertical slabs, originally cut on property, but recycled from a number of previous structures.

Cement dairy building built in 1936.

Homestead is supplied with water from a natural spring located to N of homestead on opposite side of valley.

Garden and grounds include the following mature tree plantings:

- Podocarpus (‘Brown Pine”).
- Jacaranda.
- Araucaria “Norfolk Island Pine”.
- Araucaria “Bunya Pine” (2).
- Casuarina “River Oaks”.
- Grevillia “Silky Oak”.
- Cedrus “Indian Cedar”.
- Oak.
- Maple.
- Brachychiton “Illawarra Flame Tree’.
- Tristania.
- Ficus (five mature trees, at least two types, including “Moreton Bay Fig”).

Dimensions: The original 1902 homestead, associated plantings, grounds and location of former outbuildings occur within an approximate area of 200 x 100 metres

Homestead: approximately 22 x 14 metres

Physical condition: Original homestead is an active home, and in good condition and well maintained.

Garden and grounds in good condition with many original tree plantings providing a high canopy

Integrity: Homestead includes many original features and fabric but has been modified with small additions, infilled verandas, and removal of some internal walls.

Front garden includes original highway frontage and remnant highway alignment (disused from the 1930s)

Associated features: The *Sedgeford* homestead forms part of a complex of recordings which, as a group, have value in understanding and interpreting the evolution of the Princes highway, its various alignments, and its interrelation with adjoining land holdings and homesteads. These recordings are:

- G2B H27 remnant section of 1856 Berry Estate Road.
- G2B H26 remnant section of 1870s – 1930s Highway (“Binks Corner”).
- G2B H52 potential archaeological deposit of former Berry Estate tenant farm.

Current use: residential home

Heritage listings: No current listings

Reportedly previously listed on Shoalhaven LEP Heritage schedule in the 1990s and subsequently unlisted by the Shoalhaven Council in late 2006 (NOHC 2009b & c, AECOM 2009, *South Coast Register* 11 July 2007).

Historical background/interpretation:

Unless referenced otherwise, the following information was provided by Mrs Margaret Binks (born 1928), during interviews on the 18 Aug 2008 (NOHC 2009b & c) and 18 March 2009).

Thomas Binks (1841 – 1926), was born in Sedgeford, Norfolk, England and arrived at Port Kembla in 1860 aged 19. He married Mary Hetherington (1836-1921), born Irvinestown, Fermanagh, Ireland (Cowling no date).

The name, T. Binks, presumably Thomas Binks, is listed on an 1890s map as the tenant farmer of 128 acres of upper catchment slopes, situated 500 metres to the northwest of the Sedgeford homestead (Figure G.120). Following the break-up of the Berry Estate around the turn of the twentieth century, the *Sedgeford* property was taken up by Thomas and Mary who established a dairy farm on approximately 200 acres. Cowling (no date) states that the sale occurred in 1899 and involved 700 [200?] acres and cost 3324 pounds.

The *Sedgeford* home, named after Thomas's birthplace, was constructed in 1902, and built by Sandy Johnston, a local builder. All the timber needed for construction was sourced and pit sawn on site (Cowling no date) and has remained in the same family (occupied by six generations) since that time (SFHS 2003: v.1 p58). The Binks' had eleven children, the eldest son (John ["Josh"], 1866 - 1929) was the father of the husband (Alfred John Devire Binks 1916 -) of the current resident, Mrs Margaret Binks (Margaret Binks, oral history interview August 2008). All of the daughters were married in the front room of the homestead.

Thomas is believed to have travelled to England in 1906 to learn cheese making and subsequently made cheese at Sedgeford, including flavoured cheeses. There was a single cheese room (to the south of the Dairy) which had walls packed with charcoal to assist in maintaining a constant temperature. In addition, there were milk and cream rooms. Cheese production had ceased by the 1940s and the associated buildings had also gone by this time.

Many of the original family made a lasting contribution to the local and wider community. John ('Josh") Binks (1866 – 1929), eldest son of Thomas and Mary, was a prominent local dairyman and cattle breeder, and was a long standing alderman of the Berry Council. He also served as Mayor for a period (SFHS 2003). When he died in 1929 he was described as one of the oldest members of the Agricultural Society, and a past President (Sydney Morning Herald 14 Sep 1929 p18).

Alfred Noble Binks (1873 -1953) another son of Thomas and Mary, was a Member of the NSW Legislative Council from 1932-1934. He also assisted in the founding of the Better Farming League in 1943; was a chairman of directors of the Berry Rural Co-operative Society from 1928 until 1953; director of Dairy Farmers Co-operative Milk Company from 1923; president of South Coast Butter Factories Association; member of Primary Producers Union, president of Illawarra District Council, New South Wales vice president from 1936 until 1943; chairman of Dairy Council (1932); assisted to found the Kiama Animal Health Centre; and was president of the Berry Agricultural and Horticultural Association (Parliament of NSW website).

The original plantings in the property grounds were selected from, and sourced from the Yates catalogue around 1903. One of the grandchildren of Thomas and Mary, lived to be 107 and could remember planting some of the trees when she was 4 years old.

Two former weatherboard houses have been moved from the site and re-positioned on Fern Street, Gerringong. One of these was built for John ("Josh") when he was married. It was located in the NE corner of the homestead grounds. The remains of the hearth are still evident in the grounds.

A homestead of similar age to *Sedgeford*, owned by the brother of an owner of Sedgeford is reportedly situated on an opposite property (pers. comm. John Flett, Shoalhaven City Council, 6 Feb 2008).

The Binks family dairy farm began as a Berry Estate leasehold of 50 acres, which upon the breakup of the Estate was purchased and then added to, with purchases of adjacent blocks, to form a farm of around 196 acres. In the 1970s the majority of the holding was sold off, leaving just the original homestead and grounds on a 5 acre Lot.

A remnant of the original road (prior to the later nineteenth century alignment, located adjacent to the eastern boundary of the homestead grounds), can be seen on the opposite (northern) side of the valley, above the later nineteenth century alignment). Prior to the construction of Sedgeford, it is remembered that this original road passed to the west of homestead site, west of the current Dairy building (a memory of Mrs Binks' husband's father).

The *Sedgeford* homestead and grounds were reportedly withdrawn from consideration for inclusion in the 2007 revision of the Shoalhaven City Council Heritage Schedule due to objections raised by members of the owner's family (pers. comm. John Flett, SCC., 6 Feb 2008). Margaret Binks states that she assisted the Council in registering the property in the 1990's and that it was deregistered late in 2006 (oral history interview August 2008, in NOHC 2009b & c, AECOM 2009). A local newspaper article at the time reported that the withdrawal was because "its listing might inhibit the proposed Princes Highway upgrade between Bomaderry and Gerringong" (South Coast Register July 11 2007).

Figure G.117 A glimpse of the Sedgeford homestead and grounds looking southwest

Figure G.118 The eastern front of the Sedgeford homestead (Cowling no date)

Figure G.119 Floor plan sketches of original and current homestead configurations made by Cowling (no date; additional details added in blue)

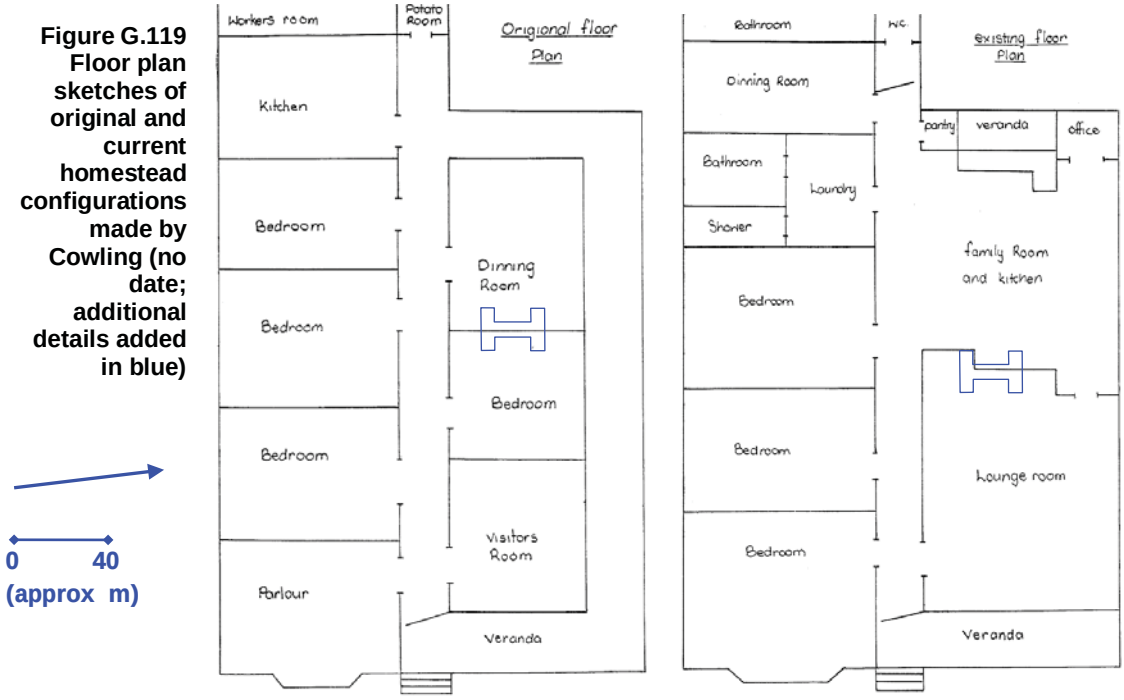

Figure G.120 Extract from 1890s map of the northern Berry Estate, showing the original Binks leasehold farm (top left) and location of 1902 (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.121 Aerial image (2007) of Sedgeford and associated plantings and grounds. Note changes in out-buildings (Google Earth Pro 2011)

Figure G.122 Aerial image of Sedgeford and associated plantings in 1958 (SHI Dapto-Ulladulla 697-5105, Run GK10 10/07/58)

Recording ID: G2B H28		**GDA Map Reference:**	**294107.6151865**
Name/Description:	***Brookside* homestead**	*Cadastral Location*: *Street address:*	Part Lot 1 DP 919179 A540 Princes Highway Broughton Village
Item/Site Type:	Early twentieth century homestead		

Context/setting: Homestead and associated existing and former outbuildings are situated on flats and basal slopes on the west bank of Broughton Creek, in the southern portion of Broughton Village. A small tributary streamline approaches the homestead from the west. The homestead is located on the basal terminal slopes of a low spur between Broughton Creek and the tributary stream. A former orchard was located on creek flats to the south of the homestead.

Description/fabric: This recording consists of a grouping of elements, including existing buildings, former building remains and platforms, any associated archaeological deposits, and traces of a former orchard.

The Brookside homestead building was constructed by combining two salvaged structures from separate and unrelated local sites. Both are wooden frame and horizontal weatherboard clad structures. The front portion of the building, which is identifiable by the north facing veranda and single gable roof aligned northeast – southwest (Figure G.125), was recovered from a homestead site 570 metres to the northeast (G2B H59). This site appears to be the original occupation site for portion 181, a grant of 100 acres to Antony Finn in the 1830s. This structure now consists of three rooms, however the roof structure suggests an original configuration of four rooms (pers. comm. 20/09/2011 Mrs Chittick).

The back portion of the homestead has two parallel gable roofs, aligned at right angles to the front roof line. A side, east facing veranda and brick chimney may have been added when the structure was installed at the current site. The former location of these back buildings prior to relocation is not known but presumed to be local.

Features of the homestead include one brick chimney at SE end of homestead, paling fence around front homestead enclosure, corrugated iron roofs, sandstone foundations.

A recently constructed residential cottage constructed using timber frame and recycled vertical wooden slabs, (possibly from former on-site outbuildings, Figure G.132) is located behind the main homestead, in the location of a similar sized former structure, evident in 1958 aerial photography (Figure G.136).

Two detached weatherboard garages, one adjacent to the homestead, the other closer to the highway (Figure G.130).

One long horizontal weatherboard storage shed (open on one side), which appears to incorporate structural elements and a former dairy (the back wall now partly clad with corrugated iron). A small outbuilding at the W end of the shed houses an *in situ* copper (heating basin) (Figure G.129).

Immediately behind (south of) the storage shed, an elevated former building platform, with cement footings, *in situ* wooden poles, surface drains , and sandstone retaining walls probably constitute the remains of a former dairy complex (Figure G.130).

	A former structure is also indicated by a low earth rectangular platform and low, downslope retaining wall, on elevated basal slopes on the south side of the tributary stream southeast of the homestead (the platform is within SW corner of the defined area of the heritage recording). Remnant paling and four rail wooden fencing survives around the yards and enclosures behind homestead (Figure G.131). The area of a former orchard is evident on the creek flats south of the storage shed. The remains of a water pump, cement slab and small shed are located at the northern edge of the former orchard (Figure G.133).
Dimensions:	The existing buildings and the remains of former structures and yards are present within an approximate area of 150 x 150 metres.
Physical condition:	Homestead is an active home, and in relatively good condition. Some outbuildings are run-down and require maintenance or repair. Some former structures now evident as traces only. Fencing around homestead and yards is dilapidated in places.
Integrity:	The homestead retains an early twentieth century character but has been subject to some modifications, and the current format relates to multiple periods of installation, renovation and maintenance. The identification of original features of the front portion of the homestead, those that may relate to its construction and occupation when located at G2B H59, would need to be the subject of a detailed analysis. Potential original features include parts of the veranda, some windows, the internal frame and some of the weatherboards. Some obvious later additions and changes include, the installation of French doors, brick pillar bases for the veranda posts, and decorative cast iron brackets (interior not inspected). The former Dairy building has been modified considerably, although the separate small building, housing an *in situ* copper, at its western end, appears original.
Associated features:	The homestead*,* original outbuildings, and former building platforms (one at SW corner of defined recording area), all form part of this recording
Current use:	residential home and associated farm buildings
Heritage listings:	no current listings

Historical background/interpretation:

The following information was provided by Mrs Helen Chittick (born 1936), during interviews on the 23 Sep 2008 (NOHC 2009b & c) and 18 Feb and 20 Sep 2009. Additional information was provided by Scott and Stuart Chittick.

The *Brookside* property has been owned by members of the Johnston family since the early twentieth century. The current owner, Mrs Helen Chittick, was born at *Brookside* in 1936, as was her father in 1905. Her grandfather, Gerard Johnston owned the property at the time of her birth. He had previously rented the land from the Berry Estate prior to its purchase by the Johnsons. In the 1890s the lease holder of the approximately 80 acre property appears to have been a T. Connors (Fourth Edition Broughton Parish Map 1890s).

The core of the homestead consists of two earlier nineteenth century structures, which were disassembled and transported from other locations. One was built by Mrs Chittick's great grandfather, another has a connection to the Stewart family. The front section of the homestead originally stood at G2B H59. It was purchased from the Stewarts, dismantled in sections, dragged using horse drawn skids to the present site of "Brookside" and re-assembled in its current position. This portion of the home now consists of three rooms, however on an occasion when an electrician was working in the roof he commented that the structure of the roof suggested that the front room may originally have been made up of two rooms.

The cremated remains of a good friend of the Chittick family, Mr Ray Barter, were scattered and memorialised at a small plot and planted tree, located on the property, some 240 metres upstream of the homestead at the foot of a low escarpment (Figures 6.133 and 6.134). A Buddhist monk performed the ceremony. Ray died on 11/11/1996. Ray used to periodically camp on the creek bank at this location when he was a boy, often with William Chittick (the current owner's late husband). Barter and his wife lived at Heathcote Sydney.

Figure G.123 General view of *Brookside* homestead, looking N

Figure G.124 View of *Brookside* homestead, looking SE

Figure G.125 Detail of front of *Brookside* homestead, looking SW. The front section of the homestead was originally located at G2B H59 and re-constructed at the present site to form *Brookside*.

Figure G.126 Front verandah and yard, looking E, enlarged detail of left hand door (inset)

Figure G.127 Detail of eastern side of homestead, looking S

Figure G.128 Separate garage adjacent to homestead, looking S

Figure G.129 Storage Shed incorporating elements of a former dairy, looking SE

Figure G.130 earth platform behind (south of) storage shed, with cement footings, drains, *in situ* poles and sandstone retaining wall, probably indicative of a former dairy complex, looking E

Figure G.131 remnant four rail fencing behind homestead, looking NE, (new timber cottage in background)

Figure G.132 New timber cottage, with re-used vertical timber slabs, looking SE

Figure G.133 Remains of a water pump and shed at the edge of a former orchard area (behind pump), looking SW

Figure G.134 Memorial tree planting and location of cremated remains of Mr Ray Barter, looking SW. Detail of collar of Mr Barter's dog, who's remains are also here

Figure G.135 Aerial image of Brookside and associated features (ACD15 NSW 3108-197 8/11/92)

Figure G.136 Aerial image(and enlargement) of Brookside and associated features in 1958, note former orchard and pump house south of homestead, out building/cottage(?) behind homestead, and small structure on opposite side of tributary west of the orchard (SHI Dapto-Ulladulla 697-5103, Run GK10 10/07/58)

Recording ID: G2B H29		**GDA Map Reference:**	**294861.6152838**
Name/Description:	**Princes Highway**	*Cadastral Location*:	Princes Highway easement
	Broughton Creek Bridge **(RTA Bridge no.704)**	*Street address:*	Princes Highway Broughton Village
Item/Site Type:	Twentieth century (1935 & 1994) concrete beam bridge		

Context/setting:	Bridge forms the current Princes Highway carriageway and spans Broughton Creek, at Broughton Village. The valley floor is characterised by extensive flats, terraces, drained swamp basins, minor flood channels and adjacent, low gradient, basal slopes.
Description/fabric:	This concrete bridge is a widened structure of three longitudinal beams which are simply supported at the central pier and curve down to frame compositely with the abutment walls. Each span has a cross girder at the pier. Widening of the bridge has been effected by means of attaching cantilever deck to each side of the bridge. These cantilevers are supported by small composite cantilever beams which are tapered upward from the main beam. To assist in distributing the twisting effect of loads outside the main beams coming through the cantilevers, three rows of steel struts per span brace the main beams. The new deck edge supports a kerb and Thriebeam style guard railing (RTA S170 citation). The central pier has two columns which frame into a cross girder which has a wider upper section to accommodate the two simply supported decks. The abutments, of wall type, have been extended to accommodate the new deck width, and gabion box walls have been used to stabilise the abutment fill (RTA S170 citation). The bridge was originally constructed in 1935, and widened in 1994
Dimensions:	Approximately 40 metres long and 15 metres wide
Physical condition:	very good condition
Integrity:	Good. Although widened in 1994 this bridge retains the capacity to demonstrate the key structural and aesthetic characteristics of reinforced concrete beam bridges of the period 1925-48.
Associated features:	Approximately 50 metres south of the bridge, a two cell cast in-situ box culvert services an overflow channel of the stream. This has had its endwalls and wingwalls raised to allow for increased formation width
Current use:	Highway bridge
Heritage listings:	Listed on the RMS s170 Heritage and Conservation Register (item no. 4309596), as an item of local significance with historical, aesthetic and representative values

Historical background/interpretation:

The concrete bridge was constructed in 1935 as part of a bypass of Broughton Village. It replaced a timber truss bridge on the old highway alignment (650 metres upstream), which was probably constructed in the 1890s. In the 1950s the old timber truss bridge was still in use by landowners, as part of the private access routes to their properties. Its demolition occurred subsequent to this time.
This crossing of the Broughton Creek corresponds with a ford location on perhaps the earliest European pathway along the valley floor, shown on a 1860s County map (refer Figures 6.216 and 217).

Figure G.137 General view of bridge from upstream west bank

Figure G.138 General view of central pier, longitudinal beams and cantilever supports for widened deck

Figure G.139 General view of road top and approaches to bridge, looking NE

Figure G.140 Aerial image (2007) of bridge (Google Earth Pro 2011)

Figure G.141 Aerial image of bridge in 1958 prior to widening (SHI Dapto-Ulladulla 697-5101, Run GK10 10/07/58)

Recording ID: G2B H45		**GDA Map Reference:**	**292662.6151257**
Name/Description:	***Glenvale* homestead former Berry Estate Tenant Farm**	*Cadastral Location*: *Street address:*	Lot 12 DP1098617 A371 Princes Highway Broughton
Item/Site Type:	Mid Nineteenth Century Homestead		

Context/setting:	The homestead is located on the floor of a minor and unnamed tributary valley which drains in a south easterly direction into Broughton Creek. The valley forms part of the northern fall of the Broughton Creek catchment. The homestead is situated between two nearby drainage lines, and 700 metres upstream from the confluence with Broughton Creek.
Description/fabric:	Vertical (sawn) slab homestead with hipped roof (corrugated iron) and five original rooms on a revered 'L' shaped plan with kitchen forming back wing. Other features include: • Verandas around all sides of building. Only the front verandah (facing SE) is considered by the owners to be original, the others having been added at a later date. • Two brick chimneys, made of sandstock bricks, rendered and detailed to resemble ashlar, one on eastern side of main front building, and one on eastern wall of kitchen wing. • Symmetrical Victorian Georgian front with central French doors and 2 x 2 sash windows on either side (Shoalhaven Heritage Inventory). • Vertical wall slabs have been sawn using a circular saw. • Central hall with two rooms on either side, kitchen on side wing. • Exposed timber framing around external and internal doors, and windows, with verticals extending to ceiling. • Rafters sit on ceiling joists (rather than a wall top plate). This is a style of construction suited to shingle roofs and went out of style in Sydney in the 1840s but probably persisted in regional areas (pers. comm. Mr Phil Bragg owner, based on inspection of roof space by John Tropman ARAIA 23/09/2011).
Dimensions:	Approximate building dimensions (including verandas): 27 x 30 metres
Physical condition:	Good, some deterioration of timbers evident (detailed inspection not made)
Integrity:	This building appears to have a relatively high degree of integrity. According to the owners, the verandas, on all but the front aspect (SE) have been added. Some fittings such as doors are modern additions or replacements.
Associated features:	Remnant alignments of the 1856 Berry Estate Road occur to the south and southeast of the homestead (G2B H22 & 23).
Current use:	Private residence on active farm.
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7 Shoalhaven Heritage Inventory

Historical background/interpretation:

The construction date for this homestead is thought to be around 1860. This is based on construction techniques, an oral history reference to a woman living at Glenvale in the 1870s and the first documentary record being in 1889 (pers. comm. Mr Phil Bragg, owner 23/09/2011).

The owners have been advised that the construction of the kitchen as an integral wing of the main building (rather than as a separate structure attached by a breezeway), follows a Scottish tradition which allowed better use of the kitchen's warmth. It reportedly is a characteristic of the Berry Estate tenant farms (pers. comm. Mr Phil Bragg, owner 23/09/2011, quoting advice from Mr John Tropman ARAIA).

A 1890s map of the northern portion of the Berry Estate (probably dated 1892, refer Graham 1998), shows a W. Fletcher as the tenant farmer in residence. Five buildings are shown on the map, the existing homestead appears to be shown on the right and a long out-building to the back left (Figure G.145).

William Fletcher presumably went on to purchase the farm. The Shoalhaven Heritage Inventory notes that Fletcher resided here for many years before moving to Jaspers Brush in the late 1890s (Shoalhaven Heritage Inventory).

A William Fletcher (born 1833 Drumadravey, Co. Fermanagh, Ireland) is noted to have arrived in Australia in 1864 on the *Sirrocco*. He married Rebecca Keys in 1867 (registered at Newtown). One daughter Mary Jane was born in 1880 (Berry). He died in 1909 at Jaspers Brush aged 76 (www.rootsweb.ancestry.com /~nswgdhs/12720.htm; SFHS 2003:187).

In 1914, the property became part of the Closer Settlement Promotion Act (1910) as portion 247 (Settlement purchase 14.3) and reverted back to the crown prior to being allotted to Ronald Hollands (5th Ed parish map of Broughton, Parish preservation project ID no. 13803901). The Closer Settlement Promotion Act allowed three to five discharged soldiers to purchase privately owned land under agreement with the vendor with the terms to be approved by the Minister of Lands. Under the 'promotion scheme' the land was subsequently occupied as a 'Settlement Purchase'. The provisions of the Closer Settlement Act 1910 under which many of these soldier settlers applied for land was extended by Section 4C of the Returned Soldiers' Settlement Act 1916.

Hollands did not achieve freehold title. The holding was transferred to Edith Coates in 1922, and then to two brothers Harold and Cyril Couzens in 1927. In 1939 the property was owned by Cyril Ernest Couzens. The property was later leased to Phil Bragg's father, who later purchased it in 1956, three years after Cyril's death (aged 50) (Sydney Morning Herald 17 Aug 1953 p.12). Phil purchased the property from his father in 1979 (pers. comm. Mr Phil Bragg, owner 23/09/2011)

Figure G.142 General view of front of Glenvale homestead in 1999 looking NW (Shoalhaven Heritage Inventory)

Figure G.143 View of southern side of homestead and storage shed, looking SE

Figure G.144 Detail of southern side of homestead, looking NE

Figure G.145 Extract from 1890s map of the northern Berry Estate, showing four buildings at the location of *Glenvale* (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.146 Detail of 1958 aerial photo showing reverse 'L' configuration of homestead

Figure G.147 Extracts from 1958 and 2006 aerial photography showing Glenvale homestead complex and replacement of out-buildings in same arrangement (SH.I Dapto-Ulladulla Run GK11 699-5030 23/07/1958; Google Earth Pro 2011)

Recording ID: G2B H47

GDA Map References
Convent: 288660.6149702
Church: 288688.6149694

Name/Description:	**former St Patrick's Convent, St Patrick's Church, and grounds**	*Cadastral Location*:	Lot 1 DP86897
		Street address:	80 North St Berry

Item/Site Type: Former Roman Catholic Convent (1921) and Interwar (1936) Church and Grounds

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Context/setting: This grouping including the St Patrick's Church, former Convent, and grounds is located on a large square block of around 7.6 hectares which extends between Albert St in the south, and North St to the north. The site is situated on level ground, 50 metres northeast of Town Creek, a small tributary which traverses diagonally across the Berry township area.

Description/fabric: *St Patrick's Convent (constructed 1921)*

The style and form of this building is characteristic of late nineteenth and early twentieth century ecclesiastical architecture throughout the Shoalhaven District (Shoalhaven Heritage Inventory).

Two storied building constructed of fairface brick with tiled hipped roof and gabled projection. The two storey verandah runs along two sides of the building from the gabled projection. Open eaves. Windows overhung sash with single large lights set in openings with brick soldier arches and brick sills. Gable decorated with battened fibre cement panels in similar manner to the detailing employed for the verandah balustrade/frieze.

Mature landscape/garden setting.

St Patrick's Church (constructed 1936)

This building has been described in the following way by George Adams (a Sydney based architect with GM Adams & Associates, who has designed many religious buildings):

> "the building has a Romanesque quality with Gothic Revival style windows. This building would possibly be the finest example of brickwork in the Illawarra... this was the first building in the Illawarra-Shoalhaven to express 'modern' materials with concrete coping and quoins revealed on the outside facade." (in Faherty accessed 2011).

The building features include:

- Small or relatively small windows in comparison to the wall proportions (providing a Romanesque character).
- Gothic arched windows.
- Decorative brickwork above windows and recesses (shaped bricks are used to form hood mouldings over doors and windows, to deflect driving rain running down the face of the building into the window).
- Surface wall patterning created using colour variation in brickwork bond.

	• Concrete coping and quoins revealed on the outside façade.
Dimensions:	Convent: approximately 15 x 10 metres
	Church: approximately 24 x 15 metres
Physical condition:	Both buildings in excellent condition
Integrity:	Convent: Verandas formerly partially enclosed at first and ground floor levels, these additions now removed. Upper storey windows inserted into north facing wall, possibly as part of 2003 renovations. New ground level brick connection in northern wall to new Church centre.
	Church unchanged since construction.
Associated features:	-
Current use:	The former convent building is now part of the Church Centre and made available for Church related conferences, accommodation needs, retreats and functions
Heritage listings:	Both the Church and the Convent building are listed on Shoalhaven LEP 1985 (as amended) Schedule 7
	Both the Church and Convent are included in the Shoalhaven Heritage Inventory

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Historical background/interpretation:

The following outline is sourced primarily from Faherty (2011) and Lidbetter (1993).

The first baptism recorded in the Broughton Creek parish register was in 1862. The following year the first resident Catholic priest arrived in the Shoalhaven District. By 1866 a small chapel had been constructed on the east side of Broughton Mill Creek (opposite to the current Mananga homestead). By 1872, Mass was being celebrated at both Broughton Creek (Berry) and Coolangatta. A report in 1880 described the condition of the chapel as poor and soon to be replaced. Following the formal survey of the new town grid, west of the creek, in 1883, a new church was built on the present site in 1884. It was a wooden frame and horizontal weatherboard building with an iron roof. The site was donated by David Berry.

The 1884 building served as both church and school until the Sisters of Saint Joseph came to reside in 1891. A six room wooden cottage was purchased adjacent to the church and served as the first convent.

A convent was constructed adjoining the church in 1921. This replaced the older cottage which was then sold and transported to Queen Street, Berry. A priest's apartment was attached to the new building at the rear (Figure G.150).

The foundation stone for the present church building was laid by the Rev. Michael Sheehan Co-Adjutor Archbishop of Sydney on 24 November 1935. It was completed the following year in May and situated parallel and just northeast of the 1884 church building. The church was designed by Clement Glancey (Sydney) and the builder was H.A.Taylor (Concord). The contract price for the building was 3,000 pounds, with an extra 500 pounds allocated for furnishings.

The old church continued to be used as a school until 1954 when a new school was constructed on the opposite side of Albert St.

Following declining enrolments and government rationalisation policy in the 1970s the school closed in 1978. The almost 90 year community presence of the Sisters of St Joseph also ended with the school's closure.

The school building subsequently served as a Church Centre and Hall, but the former school grounds were eventually sold in 2001 for residential development. The old school building was relocated and donated to the Berry Public School. Funds from the property sale went towards the construction of a new Church Centre situated directly behind, and connected to the old convent building. This was completed in 2003 and designed by Irwin architects and built by Peter Rein. The convent building was renovated as part of this new infrastructure program.

Figure G.148 General view of front of St Patrick's Convent building, looking N

Figure G.149 Front view of St Patrick's Convent in 1999, looking N (Shoalhaven Heritage Inventory)

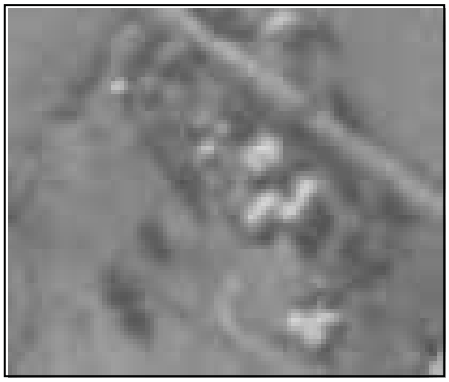
Figure G.150 Rear view of the convent building (date unknown) showing the adjacent priest's quarters (now demolished) (Faherty accessed 2011)

Figure G.151 Recent view of rear of the convent building showing the adjacent 2003 Church Centre (Faherty accessed 2011)

Figure G.152 Front view of St Patrick's Church, looking N

Figure G.153 Rear view of St Patrick's Church, looking S

Figure G.154 Church grounds (blue) in 1949 (below) and 1958 (right) aerial photo extracts (SH.I Dapto-Ulladulla Run GK11 699-5038 23/07/1958)) (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949



Note presence of 1880s wooden church between convent and current church building

Recording ID: G2B H49 **GDA Map Reference: 289727.6150118**

Name/Description:	***Oakleigh* Farmhouse**	*Cadastral Location*:	Lot 7 DP815023
		Street address:	59 Woodhill Mountain Rd Berry
Item/Site Type:	Inter War Bungalow Style Farmhouse		

Context/setting:	This 1930s farmhouse is located on locally elevated level ground within the valley floor flood plain of Bundewallah and Broughton Mill Creeks. It is situated more or less equally distant between the two creeks 250 metres away to the south and east.
Description/fabric:	Inter war farmhouse with corrugated roof (projecting gables at SE and NW corners) and encircling verandah to three sides (west, north and east [front]). Fibro cladding to front gable, cement rendered chimney to front room. The inclusion of many pre 1930s architectural elements (such as 2 x 6 pane sash windows), reflects the use of recycled components, and may relate to the use of transported buildings sourced from the Commercial Hotel (refer background section). Outbuildings include twin concrete silos and associated shed. A new separate cottage has been constructed over the foundations of a former dairy.
Dimensions:	Farmhouse: approximately 16 x 14 metres The farmhouse, associated plantings, grounds and location of current and former outbuildings occur within an approximate area of 180 x 100 metres
Physical condition:	Farmhouse in excellent condition. Roof and chute cladding on silos now dilapidated. No clear surface indication of original tenant farm structures remains, however archaeological deposits may exist.
Integrity:	The farmhouse retains its original 1930s configuration, however interior changes to dividing walls etc may relate to later renovations.
Associated features:	G2B H13 Overseer's Cottage for the Burnett Estate
Current use:	Private farmhouse residence
Heritage listings:	Shoalhaven Heritage Inventory No current statutory listings

Historical background/interpretation:

The following information is based on information presented in the Shoalhaven Heritage Inventory.

An 1890s map of the Berry estate lists Robert Virture Boyd as the tenant farmer of 172 acres, which included the land later known as *Oakleigh*.

R V Boyd was a member of the Boyd family that migrated from Donegal, Ireland in the 1860s and settled in the Woodhill and Broughton Vale areas. He was a Justice of the Peace and Mayor of Berry for the years 1894, 1895 and 1896. In 1898 he was reported to be leaving the district to take up farming activities on the Hunter. In 1911 he owned land along Broughton Creek south of Berry.

In 1912, former Lot 47 (DP4497), situated immediately south of the *Oakleigh* farmhouse land (former Lot 48), was purchased from the trustees of the Berry Estate, by Alexander Burnett, This formed part of a large Burnett holding extending between North Street and Bong Bong Road. These holdings were purchased by himself and other family members at around the same time (Lots 38-41, 43-46 and 50 DP4497, Refer Figure G.80 and G2B H13). One of those family members was Alexander's sister Alice, who married Sir Joseph Carruthers, was a friend and business associate of Sir John and Alick Hay, Secretary for Lands 1899, Premier of NSW 1904-1906 and instrumental in the passing of the David Berry Hospital Act.

It is unclear, but assumed by the existing historical documentation, that the Oakleigh homestead (on former Lot 48) also formed part of the Burnett land holdings (Shoalhaven Heritage Inventory).

From 1914 to 1921 the McGee family managed the Burnett property. They milked 80 cows of mixed varieties. There was an orchard with loquats and apples. Burnett visited regularly to pay the family and check the property. He paid Mr McGee six pounds per week out of which the two sons received 10/- each.

Sometime in the 1930s the original tenant farm homestead burnt down to its foundations.

Josiah Masters who was the owner of a Bundewallah farm bought the property in 1938 for his two sons and sons-in-law. The house had burnt down when Master purchased the property so he purchased two rooms from the Commercial Hotel that was being renovated and used them in the construction of a new home. A large fig tree (*Ficus oblique*) growing by the former dairy site is thought to have been planted in the 1930s by the Masters' who were interested in gardening. (J & J Robson) (Figure G.160).

The Masters kept stud Ayrshire cattle and farmed there until 1948 when they sold to Jack Pomeroy. Jack also grew crops and made silage. The farm was run by him and his son John. When Jack retired from farming and moved into Berry the farm was taken over by John. He sold off 133 acres in 1990 to the McIntosh family. Phil and Jan Monaghan (nee McIntosh) resided on the property until it was purchased recently by the RMS.

Figure G.155 General view of front of farmhouse, looking W

Figure G.156 View of front of farmhouse, looking W

Figure G.157 View of farmhouse looking SW

Figure G.158 View of farmhouse looking SE

Figure G.159 Detail of southern side of farmhouse looking NW

Figure G.160 Fig tree, thought to have been planted in the 1930s, located adjacent to former Dairy concrete slab looking N

Figure G.161 Extract from 1890s map of the northern Berry Estate, showing the location of tenant farm homestead in the approximate location of the later *Oakleigh* homestead (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Recording ID: G2B H50 **GDA Map Reference: 296794.6152462**

Name/Description:	***Clare Moy* Cottage**	*Cadastral Location*:	Lot 2 DP 626929
		Street address:	342 Princes Highway Toolijooa
Item/Site Type:	Late nineteenth or early twentieth century homestead		

Context/setting:	This cottage is situated on the north side of the Princes Highway, just west of the Toolijooa Road turnoff. It is situated on the upper slopes of a prominent spurline which descends on a south easterly alignment from Toolijooa Ridge
Description/fabric:	Original Georgian horizontal weatherboard cottage with corrugated iron roof, brick footings, with Federation style extension on the southwestern corner of the original building. Verandas on the Eastern (Front) and southern side of building. Corrugated iron exterior wall cladding. Single brick chimney. Separate garage Veranda partially enclosed at SE corner.
Dimensions:	Area within which cottage, garage and immediate grounds occur is approximately 20 x 20 metres
Physical condition:	Homestead is an active home, and in a habitable condition though some elements are run down and require maintenance.
Integrity:	Many details, finishes and individual elements, such as windows and awnings, have been modified or added. Interior not inspected.
Associated features:	-
Current use:	residence
Heritage listings:	no current listings

Historical background/interpretation:

This cottage is situated on the north side of the Princes Highway, just west of the Toolijooa Road turnoff. It may date to the late nineteenth or early twentieth century when a portion of approximately 50 acres was taken up by a B. Fields following the break-up of the Berry Estate (Fourth Edition Broughton Parish Map 1890s). This was part of a larger property divided between two brothers, Bartholomew and James Fields (SFHS 2003:v.2 p.21). The roofline of the building suggests that an original rectangular building of Georgian proportions was later extended to the south and west, probably in the first half of the twentieth century.

Figure G.162 General view looking W

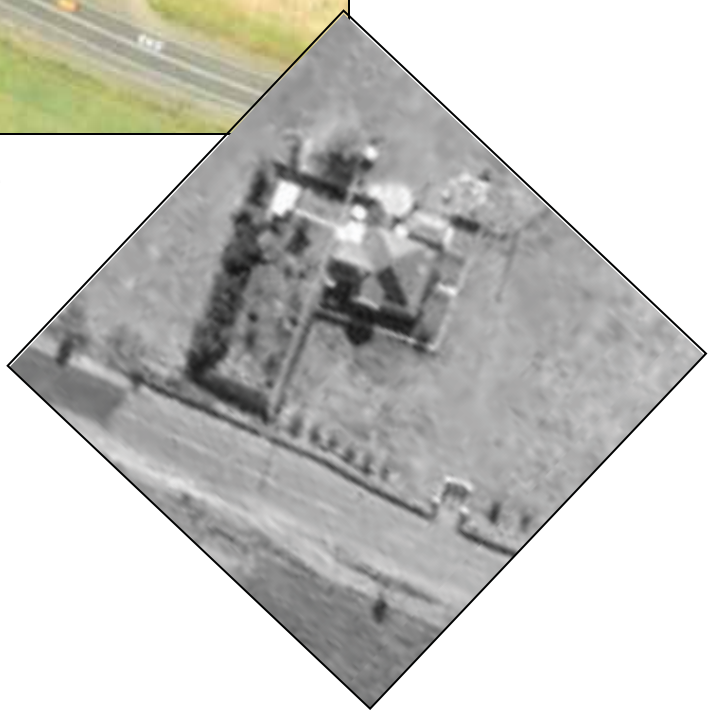
Figure G.163 General view looking NW

Figure G.164 View of Federation style extension at SW corner of building

Figure G.165 Detail of awnings and corrugated iron cladding on N side of building

Figure G.166 Aerial image of cottage (ACD14 NSW 3108-182 8/11/92)

Figure G.167 Aerial image of cottage and grounds in 1958 (SHI Dapto-Ulladulla 697-5088, Run GK9 10/07/58)



Recording ID: G2B H51 **GDA Map Reference: 287479.6148712**

Name/Description:	**Graham Park Former Agricultural Research Station**	*Cadastral Location*:	Lot 50 DP1074441 Lots 88 & 89 DP48603
		Street address:	8, 9 & 13 Schofields Lane, Berry
Item/Site Type:	Twentieth Century (1957) Agricultural Research Station		

Context/setting:	A complex of buildings, laboratories, sheds and enclosures situated at the intersection of Schofields Lane and the Princes Highway at the southern edge of Berry. The facility is situated at the southeastern end and basal slopes of a low spurline near the western margin of the Broughton Creek flood plain (former swamp basin).
Description/fabric:	A complex of administrative and research based buildings, constructed in 1957, (brick, glass, iron sheet, cement), some multiple storey, landscaped entrance grounds, fenced animal enclosures and sheds, circular entrance drive and associated car parks, entrance gates and metal feature sculpture.
Dimensions:	Area within which smaller enclosures and buildings occur is approximately 390 x 360 metres
Physical condition:	Appears to be in good and functional condition (not inspected in detail).
Integrity:	Site remains relatively intact, especially with regard to items considered to have significance including: the administration buildings and laboratories, entrance grounds, circular drive and gates, including the entrance sculpture (Minutes of Heritage Council State Heritage Register Committee 5 Oct 2005 File H99/00007). The original entrance driveway, from the highway was foreshortened as part of the realignment of the Schofields Lane intersection, sometime between 1992 and 2006. These works necessitated the re-positioning of the entrance gates and feature sculpture to their current position just short of the circular drive.
Associated features:	-
Current use:	not known
Heritage listings:	Not currently listed. This site has been the subject of previous discussion by The State Heritage Register Committee of the NSW Heritage Council, and a notice of Intention to Consider Listing (on the State Heritage Register). A site inspection by the Heritage Branch determined that the site was relatively intact and further investigations should take place to explore opportunities for adaptive reuse of some structures. A proposed heritage curtilage was restricted to just the significant buildings (administration and laboratories), entrance grounds, circular drive and gates, inclusive of the sculpture at the entrance. Four submissions were received during the notification period which concluded in December 2005. Beechwood Homes, the then owner, declined to comment but advised verbally that they did not support listing. The owner had a Development Application (DA) to demolish the site. Shoalhaven City Council approved the DA on the condition that significant heritage elements (as proposed for listing) were retained. The demolition approval was not acted upon.

The Heritage Committee was advised in April 2006 that the proposed State Heritage Register curtilage did not include the entire site, but only those areas with significant items, consistent with the DA approval. The Heritage Branch and Shoalhaven Council were both of the view that some adaptive reuse of the site was feasible. The Committee resolved to recommend to the Minister that the item be listed on the State Heritage Register if the Minister considered the item is of State heritage significance.

In September 2006, the Committee noted the Minister's decision to decline to list Graham Park on the State Heritage Register.

(Minutes of Heritage Council State Heritage Register Committee 5 Oct 2005 File H99/00007; 5 April and 6 September 2006).

Historical background/interpretation:

During the last decade of the nineteenth century, when Alexander Hay was the Manager of the late David Berry's 'Coolangatta Estate', a more scientific approach was adopted towards dairying in the Shoalhaven. Following an investigative trip to Europe by Alexander, the Trustees of the Estate erected a state-of-the-art butter factory at Berry and established a select herd of imported pure bred dairy cattle on a stud farm at Coolangatta.

At the urging of Alexander Hay, a Bill was passed through the NSW Parliament to vary the will of David Berry to the extent that a Stud Farm and an Experimental Farm should share in the endowment bequeathed by him for a Cottage Hospital established at Berry. That was agreed upon and a transfer of Port Jackson foreshores belonging to the Estate and judged to be of equal in value to the endowment was satisfactorily arranged. The Crown then assumed the Trusteeship of all three institutions (the Hospital, Stud Farm and Experimental Farm) and established them at Berry (Antill 1982:355).

The Berry Experiment Farm opened near the river beside the road from Berry to Coolangatta in October 1899, being the first of its kind on the coast. This was one of several experimental farms to be established near the end of the nineteenth century, many attracted public funding and developed into research and/or teaching institutions. Another example is the Wagga Wagga Experimental Farm established in 1893. It became an Agricultural College in 1948 and an Agricultural research Institute in 1954 (History of the Graham Centre http://www.csu.edu.au/research/grahamcentre/aboutus/ history.htm).

In 1903, the Government Stud Farm at Berry was described as,

> '…the most important institution on the coast from the dairymen's point of view. It is well situated, and is within two miles of the town. On one side it has a mile frontage to the deep, navigable waters of Broughton Creek, and the new Moeyan Bridge connects it with Berry and the railway' (Town and Country Journal, 11 February 1903).

The Experiment and Stud Farms were co-located on the east side of the Berry - Coolangatta Road (Wharf Road), either side of Broughton Creek, between one and two kilometres south of the present town of Berry.

In the 1920s, a Pasture Research Unit was established off Wharf Road, Berry, by the Department of Agriculture.

The farms continued under the Department of Agriculture until they was taken over by the Child Welfare Department in April 1934. It was remodelled with the provision of a dining room, dormitories and other facilities with cottages to house 40 boys to take farm training. In 1939, additional buildings were added, together with more modern farming facilities.

In the 1970s the Child Welfare Training Farm on Wharf Road was closed and re-opened as a holiday home for the underprivileged and was later transferred to the Department of Sport and Recreation (Bayley 1975:206, Berry Museum 2006:2).

In the 1950s, the first Artificial Insemination Breeding Station (AIBS) in New South Wales was established by the NSW Milk Board at the Pasture Research Unit, Berry.

In 1958, the AIBS was moved to the Graham Park facility which was built in 1957. At this location it occupied a total area of approximately 75 hectares, including bull yards, buildings and a quarantine area from which the semen collection and processing occurred.

The Graham Park research station was the first commercial artificial stock breeding centre in NSW and made major contributions to Australia's stock breeding industry. The centre was named after the Hon. Edgar Hugh Graham who died, the year the facility was built.

Graham was born near Wagga in 1897 and developed long term vocational and financial interests in primary production. He became the proprietor of a large butchery and subsequently founded one of the largest and most successful pig studs in Australia (the Kinilibah Stud Farm). After disposing of his pig stud he raised Poll Herefords and fat lambs on his property, *Whyanawah*, near Wagga.

Graham was a member of the Australian Labour Party and was elected to the NSW Legislative Assembly in 1941 as the local member for Wagga Wagga. He defeated the sitting Country Party member, Matthew Kilpatrick in the landslide victory that allowed William McKell to form a government. He held the seat at the next 5 elections and died as the sitting member in 1957. During the premierships of William McKell, James McGirr and Joseph Cahill, Graham held numerous ministerial positions but he is most notable for his long tenure as Minister for Agriculture which he took on in 1944. He died during his 14th year as Minister which at the time was reported as a record in that portfolio, at both State and Commonwealth levels (Obituary in *Pastoral Review and Grazier's Record* 18 Dec 1957). His achievements as Agricultural Minister include:

- The construction of an artificial insemination centre for dairy cattle (Graham Park) and the introduction of artificial insemination on a commercial basis.
- The establishment of four new country killing works at Goulburn, Wagga, Dubbo, and Gunnedah. These works were amongst the most modern in the world and cost in the vicinity of £500,000 each.
- The construction of bulk wheat storage facilities.
- The purchase of high quality stock from overseas.
- The expansion of operations at experimental farms and research institutes, including increased accommodation at Hawkesbury Agricultural College.
- The establishment of the Wagga Agricultural College.
- The decentralisation of the activities of the Department of Agriculture with the introduction of regional offices throughout rural NSW (Obituary in *Pastoral Review and Grazier's Record* 18 Dec 1957, Blocklow 2005).

Ownership of Graham Park was transferred to the NSW Department of Agriculture in 1980. Activities at the centre were reduced, and final in the 1990's the Centre was closed. Portions of the site were leased to the University of Wollongong as an off-campus research station until new premises were built for them in Nowra in 2000 (*Berry Museum 2006: 2*). Nowra Council (now the Shoalhaven City Council) purchased the site in the late 1990's. It was then sold in 2003 to Huntington Developments (Beachwood Homes) (Minutes of Heritage Council State Heritage Register Committee 5 Oct 2005 File H99/00007).

Figure G.168 General view of entrance to Graham Park (2007 image)

Figure G.169 Detail of entrance feature sculpture

Figure G.170 Entrance to Graham Park research station in 1969 (State Library of NSW image no.d2_35989r)

Figure G.171 View, looking SE across animal pens and enclosures at Graham Park in 1969 (State Library of NSW image no.d2_36000r)

Figure G.172 View, looking W towards animal pens from eastern boundary of Graham Park (Princes Highway boundary) (2007 image)

Figure G.173 Aerial image of research station in 1958 (SHI Dapto-Ulladulla 699-5051, Run GK12 23/07/58)

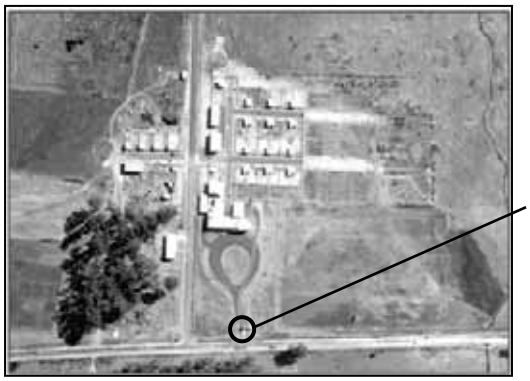
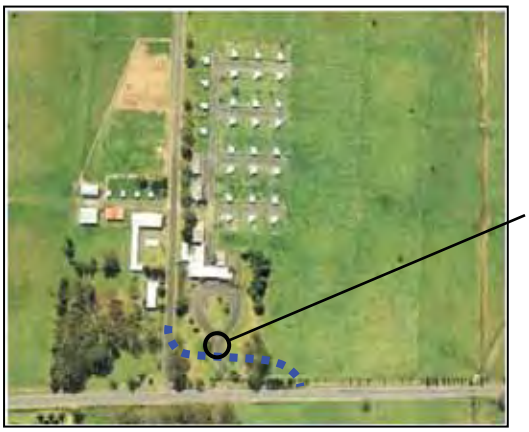


Figure G.174 Aerial image of research station in 1992. Note that since this time, a new alignment of the Schofields Lane intersection (dashed blue line) has required for-shortening of the driveway and relocation of the entrance gate and feature sculpture (ACD16 NSW 3108-247 8/11/92)



Recording ID: G2B H56		**GDA Map Reference:**	**289005.6149857**
Name/Description:	***Broughton Mill* Homestead and Dairy**	*Cadastral Location*: *Street address:*	Lot 31 DP818336 117 North St Berry
Item/Site Type:	Early twentieth century homestead, dairy, outbuildings and grounds (ruin)		

Context/setting:	The homestead and dairy are located on the edge of an upper terrace, on the flood plain, and south side, of Bundewallah Creek. The complex is located 100 metres to the east of the current *Broughton Mill* homestead which was constructed in the late 1980s.
Description/fabric:	Homestead constructed using a sawn timber frame and asbestos cement wall panelling. Four rooms in original building, plus additional back rooms under scillion roof. One chimney for kitchen stove on southern side of building. Veranda on at least western side of building, probably also on eastern (front?) side. Corrugated iron roof. Interior wall cladding labelled as "Surface Sealed and Sized by "Sealite" Process Patented 1916 Beaver Board [logo] Pure Wood Fibre" At least one out-building constructed using sawn timber frame and corrugated iron, remnants of other small structures, possibly animal pens/runs. Remains of truck, plough equipment and multiple drays in back enclosure. Two disused metal silos (one cylindrical and one rectangular) located adjacent to a ruined outbuilding at southwestern end of complex. Remnant two rail wooden fencing around homestead. Dairy (disused) constructed from brick (interior surfaces rendered), timber, corrugated iron and cement/concrete
Dimensions:	Area including homestead ruins, dairy and associated yards is approximately 90 x 80 metres
Physical condition:	Homestead in poor and uninhabitable condition – wooden frame still standing, however roof, ceiling, wall cladding and floor now unstable and structurally compromised. Building is no longer weather proof. Most of verandah has collapsed except for western side. Whole building now obscured by vegetation and vine growth. Outbuildings adjacent to homestead, except for Dairy group in similar condition. Broken asbestos sheeting poses a health risk. Dairy still structurally sound and weather proof, but no longer used as Dairy.
Integrity:	Structures still display details and characteristics of early Twentieth century homestead, and mid century Dairy. Evidence of some later additions and veranda infill.
Associated features:	planted tree wind breaks and associated fenced enclosures
Current use:	Homestead is abandoned and in ruinous state. Dairy apparently only used for storage. Whole site forms part of larger operating farm.
Heritage listings:	no current listings

Historical background/interpretation:

It is known that the great Uncle (George) of the current owner (Mr John Miller), lived in this homestead and that it was extant in the 1920s when he was born. George died in 1962 and the house has not been lived in since that time. In the last 5 to 10 years the building has become overgrown and is no longer used for storage (pers. comm.. John Miller 26/08/11).

Figure G.175 General view of complex looking south from creek flats, Dairy on left, homestead behind vegetation on right

Figure G.176 General view of homestead site looking north, note disused silos

Figure G.177 Interior view of north eastern room

Figure G.178 Detail of ceiling and light fitting

Figure G.179 Remains of dray

Figure G.180 Southern side of disused dairy, looking NE

Figure G.181 Interior view of Dairy and "Dangar-G" Milker apparatus, looking SE

Figure G.182 Aerial image (2006) of homestead remains (Google Earth Pro 2011)

Figure G.183 Aerial image of homestead complex in 1958 (SHI Dapto-Ulladulla NSW Run GK11 699-5037 23/07/58)

Recording ID: G2B H58

GDA Map Reference:
Original position: 289326.6149627
Current position: 289344.6149573

Name/Description:	***Uniting Church Hall (formerly Wesleyan Chapel)***	*Cadastral Location*:	Lot 1 DP745962
		Street address:	69 Albert St
		(formerly:	140-146 North St) Berry
Item/Site Type:	Late nineteenth century Carpenter Gothic Chapel		

Context/setting:	This building was originally located on the southern side of, and parallel to North St, on an east-west alignment, with its entrance facing east (Figures 6.184-6.185). Following the recent sale of this land, the building has been retained by the Uniting Church and moved to a new location (October 2011), 50 metres to the southeast, next to the 1932 church building, on a north-south alignment, with the entrance facing south (Albert St) (Figures 6.187-6.188). As part of the preparation for this move, a skillion roofed weatherboard addition to the western end of the building was demolished (Figure G.186).
Description/fabric:	Victorian Carpenter Gothic style chapel, constructed using timber frame, horizontal weatherboards and corrugated iron roof. - gabled roof, attached porch, finial to porch, pointed arch (gothic) windows, brick footings.
Dimensions:	Chapel dimensions are approximately 20 x 10 metres
Physical condition:	Good. Deterioration issues noted in 2002 (paint condition, weatherboard rot, roof leaks) appear to have been addressed. Following the recent re-positioning of the building, the consequential installation of new piles and higher ground clearance will address previously noted issues of dampness from soil contact.
Integrity:	Decorative bargeboards, observable in past photography, have at some time been removed from the building. These are currently being re-created and reinstated. Roof iron has been replaced with Colorbond. A skillion roofed weatherboard room (including a wheel chair access ramp) was added to the western end of the building sometime before 1949. This was demolished prior to the re-positioning of the building (Figure G.186). The Chapel retains its original form and character. The new building location maintains its historical association with the Wesleyan Church but substantially changes its landscape context. The original position was associated with mature tree plantings, surrounded by open space and included pastoral views across the road to the north. The original east-west alignment related to the large area of the surrounding Lot owned by the Church. The new position and alignment, parallels an adjacent church building. In contrast to the pastoral and open space character of the original location, this new paired arrangement, merges with adjoining urban lots and reinforces the urban character of the streetscape.
Associated features:	Twentieth century church and buildings on same Lot
Current use:	Church Hall
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7, as an item of local significance Shoalhaven Heritage Inventory

Historical background/interpretation:

The building was erected as a Wesleyan Church in 1884 following donation of the land by David Berry in 1883. At its opening, by the Rev. J.W. Brown on 13 April 1884, it was reported to be the first building to be erected on land legally acquired in the "new township" (Peter Freeman Pty Ltd 1998).

The building functioned as a Chapel until a new church was built in 1932 (Wesleyan to 1907, and then as part of the Methodist church). After 1932 it was used as a Church Hall until 1965 when a new church hall was completed (Conybeare Morrison and Partners 1999).

The opening of the chapel was reported in the Shoalhaven Telegraph (17/4/1884):-

> The chapel is a neat weatherboard structure 43 x 23 feet on wooden block foundations in the designing management of which Mr William Boyd of the firm of English and Boyd, Broughton Creek was the leading chief spirit. It is built of stud and weatherboard, lined with clear pine and roofed with corrugated iron. The building is entered by a porch 8 x 8 with a door at each side. The principal entrance into the main building is by a 4 feet door opening in two parts. It is lighted through 8 spacious Gothic topped windows, 4 on each side, the place being built east and west.
>
> The chapel is furnished with 24 pews, 12 on each side, and will seat up to 200 worshippers if required, and the officiating worshipper is provided with a light and handsome open rostrum, of varnished cedar, decorated with panels, and turned work, and is reached by a flight of steps on each side. The communion rail is also of turned work, lined with green rep.
>
> The walls inside are painted a stone colour, and bordered with a lilac paint up to about 4 feet above the floor. The height of the walls is 12 feet and the roof being half opened and ceiled (sic). Outside the building is painted in a stone colour, and the gables of the roof and porch are decorated with barge boards of unique design and finished with turned finials. Mr Herbert Pettit was the contractor, and he has completed a very creditable piece of work. (in Shoalhaven Heritage Inventory - Shoalhaven City Council).

Figure G.184 General view of original location of Chapel, looking SW

Figure G.185 General view of original location of chapel, looking SE

Figure G.186 Detail of demolition of skillion roofed addition to rear of chapel prior to relocation of main building (October 2011)

Figure G.187 General view of former chapel location, with new building position visible in middle distance, looking SE

Figure G.188 The new location of the former chapel, on the west side of the 1932 church building looking SE

G.4 Known or potential archaeological deposits

Recording ID: G2B H14		**GDA Map Reference:**	**290063.6149874 to 290019.6149750**
Name/Description:	**Former buildings at northern end of Broughton Creek township**	*Cadastral Location*:	Princes Highway easement Lot 4 DP602348
		Street address:	Nos. A29, A45 and adjacent highway easement Princes Highway Berry

Item/Site Type: Archaeological deposit – former buildings at northern end of Broughton Creek township

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Context/setting: This deposit is situated between the pre 1955 alignment of the Princes Highway and Broughton Mill Creek, and may potentially extend for approximately 180 metres across the interval where the post and pre 1955 alignments diverge. Archaeological test pits conducted within the grassed land surface between the highway platforms confirm the presence of archaeological material (refer Chapter 7). The potential for archaeological deposits below the existing highway platform remains untested. This potential is greatest under the downslope side of the platform where fill probably overlays original slope deposits. The area of confirmed or likely archaeological deposit, based on test excavation results equates roughly to the grassed area between the old and new highway platforms – with approximate dimensions130 x 15 metres.

Description/fabric: The site is defined as the archaeological deposit which potentially preserves traces of former nineteenth and twentieth-century Broughton Creek town buildings that were located along the western side of the former highway alignment (G2B H15), roughly opposite *Mananga*. Based on historical research compiled by members of the Berry and District Historical Society (refer Figure G.192), the following structures are known or reliably predicted to have once occurred in this area:

- The Berry Butter Factory (1889).
- Court House (1870s).
- Roman Catholic Church (1866).
- The Council Chambers (1868).
- Overseers Cottage (1858).
- A Carpenter's Cottage.

Refer Chapter 7 for a description of the deposits and archaeological items encountered during test excavations.

It should be noted that the G2B H14 deposit, by definition, does not include the potential archaeological remains of the original Mananga homestead, which was situated immediately south of this recording, and on the east side of the pre-1955 highway alignment. Remains of this former homestead may partially occur under the current highway pavement, and on the slope immediately to its east. Similarly, the infilled trench through which the water race for the Berry Estate saw mill traversed the spurline would also be present under the current highway and probably indivisible from the original Mananga homestead site.

Dimensions: Potential area including area under existing highway platform: 180 x 55 metres

Confirmed area (grassed areas between highway platforms: 130 x 15 metres

Physical condition: Results from an archaeological subsurface testing program confirm that archaeological deposits occur under a variable layer of construction related overburden in the grassed area situated between the pre and post 1955 highway alignments. The deposit has probably been totally or substantially removed along the upslope (eastern) half of the current highway platform. However, due to the probable use of fill to create an elevated and benched platform on the downslope margin of the highway, there remains good potential for archaeological deposits to remain under the western half of the highway platform.

Integrity: The deposit has been partially impacted by cable trenching in the first half of the twentieth century, road construction in the 1950s, root displacement from the extant tree avenue, and the installation of the current Berry sign and pediment.

Despite this, the remaining areas of confirmed and potential deposit have considerable research value and potential.

Associated features: This archaeological deposit forms part of a related group of items which relate to the history, economy, development and structure of the Broughton Creek township. Some of these items are located outside of the area of interest for this assessment:

- G2B H15 1870s - 1955 highway alignment (Adjacent to *Mananga* homestead)
- G2B H12 Remnant of 1870s – 1955 highway alignment (around Stewarts Hill)
- G2B H16 *Mananga* Homestead and property, including archaeological sites of old Mananga homestead and portion of Berry Estate saw mill water race
- G2B H55 Remnant of 1856 Berry Estate Road
- Archaeological remains of Berry Estate saw mill industrial complex, including the mill race, mill site, and Tannery works
- *Wyndree*, Former Constables Cottage A15 Princes Highway (Schedule 7, Shoalhaven LEP 1985)
- Pulman Street Heritage Conservation Area (Schedule 7, Shoalhaven LEP 1985)

Current use: Easement and platform of the current Princes Highway,

Rural residential Lots: Lot 7 DP1040653
Lot 4 DP602348

Heritage listings: no current listings

Historical background/interpretation:

The documentary basis for the identification of the potential location of former town structures and works within the G2B H14 area is based on historical research conducted by the Berry and District Historical Society. Sources used in this research include:

- Published references based on historical accounts and research conducted by Cousins (1948), Bayley (1975), Antill (1982), Lidbetter (1993).
- Original and local and State newspaper articles. Examples specific to the Berry Butter Factory include Sydney Morning Herald (SMH) (27 July 1888 p7, 23 Jan 1889 p9, 4 Feb 1890 p7, 11 Sep 1901; Clarence and Richmond Examiner and New England Advertiser 8 June 1889 p8.
- Various oral histories from local identities documented by the Berry and District Historical Society.

The Berry Butter Factory (Berry Dairy Company, 1889 - 1901)

A decision to establish a butter factory at Broughton Creek with a capital of 2000 pounds was taken at a meeting chaired by the Mayor, Lewis McIntyre in July of 1888 (SMH 27 July 1888 p7). A factory site was suggested in John Stewarts paddock, opposite his residence [old Mananga homestead], on the northern side of the South Coast Road beside Broughton Mill Creek where there was good permanent water. It was recommended they sell "refuse milk" rather than have piggeries near the factory. The latter proposal however was not adopted (Bayley 1975:150).

In January 1889 it was reported that directors of the Berry Dairy Company had been elected and the factory was nearly completed and operations were expected to commence in early February (SMH 23 Jan 1889 p9).

The *Broughton Creek Register* provided a description of the Berry Butter Factory when it was opened in March 1889. This description is presented by Bayley (1975:151):

> It was built of timber on brick piers, lined and ceiled with tongued and grooved pine, with floors of tallow wood. It had a manager's room, office, director's room and a large room for the separators and churns. Piggeries were nearby with drainage away from the factory. The hill became known as Factory Hill and overlooked the growing township of Berry. It was proposed to install refrigeration in 1901 but it was decided to close instead.'

In 1890 it was reported that the factory was processing 2000 gallons of milk daily (SMH 4 Feb 1890 p7)

On the 7 September, 1895 John Hay established the, The Berry Central Butter Factory, with the considerable financial backing of the Berry Estate. This was sited adjacent to the newly completed rail line on the site of the present Co-operative factory. The company aimed to provide a state of the art facility with the aim of promoting the Dairy industry across the Estate and its tenant farms. This factory would later be bought by a consortium of dairyman from the Estate for 5,500 pounds in 1911 and formed a Co-Operative, the Berry Rural Co-Operative Society Ltd (SMH 6 Apl 1911 p7).

In 1897 it was reported that the Berry Dairy Company was supplying cream to Dr Hay's Central Butter Factory, paying suppliers 6 ¾ d per gallon of milk (SMH 8 July 1897; also The Queenslander 24 July 1897 p37).

In 1900 a report of the annual meeting of the Berry Dairy Company indicated that the 'shareholders pronounced against pasteurisation' (Clarence and Richmond Examiner 24 July 1900 p4). In contrast, and in the same year the Berry Central Creamery became the first factory in NSW to adopt pasteurisation of cream for manufacture into butter (http://www.southcoastdairy.com.au/our-history.htm, accessed June 2011).

Faced with the competition, rail line location, and superior Estate resourcing of the Berry Central Creamery, the viability of, and justification for the Berry Dairy Company appears to have been substantially and progressively eroded.

In September of 1901, it was reported that a meeting of the shareholders of the Berry Dairy Company Limited, ratified the previous resolution to dispose of the goodwill of the premises to Dr John Hay, proprietor of the Berry Central Factory, for £1000. It was resolved to wind up the Berry Dairy Company by voluntary liquidation Mr James Stewart was appointed liquidator, subject to confirmation on October 1 (SMH 11 Sept 1901 p10).

The eventual fate of the building is yet to be determined. It is shown standing in a 1903 photograph published in the Town and Country Journal 11 Feb 1903 (Figure G.193).

A photograph entitled “The Factory” from Broughton Creek, shows the Berry Butter Factory building, looking south along, and viewed from the bottom of Broughton Mill creek. The estimated date of the image is circa 1910 (Wollongong City Library, image no. P01/P01210).

The building is no longer present, or traces in evidence, in aerial photography taken in 1949 (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949).

Figure G.189 General view of the portion of archaeological deposit G2B H14 situated between the former (left) and current (right) highway platforms, looking S

Figure G.190 General view of archaeological deposit G2B H14, looking N from its southern end. Note 1870s to 1955 highway alignment diverging from current highway on right hand side (middle of picture). The potential for archaeological deposits under the road platform remains untested

Figure G.191 General view of archaeological deposit G2B H14, looking N W, along the downslope side of the current highway platform. There is an untested potential for archaeological deposits to survive under the fill which supports this 1955 roadway

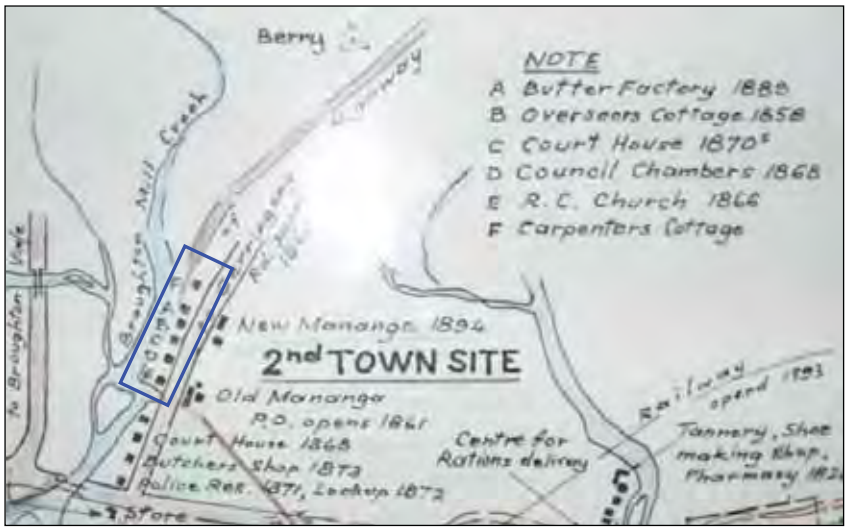

Figure G.192 Extract from display map in Berry Museum, showing potential former structures which may have been located within the G2B H14 area (blue) (courtesy Berry and District Historical Society Inc.)

Figure G.193 View looking SW down highway in area of G2BH14 (left end of photo) ('The town of Berry, from Stewarts Hill' *Town and Country Journal* 11th February, 1903)

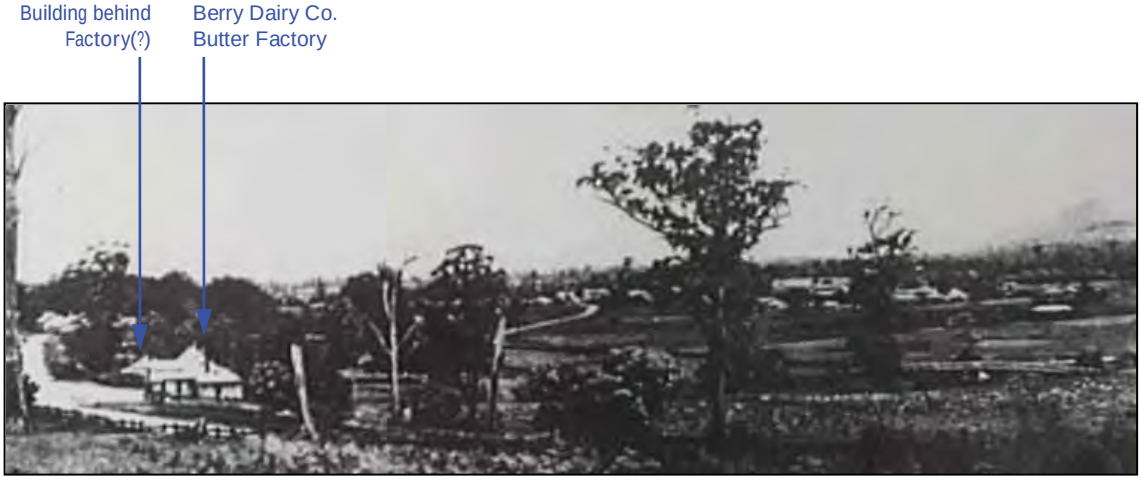

Figure G.194 'Butter Factory, Berry' (from Shoalhaven Estate page 19, Wollongong City Library Image no. P03/P03737; also [this copy, dated 1891] courtesy Berry and District Historical Society)

Recording ID: G2B H48 **GDA Map Reference: 294547.6152597**

Name/Description:	**Site of former Berry Estate Tenant farm**	*Cadastral Location*:	Lot 9 DP3344
		Street address:	161 Princes Highway Broughton Village

Item/Site Type: Potential Archaeological Deposit - Site of former Berry Estate Tenant Homestead

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Context/setting:	This site is situated on locally elevated ground (a low gradient and broad spurline, grading into creek flats), adjacent to a small tributary streamline which drains southwards into Broughton Creek. It is situated on the northern basal slopes of the open Broughton Creek valley, as they merge with the valley floor and flood plain.
Description/fabric:	Apart from two large old growth trees, a fig and a deciduous species (Figures 6.197 & 6.198), which pre-date the current farmhouse and probably relate to a former phase of European occupation, there are no surface traces of the former Berry Estate tenant farm which is indicated at this location on an 1890s map (Figure G.200). This map appears to show a main building surrounded by four outbuildings. Both of the remnant trees are likely to have been planted. The deciduous tree is an exotic species, and the fig tree is low and spreading, indicating development in an open and cleared (unforested) context. As such they are likely to have been planted in relative proximity to the former homestead. Given its close proximity, the current farmhouse may be wholly or partly superimposed on the footprint of the former homestead building(s)
Dimensions:	Not determined. The area of potential probably occurs within an approximate area of 100 x 100 metres (inclusive of former outbuildings).
Physical condition:	Potential for subsurface archaeological remains. The construction of the existing farmhouse (sometime between 1958 and 1975), is likely to have substantially disturbed or removed at least portions of this potential deposit.
Integrity:	The integrity of this deposit has not been determined but it is probable that at least a portion of the site has been substantially disturbed or removed by the construction of the current buildings.
Associated features:	-
Current use:	Rural residential farmhouse (leased and tenanted by the RMS)
Heritage listings:	no current listings

Historical background/interpretation:

An 1890s map of tenant farms across the northern portion of the Berry Estate (probably dating from 1892, refer Graham 1998), shows a homestead complex at this location leased by a J. Hicks. The farm consisted of approximately 28 acres (Figure G.200).

Figure G.195 General view of location of former Berry Tenant farm homestead, note slightly elevated spur (right) adjacent to the valley floor, looking S

Figure G.196 View of current *Greystanes Lodge* farmhouse, showing two large old growth trees (a fig tree(right), and a deciduous tree (left)) which predate the farmhouse, looking SW

Figure G.197 Views of the large old growth trees which pre-date the current farmhouse, looking S (left picture) and W (right picture)

Figure G.198 Aerial image of location of former homestead in 1958. Note remnant trees (blue circled) (SHI Dapto-Ulladulla NSW Run GK10 697-5101 10/07/58)

Figure G.199 2007 aerial image showing current homestead, remnant trees (blue circled) (Google Earth Pro 2011)

Figure G.200 Extract from 1890s map of the northern Berry Estate, showing a group of former tenant estate farm buildings located at the current Greystanes farmhouse (blue circle). The current highway is shown in red for reference. ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Recording ID: G2B H52	**GDA Map Reference:**	**293659.6151844 (approx.)**

Name/Description:	**Site of former Berry Estate Tenant homestead**	*Cadastral Location*:	Lot 2 DP593476
		Street address:	A441 Princes Highway Broughton Village

Item/Site Type: Potential Archaeological Deposit - Site of former Berry Estate Tenant Homestead

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Context/setting: This site is situated on the floor of a small tributary valley, adjacent to a minor tributary stream. The stream flows roughly west-east into Broughton Creek at Broughton Village. The homestead was situated close to the 1856 Berry Estate road, and the subsequent 1870s to 1930s highway alignment. In both cases, the roads appear to have been purposefully aligned to connect with the homestead site, creating a 'corner'. In the latter alignment this corner approximated 60 degrees and came to be known as "Bink's Corner" after the adjacent land owner family.

The exact micro-topographic location of this site is yet to been determined. The only map of the site, identified to date (Figure G.203), from 1892 (Graham 1998), shows the homestead slightly to the southwest of the highway bend and on the northern bank of the streamline. The current alignment of the stream is now further north of this mapped course and the mapped homestead location is uncharacteristically situated on moderately graded slopes. If some or all of the mapped locations, and associations, are indicative or relative, then a wide field of possible homestead locations can be predicted. For this reason a large approximate area of potential, has been identified, within which this archaeological site is likely to be situated (Figure G.204, Appendix A).

Description/fabric: This site was not subject to surface archaeological survey, as it is situated more than 200 metres away from the bypass. Apart for some nearby Coral trees, there are no traces (observable from aerial photography) of the former Berry Estate tenant farm which is indicated at this location on an 1890s map (Figure G.203). This map appears to show a main building with three outbuildings to one side and the back.

Dimensions: Not determined. The area of potential probably occurs within an approximate area of 100 x 100 metres (inclusive of former outbuildings).

Physical condition: Potential for subsurface archaeological remains. The site has probably been subject to ploughing and cropping since the removal/destruction of the homestead. The extent to which this has impacted the deposit is not known.

Integrity: The integrity of this deposit has not been determined. Its proximity to the former highway alignment, which was bypassed in the mid 1930s, means that this is the only surviving archaeological site of a former Berry tenant estate farm which retains its original configuration to the 1856 and 1870s highway alignment, exclusive of the impact from later twentieth century highway upgrading including widening, sealing, and side railing.

Associated features: This deposit forms part of a complex of recordings which, as a group, have value in understanding and interpreting the evolution of the highway, its various alignments, and its interrelation with adjoining land holdings and homesteads. These recordings are:

- G2B H27 remnant section of 1856 Berry Estate Road.
- G2B H26 remnant section of 1870s – 1930s Highway ("Binks Corner").
- G2B H25 *Sedgeford* homestead.

Current use: Agricultural pasture grassland

Heritage listings: no current listings

Historical background/interpretation:

An 1890s map of tenant farms across the northern portion of the Berry Estate (probably dating from 1892, refer Graham 1998), shows a homestead complex at this location leased by a Mrs. Wiley The farm consisted of approximately 50 acres (Figure G.203).

Recording ID: G2B H52

Potential Archaeological Deposit
Site of Former Berry Estate Tenant Farm

Figure G.201 General view of site area (middle distance, behind and to left of trees) from current highway, looking W

Figure G.202 General view of site area (lower middle distance, behind and to left of deciduous trees) from spurline on opposite side of current highway, looking W

Figure G.203 Extract from 1890s map of the northern Berry Estate, showing a group of former tenant estate farm buildings at "Bink's Corner" (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLM SS315_Map 17

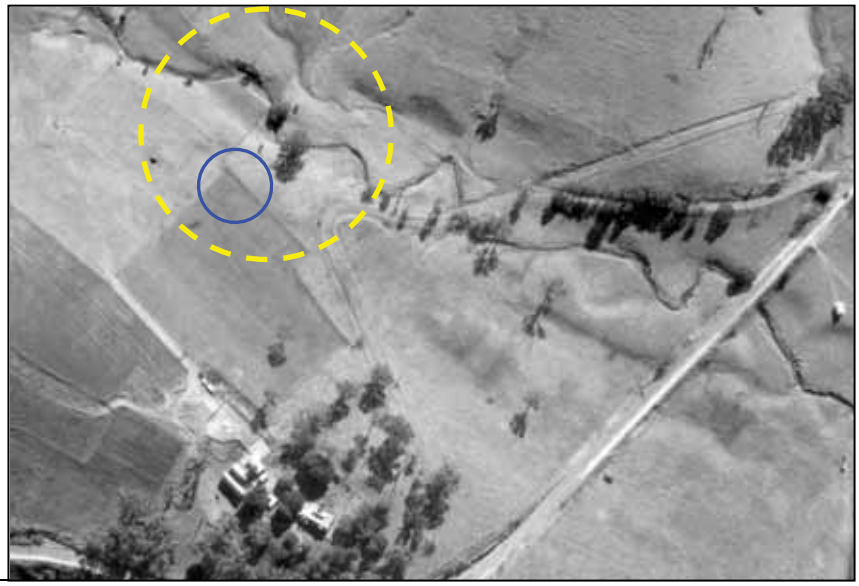


Figure G.204 1958 aerial image of location of former homestead based on 1892 map (blue circle) and potential actual location based on topography and map interpretation options (yellow dashed circle) (SHI Dapto-Ulladulla NSW Run GK10 697-5103 10/07/58)

Recording ID: G2B H53 **GDA Map Reference: 296227.6152738**

Name/Description:	**Site of former Berry Estate Tenant Farm Structure**	*Cadastral Location*:	Lot 1 DP255171
		Street address:	403 Princes Highway Broughton Village (Toolijooa Ridge)
Item/Site Type:	Potential archaeological deposit and indeterminate rock rubble alignment		

Context/setting: This recording is located on the moderately graded crest and upper slopes of a prominent spurline which forms part of the eastern fall of the Toolijooa Ridge. The current Princes highway is located 35 metres downslope to the north.

Description/fabric: This recoding combines the location of a former structure, shown as part of a Berry tenant farm on an 1890s map, and an indeterminate alignment of rock rubble situated within the same area. Apart from the alignment, there is no other surface evidence which could relate to nineteenth and early twentieth century occupation.

The former structure is drawn on the 1890s map as a single structure, and could conceivably be a farmhouse or homestead (without out-buildings), or a less substantial and non-residential structure (Figure G.208).

A modern sealed driveway, aligned east-west, is situated immediately south and adjacent to the location of the former structure, and follows the original alignment of the 1856 Berry Estate Road. The structure may thus relate to this first, or the subsequent existing highway alignment (1870s onwards).

The alignment of stone rubble extends for approximately 35 metres and runs exactly parallel with (and north of) the driveway and alignment of the former Berry Estate Road. The driveway, and a downslope (disused) extension of this alignment into the adjoining property, is significantly recessed into the natural ground level. Construction of the driveway, or its antecedent, would have involved excavation of a substantial degree of sub-surface rock.

The rubble consists of natural bedrock (latite) cobbles, with both larger gravels and smaller boulders represented. The alignment has an average height of around 0.9 metres and a width at its base of around 1.5 – 2.0 metres. A majority of the cobbles appear to have been quarried, with sharp angular faces, but there are no jumper marks or other traces of careful or hand shaping/working. In addition there are cobbles with natural rounded cortex.

Dimensions: The area of potential, within which it is likely the former tenant farm structure was located is approximately 30 x 30 metres.

The stone rubble alignment is approximately 35 metres long, and averages 0.9 metres high and 1.5-2.0 metres in width. It is aligned approximately 290 degrees (grid north)

Physical condition: Potential for subsurface archaeological remains. The site has been subject to vegetation clearance and driveway construction since the removal/destruction of the homestead. The extent to which this has impacted the deposit is not known.

Integrity: The integrity of this deposit has not been determined.

Associated features:	A portion of the 1856 Berry Estate Road which has not been impacted by modern road construction occurs 20 metres downslope of the rubble alignment (G2B H30).
Current use:	Mown landscape setting for modern residence.
Heritage listings:	no current listings

Historical background/interpretation:

An 1890s map of tenant farms across the northern portion of the Berry Estate (probably dating from 1892, refer Graham 1998), indicates that a farm of around 52 acres was leased by a B. Fields (Figure G.208).

There are a number of possible interpretations of the stone rubble alignment:

1. It is the graded remains of a former agricultural dry stone wall (a surviving wall is located 80 metres to the northwest).
2. It is the graded/disturbed remains of stone walls or foundations from the former tenant farm structure.
3. It is a spoil dump from the construction of the 1856 Berry Estate Road.
4. It is the spoil dump from the construction of a more recent road, either the 1870s highway (35 metres downslope), or a farm access track and/or the most recent residential driveway.

Of these, option 3 seems least likely given the form of the Berry Estate roadway elsewhere across the study area, and especially the general disregard for gradient (and thus the need for excavation) evident in its design. Based on the present evidence, option 4 seems the most likely, however the close spatial association of the alignment with the former tenant farm structure cannot yet be discounted.

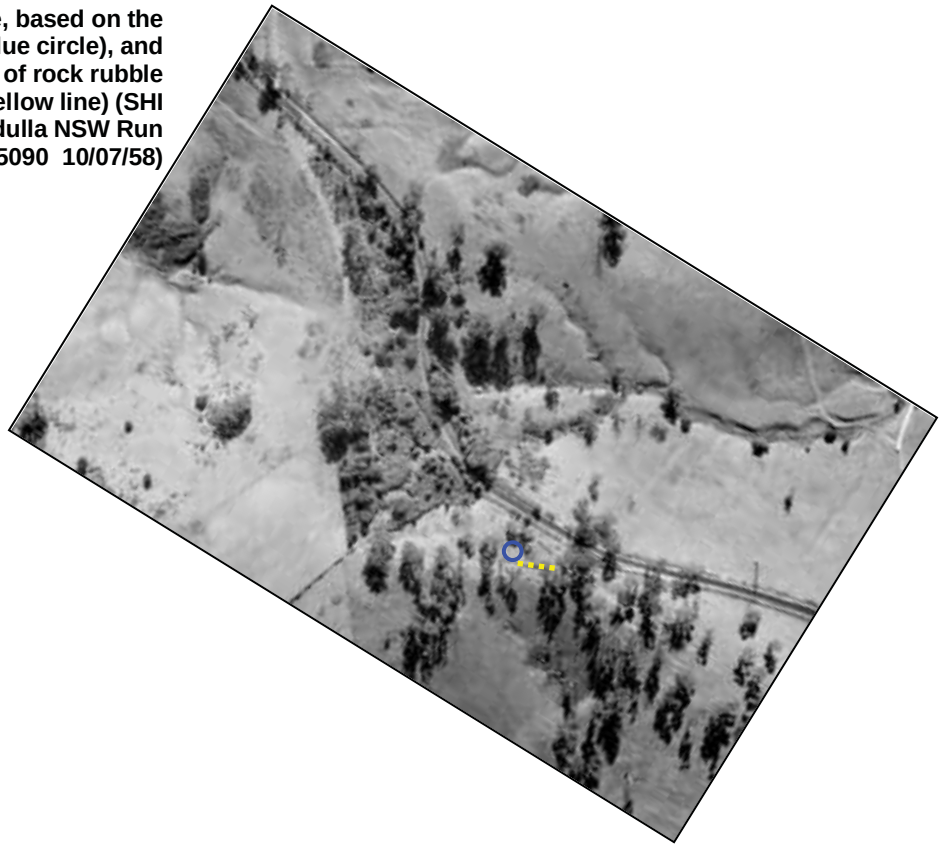
Figure G.205 General view of piled alignment of rock rubble, looking NE

Figure G.206 View of piled alignment of rock rubble, looking NW

Figure G.207 View looking SE along modern driveway (which parallels the rubble alignment, just left of the picture) and which follows the alignment of the 1856 Berry Estate Road (yellow dotted line), G2B H30 along spurline shoulder in middle distance

Figure G.208 Extract from 1890s map of the northern Berry Estate, showing a single structure on the B.Fields leasehold (blue circle ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.209 Location of the site of the former tenant farm structure, based on the 1890s map (blue circle), and the alignment of rock rubble (dotted yellow line) (SHI Dapto-Ulladulla NSW Run GK9 697-5090 10/07/58)



Recording ID: G2B H59 **GDA Map Reference: 294612.6152138**

Name/Description:	**Site of former homestead former Portion 181, (Finn/Wood/Grant/Stewart/Dinning)**	*Cadastral Location*: *Street address:*	Lot 181 DP751254 - Broughton Village
Item/Site Type:	Early Nineteenth century homestead site (Archaeological deposit and remnant plantings)		

Context/setting: This site is located 80 metres south of the southern bank of Broughton Creek, on former portion 181 (parish of Broughton). It is situated at the junction of creek flats and the low gradient basal slopes of a spurline which descends towards the west. This spur forms a partial bedrock barrier along the eastern side of the valley floor, forcing the course of the Broughton Creek to turn eastwards before meeting steep slopes on the western side and turning southwards again.

Description/fabric: The site consists of a range of remnant garden plants, including a mature live pine tree, two standing pine tree stumps, and ground storey succulents. The pine trees are aligned approximately north south. An extensive area (at least 10 x 10 metres) of low mounded and aligned rock cobbles (most being alluvial in origin) are evident at the northern end of the grouping of pine trees. These appear to relate to former hearth and wall foundations.

There may be remnants of earthen building platforms situated between the tree grouping and the creek bank to the north.

Dimensions: The area of remnant plantings and surface cobbles is approximately 35 x 25 metres. This may approximate the area of the former homestead residence and immediate surrounds. A broader area which may include the location of former outbuildings has been defined as 100 x 120 metres.

Physical condition: The presence of remnant trees and garden plants, and of stone alignments and low mounds suggests that ploughing and other ground disturbance has been minimal in the area of the surviving trees. Elsewhere there is likely to have been some degree of disturbance to subsurface features from ploughing.

One mature pine tree remains alive and standing, stumps of two further examples survive. Some ground cover plants remain.

This site presents considerable archaeological potential for *in situ* and largely undisturbed remains.

Integrity: The occupation of this site as a residence may potentially extend from the 1830s, to the 1940s. The site may have undergone a number of phases of construction, renovation and/or demolition in this time. There is considerable potential for the integrity of this site, as an archaeological record of this occupation sequence.

Associated features: The above ground residential building from this site was dismantled and re-assembled to form the front section of the Brookside homestead (G2B H28). This possibly occurred sometime in the 1930s or 40s.

Current use: Agricultural pasture grassland

Heritage listings: no current listings

Historical background/interpretation:

This recording is situated in portion 181, Parish of Broughton, County of Camden. This portion was a land grant of 100 acres to Antony (or Anthony) Finn. The date of the grant was 23 Dec 1829, and was formalised by Lt Gen Sir Richard Bourke on the 27 July 1837. Authority to take possession occurred on 4 June 1830. The grant was advertised in Government Notice of 17 November 1835. Lands department documentation of the grant describes it as a 'Deed …of the situation allotted for small settler' and in 1837 lists the property name as "Finn Valley", and states that Finn was in residence (SRNSW Reel 1127 Item 27857).

There is an Anthony Finn recorded on the NSW 1828 Census. He is listed as a retired soldier, 30 years of age, and living in Kent Street, Sydney. The listing is paired, as a family grouping, with an Ann Finn, who is 29 years old. Anthony is noted as 'Came Free' and arriving in the Colony on the *Caledonia* in 1822. Ann is noted as 'Free by Servitute', having served a seven years sentence after arriving in 1818 on the *Friendship* (Sainty and Johnson 1980:146).

Lands department documentation describes Finn as "late a soldier in the Buffs (from which regiment he has been discharged)" (SRNSW Reel 1127 Item 27857 Finn; and Land Title records). 'Buffs' is a reference to the Royal East Kent Regiment which served in Australia in four separate detachments between 1823 and 1827. Anthony Finn is listed as one of the Third Regiment soldiers sent to Australia on Garrison Duty. The third detachment is reported to have left Deptford for Sydney in 1823, arriving the same year (Chapman 2010). Finn was supported by his former regiment captain, Archibald Clunes Innes, later a brigade Major, as a referee in his grant proceedings (SRNSW Reel 1127 Item 27857 Finn).

When the regiment returned to England Finn remained in Australia and joined the Police Force. He was appointed an Ordinary Constable on 19th January 1928, serving in the Cumberland area (Government Gazette Notice 25 Jan 1828, in Florance 2011:9).

Finn's Broughton Creek property is notable in that it constitutes the only land grant on the floor of the middle and lower Broughton Creek valley, which does not constitute a grant or purchase by Alexander and David Berry. It appears that Finn had already selected this land, and entered into a Bond, prior to being awarded the grant, which then allowed him to secure freehold.

Frank McCaffrey, an Illawarra historian active in the first half of the twentieth century noted that Finn's 100 acre land grant was in recognition of his role in the apprehension of a bushranger (McCaffrey 1914 in Caldwell 1999). This reference relates to the capture of William Dalton on the 22 June 1830 in the neighbourhood of Liverpool, Parramatta.

Dalton, a runaway from a government convict work gang, was one of a party of five bushrangers who were involved in a shoot out on the Windsor Road (close to its modern junction with Pennant Hills Road), with a party of at least six, persons including two wardsmen, (Wells and Samuel Horn) a constable (Ratty) and a chief constable (John Thorn). Three of the bushrangers were shot dead (Cook, Ward and McNamara), one escaped (Currey) and Dalton was later caught following some hours of tracking by Horn and Thorn. Dalton was executed at the gallows on 28 June 1830 (Alexandra and Yea Standard, Gobur, Thornton and Acheron Express, 2 Sep 1904, Uebel 2001).

McCaffrey was probably mistaken in linking the portion 181 grant with the capture of Dalton, because the grant dates from December 1829, six months prior to Dalton's capture. However, Finn's role in Dalton's capture, and his consequential reward with a further grant of lands is documented in a notice of Land Grants in April 1836:

> '32 Anthony Finn, Three hundred and twenty acres, parish of Branxton, at Anvill Creek…
> Promised to him on 1st July, 1830, by General Darling, for his zeal in capturing the bushrangers Dalton and Macnamara, and possession authorised on 1st October 1830, free of quit rent.' (Sydney Gazette and New South Wales Advertiser 5 April 1836 p.4)

In December 1836 this grant was readvertised in the name of John Thompson, with a note that it was, 'originally promised' to Finn and 'is now readvertised at his [Finn's] request in favour of the claimant' (The Sydney Gazette and New South Wales Advertiser 24 Dec 1836 p4).

Possibly as a result of a financial transaction surrounding the transfer of this subsequent grant, Finn appears to have ceased residence at Broughton Creek and subsequently leased the property, first to a William Kerr in 1837, and subsequently to Charles Edwards and Edward Bailey in 1838. The lease was in respect of "…all that Messuage or Tenement and Farm House situate in the District of Illawarra …. Called and known as Finn's Valley together with 100 acres of land thereunto belonging" (Land Title records Bk M No.904). This is the first reference to a residence on the portion.

Finn subsequently became a publican, and owned and operated several Sydney Hotels including the William Street Hotel in 1854, and the Pelican Hotel, South Head Road, prior to 1860 (The Empire 3 May 1854 p.3; Sydney Morning Herald 22 March 1860 p.3). He died in 1871 at his residence in Darlinghurst, aged 75 years, leaving a widow and five children (Sydney Morning Herald 28 November 1871 p1; Florance 2011:9).

Richard Woods (or Wood), of Shoalhaven, purchased portion 181 in 1842 for 400 pounds. The property is referred to as 'Finns Valley or the Little Meadow" (Land Title records Bk 9 No.203, but see also Elliott 2009, and McCaffrey 1914 in Caldwell 1999)). 'Dick' Woods was employed at one time as a cook on one of the boats owned by the Berry and Wollstonecraft partnership. He was joined by his brother William, a carpenter, who is reported to have built the second house erected in Goulburn (McCaffrey 1914 in Caldwell 1999). Dick Woods was remembered to have bred dairy cows and horses on the property and was considered an 'excellent horse doctor". Both of the Woods brothers had been transported to New South Wales, and neither married (McCaffrey 1914 in Caldwell 1999).

In 1866 Richard Woods of Broughton Vale, farmer, sold to George Tate, also of Broughton Vale, Farmer, for 2000 pounds (Land Title records Bk 100 No.853). A mortgage of 1000 pounds was subsequently discharged from Woods to Tate in 1870 (Land Title records Bk 100 No.855; Bk119 No.124).

McCaffrey notes that following the death of William Woods, Richard sold the farm to George Tate for 1000 pounds. The horses and cattle on the property realised 250 pounds which was "handed over" to George Adams of the Steam Packet Hotel, Kiama, 'to keep him for life – which was most faithfully carried out" (McCaffrey 1914 in Caldwell 1999).

At this time, George Tate owned a large proportion of the original Broughton Vale town subdivision which he called "The Pines" (Elliott 2009; Plan of Broughton Creek Village Reserve 1855, folio 256-672). Portion 181 thus became part of a larger estate holding and it is probable that Tate's primary residence was, and remained, elsewhere. This was most probably the homestead complex still known as *The Pines* today, situated west of the bend in the current highway 285 metres west of the Thompson Rd intersection. It is worth noting that one live and two dead mature pine trees are evident at G2B H59, suggesting that this site may have formed the Tate residence

In 1879, the portion was subdivided into two 50 acre lots, with the Broughton Creek dividing the two. The southern lot was purchased by James Mitchell of Gerringong (Land Title records Bk191 No. 56). In 1900, the northern portion was still owned by George Tate, but occupied by George Thompson. The southern lot was owned by Dinning (Crown Plan 6721-1603).

In 1914 McCaffrey noted that the property was "in the hands of the executors of the estate of George Thompson", and added that the Wiley Brothers "have a stiff mortgage over it" (McCaffrey 1914 in Caldwell 1999).

Given that the homestead site, G2B H59, is situated in portion 181, on the south bank of the creek, and in association with a track marked on the 1866 County map (and which most certainly pre-dates the Berry Estate Road constructed in 1856), there is a high probability that this site dates from its earliest European settlement under Finn, possibly from 1830 onwards. (Figures 6.216 & 6.217). The association of the homestead site with a pre 1865 track strongly suggest that it was, at least, the residence for the Woods' occupation, between 1842 and 1866. The residence may have been leased during Tate's ownership, followed possibly by a return to owner-occupation after subdivision in 1879. Later owners, south of the creek were Dinning, Stewart, and then Johnson (refer below).

Mrs Chittick, the current owner of the original portion 181 lands, south of the creek, told of the following relevant information (pers. comm. 20 Sep 2012):

- The surname Finn remains known to locals through the use of the name "Finn's Valley", a nearby gully.
- The property was purchased by Irvin and Charlie Johnson, and Mrs Johnson (Mrs Chittick's mother) in 1948, from Eddie Stewart (Jnr).
- Eddie Stewart used the property as a "dry run" for cattle, together with a larger property in Kiama. Eddie Stewart was Mrs Chittick's grandfather's cousin.
- In Mrs Chittick's grandmother's time (her father's mother) the house (the above ground structure) located at G2B H59, was purchased from the Stewarts, dismantled in sections, dragged using horse drawn skids to the present site of "Brookside" and re-assembled to form the front portion of the Brookside homestead. This portion of the home now consists of three rooms, however on an occasion when an electrician was working in the roof he commented that the structure of the roof suggested that the front room may originally have been made up of two rooms. The relocation of the G2B H59 building possibly occurred in the 1930s or 40s.
- Prior to the Stewarts owning the property, it was owned by members of the Dinning family, three sisters and a brother. The brother died, and the three sisters finally left to reside in Berry around 1904. Mrs Chittick's grandfather always referred to the property as Dinnings.
- The homestead used to include stables which were situated between the homestead and the creek, they may have been made of brick.
- There are still remnant garden plantings at the homestead site. Mrs Chittick can remember a large quince tree (possibly now dead), a pink and red rose, a large spiky Lilly and Aloe Vera plants, as well as the obvious large pine trees.
- The Hamilton family used to own the land on the north side of the creek (Mrs Chittick's fathers grandmother was a Hamilton).
- The Mitchells may also have owned land (belonging to the original portion 181).

Recording ID: G2B H59 **Site of former homestead (plantings and archaeological deposit)**

Figure G.210 General view across the southern portion of former portion 181, looking E, location of G2B H59 outlined with yellow dotted line

Figure G.211 View looking SE at G2B H59 site, showing remnant mature pine plantings

Figure G.212 Detail of remnant garden plantings (succulents in foreground) at site, looking NE

Figure G.213 Detail of aligned cobbles, probably indicative of relatively undisturbed foundations and associated archaeological deposits

Figure G.214 Extract from 1890s map of the northern Berry Estate, showing the land grant to A.Finn ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17

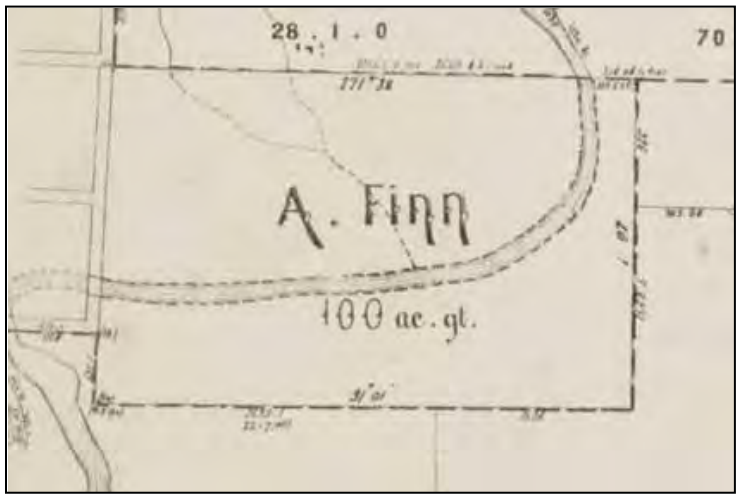
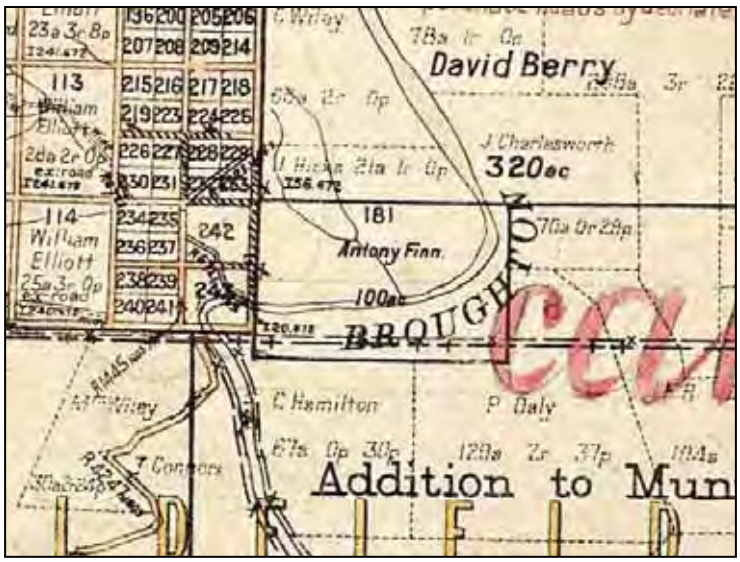


Figure G.215 Extract from 4th Edition parish map for Broughton, showing portion 181 and adjacent Broughton Village Lots (1893, cancelled 1902, Parish map preservation project ID no. 10353801)



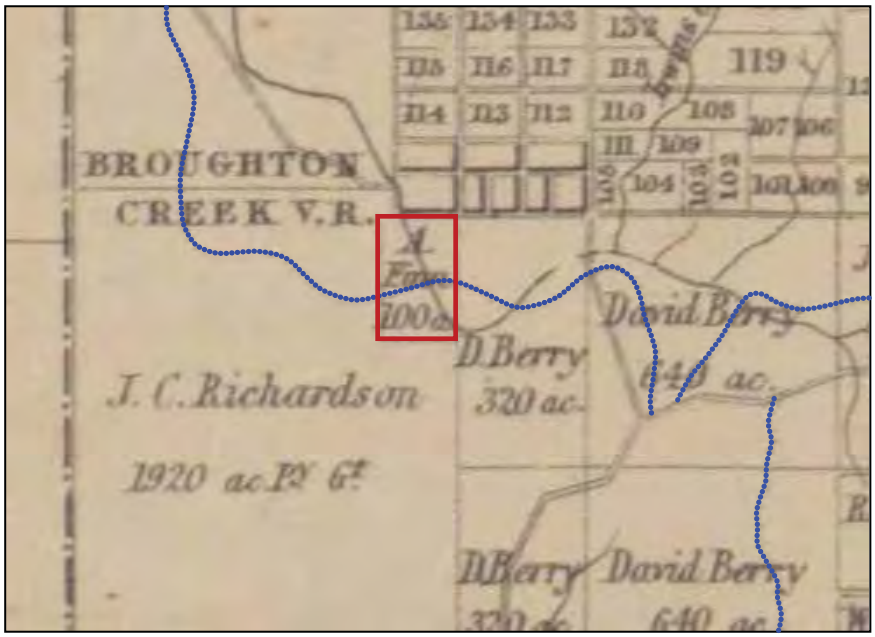


Figure G.216 Extract from County map showing location of the Finn land grant (red line), relative to: surrounding Berry Estate landholdings; and early tracks (dotted blue lines) (County of Camden, National Library of Australia (Braddock and Baly 1866))

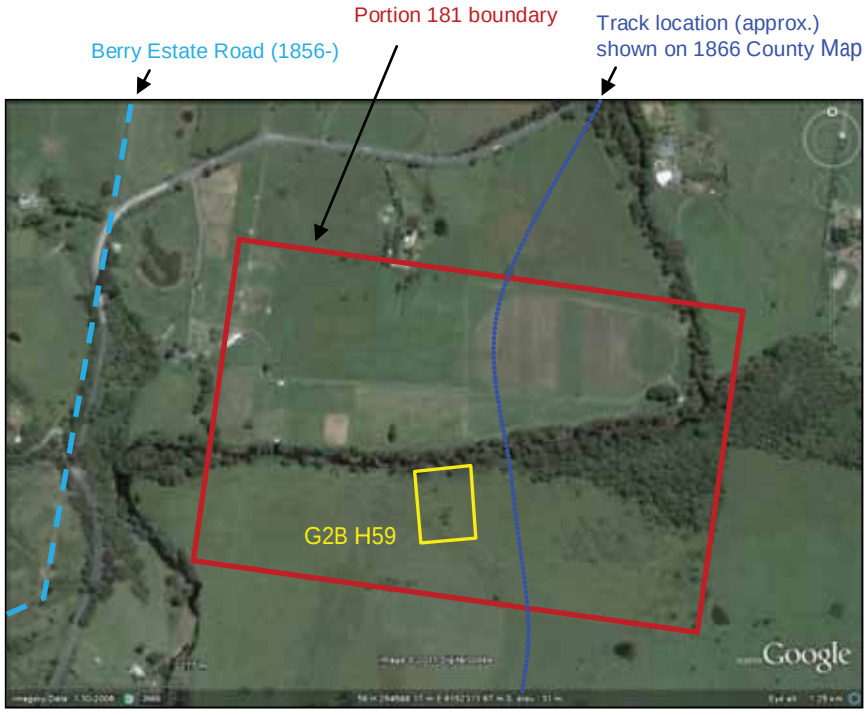


Figure G.217 Location of G2B H59 relative to former portion 181 boundary and nineteenth century tracks and roads (2006 aerial photo, Google Earth Pro 2011)

G.5 Miscellaneous sites types

Recording ID: G2B H61 **GDA Map Reference: 292261.6150863**

Name/Description:	**Quarried stone outcrop**	*Cadastral Location*:	Lot 4 DP801512
		Street address:	A350 Princes Highway Broughton
Item/Site Type:	Quarried rock outcrop		

Context/setting:	This site consists of a natural sandstone outcrop exposed within the bed of a minor tributary streamline. The outcrop forms three benches over which the stream forms a cascade, approximately two metres in total fall. The stream drains roughly southwest into Broughton Creek. The rock exposure is situated on south facing basal slopes within the Broughton Creek valley. The outcrop is situated immediately adjacent to and south of the current highway platform. A concrete highway culvert now directs water flow across the rock outcrop. It is probable that sandstone exposures of this nature, and in this low valley context, are relatively rare across the region.
Description/fabric:	The site consists of a series of three rock benches which display evidence of quarrying along their roughly vertical edges. Quarrying is indicated by a small number of vertical drill (or jumper) marks, and quarrying scars created by the removal of stone blocks from the leading edge of the benches (Figures 6.220 & 6.221).
Dimensions:	The rock exposure extends across a creek bed interval of approximately 10 metres, and averages three metres in width.
Physical condition:	The rock outcrop and quarrying features are well preserved
Integrity:	The modern concrete culvert and property fenceline above the outcrop provide modern visual intrusive elements, but overall, the integrity of the quarry features and outcrops has not been compromised.
Associated features:	The age of the quarrying is yet to be determined. If associated with early road construction, it may relate to the 1856 Berry Estate Road which at this point was located approximately along the current highway platform, immediately adjacent to outcrop. Remnants of the Berry Estate road have been recorded 45 metres to the northeast (G2B H22), and 240 metres to the west (G2B H19).
Current use:	Natural drainage line.
Heritage listings:	no current listings

Historical background/interpretation:

The age of the stone quarrying evidenced at this site is yet to be determined. There are a number of alternative interpretations of the quarrying activity:

1. Early quarrying related to the construction of the 1856 Berry Estate Road (which followed the current highway alignment at this location. Procures stone may have been used for the construction of a culvert or gutter.
2. Quarrying related to the construction of the later 1870s highway alignment, or for later upgrading or maintenance of this road.
3. Quarrying unrelated to the adjacent road, and most probably associated with construction of piers and foundations for local homesteads.

Recording ID: G2B H61 **Quarried rock outcrop**

Figure G.218 General view of quarried outcrop, during rain event, looking N

Figure G.219 View of upper rock ledge with area of drill or jumper mark indicated, looking N

Figure G.220 Detail of drill or jumper mark (yellow dotted line) and quarried edge (blue dotted line) evident on upper ledge, looking NW

Figure G.221 drill or jumper mark (yellow dotted line) and quarried edge (blue dotted line) evident across the second ledge

Recording ID: G2B H62		**GDA Map Reference:**	**289862.6149907 to 289819.6149672**
Name/Description:	**Avenue of Mature Poplar Trees**	*Cadastral Location*:	Woodhill Mountain Road easement *and/or:* Part Lot 24 DP5270 Lot 8 DP1040653
		Street address:	76 Woodhill Mountain Road Berry
Item/Site Type:	Avenue of mature Poplar Trees, Woodhill Mountain Road		

Context/setting: This avenue of trees is located on the east side of Woodhill Mountain Road between its intersection with the Princes Highway and just north of the Bundewallah Creek bridge. The terrain consists of relatively level valley floor flats and flood plain.

Description/fabric: The description of this avenue in Schedule 7 of the Shoalhaven LEP 1985 specifies nine Lombardy poplars (*Populus nigra*). The Shoalhaven Heritage Inventory includes a sketch of the avenue which makes it clear that only the nine mature poplars at the southern end of Woodhill Mountain Road are included. These trees are around 40 to 50 years old. They are absent in 1958 aerial photography, and appear as nine (only) trees in 1986 and 1992 aerial photography (NSW 2625-138 XD15 7 March 1986; NSW 3108-205 ACD15 8 Nov 1992).

Sometime after 1992, several phases of poplar tree planting are in evidence, forming avenues on both sides of Woodhill Mountain Road, north from Bundewallah Creek bridge, up to the driveway of Broughton Mill Farm Guesthouse (almost as far as the intersection with Bong Bong Road). There are twenty eight on the western side (of varying ages), and forty six on the eastern side, many very young, especially towards the northern end. Many of the trees on the eastern side of the road have been cut to protect overhead powerlines.

The mapping of heritage items associated with the 1985 Shoalhaven LEP and Draft 2009 Shoalhaven LEP includes all of the poplar trees along Woodhill Mountain Road between the Princes Highway and Bong Bong Road. This is contrary to the specification of nine trees in the Schedule, and the mapping in the Shoalhaven Heritage Inventory. As a consequence, the definition of this LEP listed heritage item is unclear. This assessment has adopted the Schedule definition and includes only the area of the original nine plantings.

Since 1992, two of the original trees have fallen and are no longer extant. Another example, the southernmost, has recently died but remains standing.

Dimensions: The original nine trees created an avenue 244 metres long. The total length of the avenue, including the additional plantings to the present time is 760 metres. The Shoalhaven Heritage Inventory states that the average height of the original poplars is 25.6 metres, and average canopy diameter is four metres.

Physical condition: Of the remaining seven of the original nine trees (from the original Schedule citation), one is dead and standing, and the remaining six, alive and standing. The health and vigour of some of the live trees may be compromised, as evidenced by the gradual attrition of three trees since 1992. These losses may be due in part to strong winds, but may also relate to structural instability and disease.

Integrity:	Due to past and recent tree losses, the remaining avenue formed by the original trees presents an incomplete and irregularly spaced avenue. The original avenue appears to have had a planting interval of approximately 12 metre.
Associated features:	-
Current use:	Roadside tree avenue, which presents a landscaped entry and departure from Berry.
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7
	Shoalhaven Heritage Inventory

Historical background/interpretation:

The original tree avenue appears to have been planted in the 1970s.

Figure G.222 General view of poplar avenue, looking S from the bridge over Bundewallah Creek

Figure G.223 View looking N from the Bundewallah Creek bridge. Note the northern most of the mature poplars at the near end of the avenue

Figure G.224 View, looking W at the same section of tree avenue shown in the figure above. Note the northern most of the mature poplars situated at the left end of the avenue shown in this picture

Figure G.225 View looking SW towards Bundewallah Creek in the late 1890s. No poplars are evident at this time along Woodhill Mountain Rd (then known as Broughton Vale Rd) and appear not to have been a feature of the roadscape until the second half of the twentieth century ("Town of Berry from Stewarts Hill" Government Printing Office , 1898 State Library of NSW d1_12472r.jpg; also Wollongong Library)

Recording ID: G2B H63 **GDA Map Reference: 288189.6149433**

Name/Description:	**Mark Radium Park**	*Cadastral Location*:	Lot 1 DP925241
		Street address:	Victoria Street Berry
Item/Site Type:	Mark Radium Park		

Context/setting:	Mark Radium Park is located at the intersection of Victoria Street and the Princes Highway, at the western margin of the town grid of Berry. The Park is located on southeast facing, low gradient basal slopes of a low spur which extends in a south-easterly direction from Berry Mountain. A small intermittent tributary stream traverses the southwestern corner of the park.
Description/fabric:	The park serves as a general recreation and rest area and includes: a public toilet block, gas BBQ, shelter and picnic furniture, car parking bays on a looped single entrance gravelled track, a shallow ornamental pond retained by a low masonry dam wall, landscaped and planted grounds, walking paths and seats. The trees and other plantings in the park follow a local area native theme. All but a small number of the established trees are relatively young. An arboretum of local endemic species has recently been established at the northern upslope end of the park. The name of the park commemorates a local champion show ring pony named “Mark Radium”, owned by Jack McGee. An outline of the pony’s story is provided on a park sign (Figure G.226). The pony held high jump records at Adelaide, Albury and Melbourne (1938) and between 1947 and 1955 competitions was beaten only once. He was 23 in his last year of competition (1955). Although Mark Radium was foaled in 1932 at Taree, he was stabled at Berry during non-competitive times.
Dimensions:	Approximately 170 x 107 metres
Physical condition:	Good condition – eastern abutment of pond wall is leaking.
Integrity:	not applicable
Associated features:	-
Current use:	Community space - public recreational park and rest area
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7 Draft Shoalhaven Local Environmental Plan 2009 – Schedule 5 Shoalhaven Heritage Inventory

Historical background/interpretation:

The park was initially developed by the Berry Apex Club and some years later handed over to the Shoalhaven Shire Council. The park continues to be developed with the aid of Landcare grants and community volunteers.

The park was established on the site of the old pound.

Figure G.226 View of park sign at southern entrance to park

Figure G.227 Park area (blue line) relative to 1958 aerial image (SHI Dapto-Ulladulla NSW Run GK11 699-5039 23/07/58)

Figure G.228 Park area on 2006 aerial image (Google Earth Pro 2011)

Recording ID: G2B H54		**GDA Map Reference:**	**296197.6152799 to 296152.6153045**
Name/Description:	**Dry Stone Wall**	*Cadastral Location*: *Street address:*	Lot 2 DP224377 455 Princes Highway Broughton Village
Item/Site Type:	Dry stone wall, Toolijooa Ridge		

Context/setting:	This site consists of a section of dry stone wall located approximately along the western (upslope) boundary of the current highway easement where it traverses the upper slopes of the Toolijooa Ridge.
Description/fabric:	Access to the wall is currently severely limited by dense overgrowth. As a consequence, the remaining length of the wall and its condition over that interval remains to be confirmed. The wall is accessible and visible in only a small number of places. Based on limited observation, and an interpretation of the contouring of the densely vegetated western side of the highway easement, it is possible that an approximately 230 metres section of wall may be present. The wall appears to vary in height above the road, from roughly level or below at its southern end, where it appears to end at a small gully, and up to three metres above mid way along its possible length. Based on observations at its southern end, the wall appears to have been constructed using the 'double dyke' technique which is characteristic of the Kiama and Foxground walls (Figures 6.229 & 6.234). The wall is currently acting as a partial retaining wall, with a substantially higher ground level on the upslope side. It is unclear however if the wall was constructed with this function in mind, or downslope soil creep has created this effect.
Dimensions:	The base of the wall is approximately 1.0 metres to 1.2 metres wide and the height roughly 1.1 metre. The confirmed length of wall is in the order of 100 metres. The potential surviving length is around 230 metres.
Physical condition:	Areas of partial collapse and missing copestones are noted. The full condition of the wall remains to be documented. The wall is no longer relied upon to define or enforce an enclosure.
Integrity:	Yet to be determined.
Associated features:	-
Current use:	Disused, partially ruined
Heritage listings:	The Kiama Municipal Council considers that all dry stone walls within the Kiama Local Government Area are included within a listed item for 'dry stone walls' on Schedule One (Items of Environmental Heritage) of the Illawarra Regional Environmental Plan No. 1 (first gazetted in 1986) (pers. comm.. Andrew Knowlson, Director of Environmental Services, Kiama Municipal Council, 5 Oct 2011). This Schedule listing consists of: 'Dry stone walls, Jamberoo, Dunmore and Foxground Areas, Kiama.' Given the reference to specific areas, the degree to which this definition is inclusive or exclusive of walls elsewhere across the Kiama LGA remains ill-defined. The Draft Kiama LEP 2010 (Kiama Heritage Inventory), contains an inclusively defined item for all 'stone walls' in the Kiama Local Government Area.

Historical background/interpretation:

The following historical outline has been drawn from Mayne-Wilson 1998, 2000; and RTA Environmental Technology 2006).

As part of the land clearing process, loose and surface rock was often removed and d. Where the collected rock was of a suitable quality, this practise provided a ready resource for early landowners to define property boundaries and enclose sections of their properties through the construction of dry stone walls. The earliest examples were probably built using convict labour or by early farmers in the 1840s lacking technical knowledge of dry stone wall building. As a result, it is expected that few walls of this period have survived (Mayne-Wilson 1998: 2).

The earliest skilled stone wall builder in the Kiama region is recognised as being Thomas Newing (1832 – 1927), who arrived from Kent in 1857 aged 22. Newing was taught stone wall building by Mr W. Cook of Longbrush (south of Kiama), and built his first wall in Foxground that same year. He soon perfected the 'double dyke' or twin skin technique of dry stone wall construction, and after 18 months began to undertake work independently throughout the region, having been said to have surpassed the skills of Mr Cook (Mayne-Wilson 1998: 3). This method, which is well distributed throughout Kiama, consists of two walls leaning toward each other (in an A-frame), with smaller stones used as infill, and heavier coping stones laid on top to bind the walls together (Figure G.229). The walls were generally built for the demarcation of property alignments, both along roads and Lots, as well as internal subdivisions.

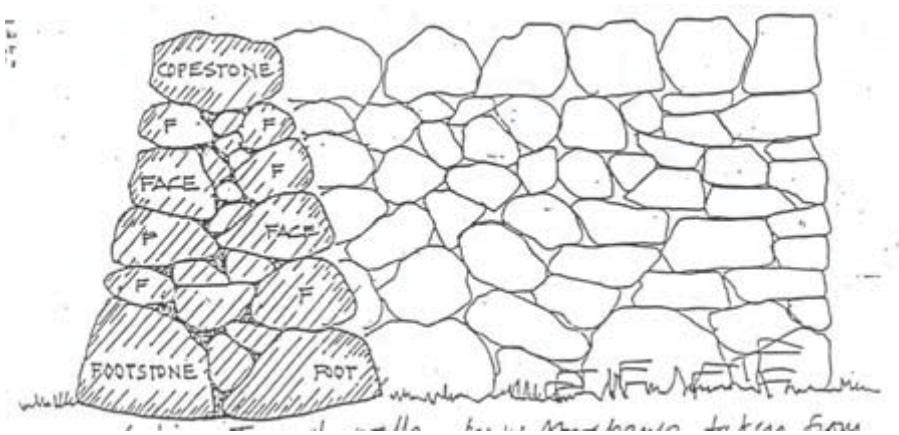


Figure G.229 Diagram illustrating the typical form of a 'double dyke' dry stone wall (from Register of the National Trust inventory listing for 'Dry Stone Walls Conservation Area' Kiama, In RTA Environmental Technology 2006)

From an account in the Sydney Morning Herald (24th March 1936), Newing's son Thomas, recounted that following the successful construction of a stone wall for Mr Joseph Pike of Kiama, his father sought to master the trade, and later became an expert at it. He was noted for his skill in manipulating the local stone and for his ability to interlock the facing stones to attain maximum stability and strength. Having generated interest from local landowners, Newing continued to construct walls around Kiama with his son until 1917, aged 85. Newing Jr stated that his father was responsible for the creation and/or overseeing of 95% of the stone walls in Kiama, with other wall builders of the time, Prott and Dietz, unable to compete to the same degree (Mayne-Wilson 1998: 16).

Stone walls were built extensively until 1880, when wire became cheaply available for fencing.

In a 2000 study commissioned by the Kiama Shire Council, Mayne-Wilson and Associates aimed to locate, record and assess the heritage values of every wall within the Shire. Over a three month period 379 walls were located and recorded (Mayne Wilson and Assoc 2000). Five different types of walls were identified:

- Roadway boundaries.
- Lot and paddock boundary fences (the most numerous).
- Holding yards (often found surrounded by stands of cultural plantings).
- Retaining walls (uncommon).
- modern examples (including town markers and private constructions in suburban subdivisions).

The G2B H54 wall has not been formally recorded before and does not appear in the inventory of known walls within the Mayne-Wilson 2000 study. It is the only dry stone wall as yet to be formally recorded on the Toolijooa Ridge. Given the surface geology of the ridge crest, there is potential for other dry stone walls to be present, although no obvious examples are visible on aerial photography (including the G2B H54 example).

The alignment of the G2B H54 wall along the upslope boundary of the highway easement suggests that it served as a roadway boundary. An alternative, or additional function, would be as a retaining wall on this steep slope. The close association with the current highway corridor provides a maximum age of approximately the 1870s - the period when the current highway alignment, replaced the Berry Estate Road, which is situated on the spur crest some 80 metres to the south. The construction of this wall may have been a component of the 1870s highway alignment, or subsequently sponsored by the Berry Estate for a leasehold farm, or by a freehold farmer following the sale of the farm around the turn of the twentieth century.

These potential time frames place construction within the active career of Thomas Newing, however further research and site recording is required before this wall can be linked with the Newing legacy.

Figure G.230 General view of the Princes Highway corridor, just east of the Toolijooa Ridge crest, looking S. A dry stone wall, obscured by vegetation, is located approximately along the western road easement boundary (yellow dotted line)

Figure G.231 General view of the Princes Highway corridor, east of the Toolijooa Ridge crest, looking NW. A dry stone wall, obscured by vegetation, is located approximately along the western road easement boundary (yellow dotted line)

Figure G.232 Extract from 1890s map of the northern Berry Estate, with an overlay of the approximate location of the G2B H63 dry stone wall (blue line. The condition and extent of the northern end of the wall is yet to be determined ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.233 Detail of dry stone wall , looking NW from near the southern known extent of the wall. Note partial collapse in foreground and large foot stones

Figure G.234 Detail of dry stone wall , looking NW from near the southern known extent of the wall. . Note clear double-dyke technique and higher ground level on upslope side of fence

G.6 Movable items

Recording ID: G2B H60 **GDA Map Reference: 294536.6152562**

Name/Description:	**Skid mounted work-site shed**	*Cadastral Location*:	Lot 9 DP3344
		Street address:	161 Princes Highway Broughton Village
Item/Site Type:	**Skid mounted work-site shed**		

Context/setting:	This recording is a movable (towable) shed, currently located at the rear (southeastern end) of the Greystanes Lodge farmhouse, 161 Princes Highway, Broughton Village.
Description/fabric:	The shed consists of a rectangular sawn hardwood stud frame clad with corrugated iron on the exterior walls and roof (painted green), and masonite panelling on the interior (painted cream). The floor is hardwood boards. The roof has a single slope, elevated on the door side. A single window is set on one side, opposite a ply and cross-boarded single door. The window is protected by a metal grid mounted over the exterior of the window. Two cupboards (now missing doors and shelves) have been installed into the two corners on the right side of the door, and a bench top spans the two cupboards. Two hardwood skids, separated and supported by two horizontal metal supports and a diamond configuration of angle iron, have been attached to the floor beams parallel to the long axis of the shed Use of the shed in the past as a horse bridle and tackle shed has been accompanied by the fixing of multiple wooden boards around the walls to fix nails and hooks for hanging items.
Dimensions:	The shed has approximate dimensions of 2.3 x 3m and up to 2.3 metres high
Physical condition:	The shed is in relatively good condition with the exception of some missing and torn sections of the masonite cladding on the interior (window) wall and, all of the ceiling cladding. A limited amount of paint and spirit felt tip pen graffiti is evident on the interior walls. Some related to the recent use as a horse tackle shed.
Integrity:	The cupboards installed into two corners of the shed and associated bench appear to be contemporaneous with the construction of the shed. Apart from the superficial addition of wall boards to affix hooks and nails, there does not appear to have been major additions or renovations to the shed. The original exterior swing bolt door latch has been replaced for a larger example.
Associated features:	-
Current use:	Ad hoc storage (especially for swimming pool equipment and supplies.
Heritage listings:	no current listings

Historical background/interpretation:

Masonite was invented in the USA in 1924 and production started in 1925. It was licensed for production in Australia and became available from 1931 (http://www.fundinguniverse.com/ company-histories/Masonite-International- Corporation-Company-History.html; http://mileslewis.net/australian -building/pdf/05-timber-frame/5.11%20bldg%20boards.pdf).

The 1930s are thus a maximum age for this structure. It is considered likely that by the 1960s metal framed and prefabricated sheds would have replaced this form. The utilitarian character of this structure, including the window grill, and absence of air vents, suggests a function as a storage or low frequency works shed/site office for a building site or other industrial activity area. The installation of skids points to a need for flexibility in positioning and ease of re-location. These all point to an original function as an on-site work shed or office at a construction site or depot. Skids are still used on work sheds today.

The materials, construction, colour, fittings all suggest a 1940s or 50s origin.

Figure G.235 Exterior of shed and door side, viewed from a corner

Figure G.236 Detail of metal grid over window

Figure G.237 Detail of the metal cross bracing between the wooden skids and floor

Figure G.238 Interior views, showing interior of door and cupboards and bench constructed at one end.

Figure G.239 Interior view showing damage to interior wall cladding and addition of wall boards for hanging items

Figure G.240 Detail of wood skid mounted below floor (door side)

Appendix H

Detailed significance assessment

Detailed significance assessment

H.1 Nineteenth century road remnants

Recording ID:	**G2B H19, 22, 23, 27, 30 & 55**	**Name/*Description*:**	**Remnants of Berry Estate road (c.1856 – 1870s)**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The nineteenth century remnants of the Berry Estate road are examples of a former transport corridor that was locally important as the first north-south communication route that moved inland and bypassed Seven Mile Beach. These remnants are also important as an example of a private road that was distinctive in its use of long straight sections, which often traversed steep spurs and ridges without apparent regard for the consequentially steep gradients. The Berry Estate road is also important as a transport corridor that has in many places been retained to the present day by the current Princes Highway alignment.

The six remnants (G2B H19, 22, 23, 27, 30 and 55) of this road identified in the course of this project are all assessed to be of local importance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The remnants of the Berry Estate road have a strong association with Messrs Alexander and David Berry, who were instrumental in the private construction of this road. Alexander and David were also of local importance due to their prominent role in European settlement. They were key figures in the nineteenth century development of the lower Shoalhaven through their development and promotion of their estate lands. This included the establishment of private towns, promotion of local industry and development of agricultural infrastructure.

The six remnants (G2B H19, 22, 23, 27, 30 and 55) of this road identified in the course of this project are all assessed to be of local importance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The nineteenth century remnants of the Berry Estate road are not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. These items are assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the remnant sections of the Berry Estate road. These items are assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The remnant sections of the Berry Estate road have the potential, both individually and as a group, to yield information that would contribute to an understanding of nineteenth century road construction and use. In particular, these items have the potential to provide insights into the nature of what was once a ubiquitous road type, but for which relatively little information or evidence is readily available.

A combination of archaeological excavation and survey could potentially provide information on road dimensions, pavement types, methods of construction, drainage and other aspects of design, phases of modification and site chronology.

While all six of the road remnants identified in the course of this project are assessed to have local significance against *criterion e*, it is noted that items G2B H23, 27 and 30 are all particularly good examples with relatively good integrity.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Examples of nineteenth century private roads are a relatively little known site type. Moreover, the once ubiquitous bullock dray roads that provided one of the primary transport routes between many nineteenth century settlements are rarely preserved/identified. It is also unusual to be able to identify a series of road sections such as these that can all be traced to the same road alignment at a fairly discrete period in time.

The six remnants (G2B H19, 22, 23, 27, 30 and 55) of this road identified in the course of this project are all assessed to be of local importance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The remnant nineteenth century road sections are important as local examples of bullock dray routes; they are also locally important as examples of the private road established by Alexander and David Berry across the Berry Estate. Item G2B H23 is of note as the longest and best conserved example identified. G2B H27 is notable for containing a series of straight section, which are characteristic of the Berry Estate road. G2B H30 is important as an example that demonstrates both shallow road cuttings and well defined sections of road with side ditches. G2B H55 notable as a remnant that is easily discernible due to the significant relief of its features.

Four (G2B H23, 27, 30 and 55) of the six remnants of this road identified in the course of this project are assessed to be of local importance against *criterion g*. Items G2B H19 and 22 are assessed as not having significance against this criterion.

Assessment of constituent elements

Element	Grading	Justification
G2B H19	Moderate	Comprises vestigial remnants
G2B H22	Moderate	Is a relatively small section that is used as a modern track - contributes to the overall significance of this group of items.
G2B H23	High	Large, well conserved remnant
G2B H27	High	Series of original characteristic straight segments
G2B H30	High	Well preserved road section that displays side ditches and varying ground relief
G2B H55	High	Readily discernible road remnant

Statement of heritage significance:

The remnant sections of the nineteenth century Berry Estate road are representative and relatively rare examples of a transport corridor that was locally important as a private road and as the first inland route that bypassed Seven Mile Beach.

These road remnants have a strong association with Messrs Alexander and David Berry, who were of local importance due to their prominent role in European settlement. They also display the potential to yield information, through archaeological excavation and survey, that would contribute to an understanding of nineteenth century road construction and use.

H.2 Twentieth century highway remnants

Recording ID:	**G2B H12, 15, 18, 20, 21, 24, 26 & 57**	**Name/*Description*:**	**Remnant portions of twentieth century highway**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The section of remnant highway at G2B H26 was established in the late nineteenth century; it replaced the 1856 Berry Estate road and was in use until the 1930s. This item encompasses a corner that was known as "Binks' Corner", a danger spot that was eventually bypassed in 1936. This recording is locally important as an example of significant changes to the road network, including modifications in response to dangers for motorised transport on a road initially developed for non-motorised transport.

Item G2B H26 is assessed as being of local significance against *criterion a*.

Items G2B H12, 15, 18, 20, 21, 24 and 57 are assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The remnant highway at G2B H26 is directly linked to a family of local importance: the Binks Family. The name, T. Binks, presumably Thomas Binks, is listed on an 1890s map as the tenant farmer of 128 acres of upper catchment slopes within the Berry Estate. The Binks' were also a large family who made a lasting contribution to the local and wider community through the dairy industry. The link between the Binks family and G2B H26 is demonstrated by the fact that the tight corner within this remnant portion of highway is known as "Binks' Corner"; it owes its name to its proximity to the Binks Family property, *Sedgeford* (G2B H24)

Item G2B H26 is assessed as being of local significance against *criterion b*.

Items G2B H12, 15, 18, 20, 21, 24 and 57 are assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The twentieth century highway remnants are not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. These items are assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the remnant sections of the twentieth century highway. These items are assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

Items G2B H20, and 21 are remnant sections of the 1930s highway that appear to be relatively well preserved. It is likely that further investigation, such as archaeological survey and excavation, would contribute to an understanding of construction standards and tolerances of a main road corridor from the first half of the twentieth century.

Similarly, G2B H26 appears to be a well preserved and relatively extensive section of road. Further investigations at this item may reveal whether culverts exist in association with the creek crossings, and if any original road surface has survived, which would in turn contribute to an understanding of early twentieth century highway design and construction.

Items G2B H20, 21 and 26 are assessed as being of local significance against *criterion e*.

Items G2B H12, 15, 18, 24 and 57 are assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Items G2B H15 and 26 are both notable for their rarity. G2B H15 is unusual as a portion of the early twentieth century highway (alignment formalised in the 1880s) that is preserved as a sealed section of road that, while no longer part of the Princes Highway, remains in use for access to private properties. This item retains many features of the 1950s highway easement.

The recording G2B H26 is unusual as a relatively well preserved example of an early twentieth century danger spot on the highway. It is rare to have an extant section of road that is directly associated with a fatal accident from the early years of motorised transport.

Items G2B H15 and 26 are both assessed as being of local significance against *criterion f*.

Items G2B H12, 18, 20, 21, 24 and 57 are assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The remnant sections of twentieth century highway at G2B H15 and 26 are important in demonstrating the principal characteristics of late nineteenth century road alignments and early twentieth century road design and construction (specifically the characteristics of 1930s (G2B H26) and 1950s (G2B H15) highway easements). As outlined above, these items are relatively rare, which adds to their importance as items that display these characteristics.

Items G2B H15 and 26 are assessed as being of local significance against *criterion g*.

Items G2B H12, 18, 20, 21, 24 and 57 are assessed as not having significance against this criterion.

Assessment of constituent elements

Element	Grading	Justification
G2B H12	Little	Poorly preserved, difficult to interpret
G2B H15	Moderate	Well preserved section of road that displays elements of the 1950s highway easement.
G2B H18	Little	Poorly preserved, difficult to interpret
G2B H20	Moderate	Relatively well preserved corner from the turn of the century; has the potential to contribute to overall understanding of the twentieth century highway.
G2B H21	Moderate	Relatively well preserved corner from the turn of the century; has the potential to contribute to overall understanding of the twentieth century highway.
G2B H24	Little	Poorly preserved, difficult to interpret
G2B H26	High	Well preserved section of road that is integral to the overall significance of this group of items.
G2B H57	Little	Poorly preserved, difficult to interpret

Statement of heritage significance:

The twentieth century road remnants comprised by the recordings G2B H15, 20, 21 and 26 form an important example of elements of early twentieth century highway design, construction and modification.

In particular, G2B H26 is important in the course of local highway upgrades; it is also directly associated with the Binks, an early tenant farming family that is of importance due to its involvement with the development of the local dairy industry.

Items G2B H20, 21 and 26 all have the potential to yield information regarding standards in early twentieth century road design and construction, and G2B H15 and 26 are notable in terms of their rarity and representativeness.

Remnant recordings G2B H12, 18, 24 & 57 all fall below the threshold of significance defined in the assessment criteria.

H.3 Standing buildings and structures

Recording ID: G2B H10 **Name/*Description*: Cottage (72 North St. Berry)**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The cottage at G2B H10 was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The cottage at G2B H10 does not have strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The cottage at G2B H10 is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the cottage at G2B H10. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The cottage at G2B H10 does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Early twentieth century cottages such as the one at G2B H10 are a relatively common site type. There are numerous local examples of such buildings. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The cottage at G2B H10 is not a good example of its type, it has few original exterior materials or features. This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The cottage at G2B H10 does not meet any of the significance criteria. This item falls below the threshold for heritage listing.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The house at G2B H11 was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The house at G2B H11 does not have strong or special association with the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The house at G2B H11 is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the house at G2B H11. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The house at G2B H11 does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The house at G2B H11 is not rare or uncommon. There are numerous local examples of Federation period farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The *GlenDevan* house is a well conserved example of Federation architecture and it is representative of accommodation constructed late in the history of the Berry Estate. As such, G2B H11 is important in demonstrating the principal characteristics of a Federation period tenant farm house on the Berry Estate.

The house at G2B H11 is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The *GlenDevan* house (G2B H11) is of local significance as a representative example of Federation period housing on the Berry Estate.

Recording ID: G2B H13	Name/*Description*:	Burnett Estate Overseer's Cottage

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The overseer's cottage at G2B H13 was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The overseer's cottage at G2B H13 does not have strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The overseer's cottage at G2B H13 is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the overseer's cottage at G2B H13. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The overseer's cottage at G2B H13 does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The overseer's cottage at G2B H13 is not rare or uncommon. There are numerous local examples of early twentieth century cottages. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

With the exception of the enclosed verandah, the overseer's cottage at G2B H13 is in original condition. It is a very good example of an early twentieth century, horizontal weatherboard cottage and is typical of an overseer's cottage from this period.

The Burnett Estate Overseer's Cottage at G2B H13 is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The Burnett Estate Overseer's Cottage at G2B H13 is a well preserved and locally representative example of an early twentieth century weatherboard overseer's cottage.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

Mananga Homestead is of local historical importance as the former residence for the Berry Estate Manager. It was a key component of the Berry Estate and as such is of integral importance to the course of the history of the estate.

This item is also of local importance as a component of the development and operation of Broughton Creek village.

G2B H16 is assessed to be of local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The original 'Mananga Cottage' was built for William Stewart, who was an individual of local importance. He was an acquaintance of David Berry and he helped control the Berry Estate through his role as first Commissioner of Peace for the Broughton district. William's brother, Donald, was the first Post Master at Berry, the Post Office being 'Old Mananga Cottage'.

William's son John purchased the Mananga land following the break-up of the Berry Estate. He built the existing 'Mananga Homestead', within which he set up his office as the first registered auctioneer in NSW.

William and John were also both involved in the formation of the Municipality of Broughton Creek and Bomaderry and the establishment of the local Agricultural Society and the School of Arts.

The Mananga homestead remained in the ownership of the Stewart family until 1992.

Due to this item's association with the Stewart family, and in particular William, Donald and John, G2B H16 is of local significance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

Mananga Homestead has landmark qualities and is important in demonstrating a Federation Queen Anne homestead with Art Nouveau character within in a mature garden setting.

G2B H16 is assessed as being of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Mananga Homestead complex at G2B H16. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

G2B H16 comprises a series of buildings that relate to a variety of activities and phases of occupation from the nineteenth century through to the present day. The site also includes traces of water race for the 1830s Berry Estate saw mill.

Further investigation in the form of archaeological survey and excavation would be likely to yield information that would contribute significantly to an understanding of the history and development of Mananga homestead, Broughton Village, the Berry Estate mill and the Berry Estate as a whole.

Mananga Homestead is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The Mananga homestead complex is not rare or uncommon. There are numerous local examples of late nineteenth to early twentieth century homesteads. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The Mananga homestead complex demonstrates the principal characteristics of a site that has been occupied and modified over various phases since the early nineteenth century, including an accretion of outbuildings and a shift in location of the main house from 'Mananga Cottage' to the current 'Mananga Homestead'. The current homestead is also an excellent example of a Federation Queen Anne style house with Art Nouveau character.

G2B H16 is assessed as being of local significance against *criterion g*; it is representative of its type.

Assessment of constituent elements

Element	Grading	Justification
Old Mananga	Exceptional	An integral component of the complex that is linked to William, Donald and John Stewart.
Mananga Homestead	Exceptional	An excellent example of its type, readily interpretable, directly linked to John Stewart.
Outbuildings	Moderate	Important in understanding the site complex as a whole, not of direct heritage significance on their own
Mill race deposits	High	An important component of the complex that has direct potential to yield information.

Statement of heritage significance:

The Mananga Homestead and the broader site complex are of local historical importance due to their role in the course of the history and development of the Berry Estate and Broughton Creek Village. Mananga Cottage and Mananga Homestead are both directly linked to important members of the Stewart Family, and as such have a strong and special historical association.

The complex as a whole, and the Mananga Homestead in particular, display landmark qualities and are important in demonstrating aesthetic characteristics of a Federation period homestead. The site also has the potential to yield information that would contribute significantly to an understanding of the history of and development of the site, the Berry Estate and Broughton Creek Village. Of particular note is the existence of traces of the water race from the 1830 Broughton Creek saw mill.

This item is also locally representative of a complex with multiple phases of occupation and a Federation Queen Anne style farm house with Art Nouveau character.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Hillview* homestead is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Hillview* homestead does not have strong or special association with the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Hillview* homestead is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Hillview* Homestead. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The homestead at *Hillview* is an example of a relatively early vertical slab 'L' shaped house from the Berry Estate. It is likely that archaeological/architectural survey of the building, and possibly even excavation of associated deposits, would yield significant information regarding the construction techniques, influencing styles, and occupation phases. Investigations of this nature would contribute to an understanding of the organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

G2B H17 is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

This item is a well preserved example of an early slab house from the Berry Estate. While the sites of structures of a similar age are known to occur locally (eg G2B H52), examples of extant buildings such as this, particularly slab structures, are rare.

G2B H17 is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The *Hillview* homestead is a relatively well preserved example of a vertical (sawn) slab homestead with hipped roof and five original rooms on a revered 'L' shaped plan with kitchen forming the back wing. It is characteristic of a Scottish style of house layout that appears to be associated with the Berry Estate.

This item is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The *Hillview* homestead is a locally rare and representative example of a mid-nineteenth century slab house from a Berry Estate tenant farm. It is characteristic of a Scottish style of house layout and it has the potential to contribute, through archaeological survey/excavation to an understanding of organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Sedgeford* homestead and gardens were not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Sedgeford* homestead and gardens were established by Thomas Binks and Mary Hetherington. The Binks' were a large family who made a lasting contribution to the local and wider community through the dairy industry. All of Thomas and Mary's daughters were married in the front room of the homestead.

This item is assessed as having local significance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Sedgeford* homestead and gardens are not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Sedgeford* homestead and gardens. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The *Sedgeford* homestead and gardens do not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The *Sedgeford* homestead and gardens form a relatively common site type. There are numerous local examples of Federation period farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

While the *Sedgeford* homestead and gardens are not a rare site type, G2B H25 is representative of an early twentieth century dairy farm in association with a disused highway alignment; it retains well preserved examples of the Federation period homestead and the associated gardens.

G2B H25 is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The *Sedgeford* homestead and gardens have a strong and special association with the Binks Family, a well-known local family who have, since the beginning of the twentieth century, made a lasting contribution to the local and wider community through the dairy industry.

G2B H25 is representative of an early twentieth century dairy farm in association with a disused highway alignment; it retains well preserved examples of the Federation period homestead and the associated gardens.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The Brookside homestead was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The Brookside homestead comprises two salvaged structures, one of which appears to be from portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. Anthony Finn was an individual of local importance as someone granted land, due to his role in the apprehension of a bushranger, in an area dominated by larger estates. The element of the homestead that originates from portion 181 appears to date to the mid to late nineteenth century, and as such is unlikely to be the original Finn residence; it is more likely the residence of Dicky Woods, who does not have the same level of local importance.

On the basis of the available information from research and field survey, G2B H28 cannot be definitively assessed against this criterion. It appears unlikely to be of significance against *criterion b,* however this may be revised if stronger link can be established between this site and Anthony Finn.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Brookside homestead is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Brookside homestead. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The sandstone retaining walls and earth platforms that mark the location of former structures and yards, notably in association with a former dairy, and a former structure on slopes to the south of the tributary stream at G2B H28 have the potential to yield information, through archaeological excavation and survey, that will contribute to an understanding of the history of the local dairy industry.

The Brookside homestead comprises two salvaged structures, one of which appears to be from portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. This portion is somewhat unique in the local area as an example of an early small farm that was not a tenant farm of one of the larger estates. As such, investigation and analysis of the Brookside homestead's constituent elements, in particular the section from portion 181, may yield information that will help in interpretation of deposits at G2B H59.

The Brookside homestead is assessed as having local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The Brookside homestead is a relatively common site type. There are numerous local examples of similar early twentieth century farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The retaining walls, earth platform and yards associated with the former dairy at G2B H28 have the potential to be representative of archaeological remains of an early twentieth century dairy.

This item is assessed as potentially having significance against *criterion g*.

Statement of heritage significance:

The Brookside homestead comprises two salvaged structures, one of which appears to be from portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. Investigation and analysis of the Brookside homestead's constituent elements, in particular the section from portion 181, may yield information that will help in interpretation of deposits at G2B H59.

The archaeological traces of former structures, including a dairy, at G2B H28 have the potential to yield information that will contribute to an understanding of the history of the local dairy industry. They also have the potential to be representative of such a site.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The Broughton Creek Bridge was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The Broughton Creek Bridge does not known for any strong or special association with the life or works of anyone of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Broughton Creek Bridge embodies the design principles and construction techniques applied to modest concrete bridges during the period 1925-1948, being a sturdy structure of a standard concrete beam design, poured on site and neatly finished. The widened bridge represents an excellent adaptation to achieve a wider deck without the need for additional piers, and has retained the spacious and clean lines of the original structure, with most of the original fabric remaining unaltered, and the views to and from the structure, which allow its interpretation, have been maintained.

G2B H29 is assessed as being of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Creek Bridge. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The bridge has the ability to contribute to an understanding of heritage conservation itself and to sympathetic approaches to the continued use and adaptation of older structures.

G2B H29 is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

This bridge is apparently unique in its method of widening which has minimised the impact of supporting the extra width on the basic structural support system.

G2B H29 is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Although widened, the bridge retains the capacity to demonstrate the key structural and aesthetic characteristics of reinforced concrete beam bridges of the period 1925-48.

G2B H29 is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The Broughton Creek Bridge's construction is associated with the grand scheme of highway improvement undertaken by the Main Roads Board cum Department of Main Roads in an attempt to bring the State's main roads up to the standard required by the modern motoring age emerging in the inter-war period. As a widened bridge, it represents the continual process of upgrading required in response to the increased volume, weight and speed of traffic on this busy highway.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Glenvale* homestead is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Glenvale* homestead does not have strong or special association with the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Glenvale* homestead is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Glenvale* Homestead. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The homestead at *Glenvale* is an example of a relatively early vertical slab 'L' shaped house from the Berry Estate. It is likely that archaeological/architectural survey of the building, and possibly even excavation of associated deposits, would yield significant information regarding the construction techniques, influencing styles, and occupation phases. Investigations of this nature would contribute to an understanding of the organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

G2B H45 is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

This item is a well preserved example of an early slab house from the Berry Estate. While the sites of structures of a similar age are known to occur locally (eg G2B H52), examples of extant buildings such as this, particularly slab structures, are rare.

G2B H45 is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The *Glenvale* homestead is a well preserved example of a vertical (sawn) slab homestead with hipped roof and five original rooms on a revered 'L' shaped plan with kitchen forming the back wing. It is characteristic of a Scottish style of house layout that appears to be associated with the Berry Estate.

This item is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The *Glenvale* homestead is a locally rare and representative example of a mid-nineteenth century slab house from a Berry Estate tenant farm. It is characteristic of a Scottish style of house layout and it has the potential to contribute, through archaeological survey/excavation to an understanding of organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

St Patrick's Church and grounds is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

St Patrick's Church is not notable in terms of a strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

St Patrick's Church is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

St Patrick's Church (constructed 1936), and associated grounds, has a history of association with the Catholic Church dating back to the 1880s, when the original weatherboard church was built on this site. It continues in use as a Church and the convent is used as a Church centre.

Due to this continued strong association with the local Catholic community this item is assessed as being of local significance against *criterion d.*

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

St Patrick's Church and grounds do not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The former St Patrick's Convent is a locally rare item. Examples of convents are uncommon.

This item is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

St Patrick's Church and former Convent are locally representative in terms of an early twentieth century Catholic site complex and inter-war religious architecture.

G2B H47 is assessed as being of local significance against *criterion g*.

Assessment of constituent elements

Element	Grading	Justification
St Patrick's Church	High	The Church is a well preserved and integral component of this site; it is readily interpreted and continues in use.
St Patrick's Convent	High	This is an excellent example of a locally rare site type.

Statement of heritage significance:

St Patrick's Church and grounds, including the former St Patrick's Convent, are strongly associated with the local Catholic community; the site has been associated with the Catholic Church since the late nineteenth century.

The former convent is a locally rare site type and the complex as a whole is representative of inter-war religious architecture and a Catholic site complex.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Oakleigh* homestead at G2B H49 is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Oakleigh* homestead at G2B H49 does not have strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Oakleigh* homestead at G2B H49 is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Oakleigh* homestead at G2B H49. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The *Oakleigh* homestead does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The *Oakleigh* homestead is not rare or uncommon. There are numerous local examples of 'inter war' period farmhouses. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The farmhouse at *Oakleigh* homestead is in excellent condition and retains its original 1930s configuration, including the characteristic incorporation of many pre 1930s architectural items that were recycled. This building is representative of construction from this period.

The *Oakleigh* homestead is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The homestead at G2B H49 is locally representative of 1930s farm house construction. It is a well preserved example of its type.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Clare May* Cottage was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Clare May* Cottage is not known for any strong or special association with the life or works of anyone of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Clare May* Cottage is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Clare May* Cottage. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The *Clare May* cottage does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The *Clare May* Cottage is a relatively common site type. There are numerous local examples of similar late nineteenth/early twentieth century farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The *Clare May* Cottage is not a good example of its type; many of its exterior materials or features have been altered. This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The *Clare May* Cottage does not meet any of the significance criteria. This item falls below the threshold for heritage listing.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

Graham Park Research Station is of importance at local and State levels as one of the first Artificial Insemination Breeding Stations (the AIBS) in New South Wales. The Graham Park research station was the first commercial artificial stock breeding centre in NSW and made major contributions to Australia's stock breeding industry.

This item is important at local and State levels in terms of the history of agricultural research, and in particular stock breeding. The historical importance of the research station derives in part from the fact that it is a legacy of earlier agricultural research (the Experiment and Stud Farms), established by the Berry Estate in 1899 under the direction of Alexander Hay.

G2B H51 is assessed as being of local and State significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

This item is named after the Hon. Edward Graham, one of the longest serving NSW Minister's for Agriculture. As such, Graham Park Research Station has a direct link with the life and work of an individual of State importance.

The research station is also historically linked with Alexander Hay and the sponsorship of agricultural research in the final decades of the Berry Estate by its trustees.

G2B H51 is assessed as being of State significance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

Graham Park Research Station played an important role in the development of artificial insemination in NSW; it also made major contributions to Australia's stock breeding industry.

Due to the role of Graham Park in agricultural research during the twentieth century, this item is assessed as being of local and State significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for *Graham Park*. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

Archaeological analysis of the Graham Park Research Station, inclusive of survey and potentially excavation, has the potential to contribute to an understanding of the establishment, development and operation of agricultural research stations. While there are various historical documents that relate to different aspects of the site's history, archaeological investigation of such a comprehensive and well conserved site would undoubtedly provide alternative insights into the complex's history.

G2B H51 is assessed as being locally significant against *criterion e*. There is also the potential that this item may be of State significance against this

criterion, however this could only be determined through investigation of, and comparison with, similar sites across NSW

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

This item is relatively unusual as a fairly intact example of an agricultural research institute. It is also rare in terms of its role in the early development of artificial insemination in NSW.

G2B H51 is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Graham Park Research Station is an excellent example of a twentieth century agricultural research station. The site remains relatively intact and includes administration buildings, laboratories and entrance grounds.

G2B H51 is of local and state significance against *criterion g*.

Statement of heritage significance:

Graham Park Research Station is of local and State importance in terms of its role in the development of agricultural research, in particular artificial insemination and stock breeding. It is also historically linked to pioneering research sponsored by the Berry Estate under Alexander Hay, and directly linked to the life and works of Edward Graham, an individual of State importance in the context of government policy on agriculture and agricultural development.

Graham Park also derives significance at local and State levels due to its contributions to agricultural research. The complex of buildings, laboratories, sheds and enclosures has the potential to yield information, through archaeological investigation, that would contribute to an understanding of the development and operation twentieth century agricultural research stations.

It is a locally rare site that is also representative of its type at local and State levels.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The Broughton Mill homestead and dairy was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The Broughton Mill homestead and dairy is not known for any strong or special association with the life or works of anyone of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Broughton Mill homestead and dairy is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Broughton Mill homestead and dairy. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The Broughton Mill homestead and dairy site does not have the potential to yield significant information regarding local cultural history that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The Broughton Mill homestead and dairy is a relatively common site type. There are numerous local examples of similar early twentieth century dairy farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The Broughton Mill homestead and dairy was constructed in the early twentieth century and abandoned around the middle of the century. During its period of use it appears to have undergone relatively few modifications. As such, it is a good and locally representative example, albeit somewhat dilapidated, of an early twentieth century dairy farm.

G2B H56 is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The Broughton Mill homestead and dairy is a good and locally representative example, albeit somewhat dilapidated, of an early twentieth century dairy farm.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The Uniting Church Hall was the first building to be erected on land legally acquired in the new township of Berry; it was constructed in 1884 following donation of the land by David Berry in 1883.

The building originally operated as a chapel, and then as a church hall when a new church was built in 1932.

This item is important in the course of the development of Berry township and, in particular, the history of local religious worship. G2B H58 is assessed as being of local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The Uniting Church Hall is not known for any strong or special association with the life or works of anyone of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Uniting Church Hall is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

This item continues in use as a church hall; it has a strong association with the local Uniting Church community.

G2B H58 is assessed as being of local significance against *criterion d*.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The Uniting Church Hall does not have the potential to yield significant information regarding local cultural history that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Examples of Victorian Carpenter Gothic style buildings are locally rare. While there are other examples of Victorian Gothic churches (eg St Luke's Anglican Church), they are not weatherboard. The rarity of this item is increased by the fact that it was the first building erected on legally acquired land in the town and the building's history of use as, first a chapel and then a church hall.

This item is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The Uniting Church Hall is a good example of a Victorian Carpenter Gothic style chapel. It displays the characteristic elements of the style including horizontal weatherboards and pointed gothic windows. Decorative bargeboards, consistent with the building's original style are currently being re-created and installed. The Chapel retains its original form and character.

This item is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The Uniting Church Hall is of local historical importance as the first building to be erected on land legally acquired in the new township of Berry; it is also important in the course of the development of the township and its places of religious worship.

This item is also of local social significance due to its ongoing connection with the Uniting Church community.

The church hall is also a locally rare and representative item in terms of a Victorian Carpenter Gothic building.

H.5 Known or potential archaeological deposits

Recording ID: G2B H14 **Name/*Description*: Archaeological deposit (former C19th *Broughton Creek* town buildings)**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

On the basis of the available historical and archaeological information for G2B H14, the site appears to have played an important role in the nineteenth-century development of local commercial and government premises. While much of the site has been destroyed or disturbed by the current highway alignment, the test excavations at this site suggest that the site still contains evidence relating to spatial and chronological aspects of the urban development at Broughton Creek.

This item is assessed to be of local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

On the basis of the available historical and archaeological information regarding this item, it does not appear to have a strong or special association with the life or works of a person or group of local or State importance.

G2B H14 is assessed as not having significance against this criterion

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The site is not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. While the Berry Butter Factory was undoubtedly of importance at local and state levels as an early dairy factory, the site has been significantly impacted by construction of the current Princes Highway alignment, which has compromised the site's value against this criterion.

This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The archaeological deposits at G2B H14 have been assessed, on the basis of the test excavations, as having potential to provide information on the following aspects of the site's history:

- The width of the street frontage and the activities that took place in this area.
- The location of individual buildings or portions of their eastern limits.
- The location of individual lot boundaries that extend east to west across the site.
- Differing site functions across these lots.
- Overall site chronology from the mid nineteenth to mid twentieth-century.

As such, this item is assessed as having local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The archaeological deposits at G2B H14 are likely to be the only remaining evidence of the northernmost urban development at Broughton Creek. Furthermore, the deposits have not been subject to the same levels of ongoing development and disturbance as the street frontages in the centre of Berry.

As such, the deposits at G2B H14 are assessed to be of local importance against *criterion f* in terms of their rarity.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

G2B H14 is not considered to be exemplar in terms of archaeological evidence for either butter factories or nineteenth-century urban landscapes. This is due primarily to the extent of prior disturbance across the site.

However, given that the surviving portion of the site relates primarily to remains of street frontages from the turn of the nineteenth to twentieth-century, including early service easements; and since the site has not seen continued development into the twentieth and twenty first-century, it provides a potentially valuable window into a local example of the relationship between public and private spaces.

This item is assessed as having local significance against *criterion g* as a representative example of archaeological evidence for street frontages from the late nineteenth to early twentieth-century.

Statement of heritage significance:

The site G2B H14 is of importance in terms of the local history, particularly the development of nineteenth-century commercial and government premises and the road network. Excavations at the site have demonstrated that the G2B H14 archaeological deposits have the potential to yield information that will contribute to an understanding of site function(s), the spatial organisation of the urban landscape at Broughton Creek, and site chronology and formation processes.

The remaining deposits at G2B H14 are rare within the local Berry context as the only remnants of this northernmost portion of the urban landscape and as a representative example of a relatively undisturbed portion of a nineteenth century street frontage.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The site of the former Berry Estate tenant farm at G2B H48 is not a place that could be described as important in the course, or patter, of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

On the basis of the available historical and archaeological information regarding this item, it does not appear to have a strong or special association with the life or works of a person or group of local or State importance.

G2B H48 is assessed as not having significance against this criterion

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The site is not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

While it appears likely that construction of the twentieth century farmhouse has disturbed, or removed a portion of, the potential archaeological deposit at this site, potential remains for G2B H48 to yield information regarding late nineteenth century settlement. In particular, it has the potential to contribute to an understanding of the chronology, social status, living conditions and architecture of nineteenth century tenant farms on the Berry Estate.

The archaeological deposits at G2B H48 are assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Berry Estate tenant farms, both extant houses and places with potential archaeological deposit, are not locally rare or endangered.

This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Given that this site has been disturbed by later phases of occupation, it is not a particularly good example of its type.

This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The potential archaeological deposits at G2B H48 are locally significant as a site that may contribute to an understanding of life on Berry Estate tenant farms.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The site of the former Berry Estate tenant farm at G2B H52 is not a place that could be described as important in the course, or patter, of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

On the basis of the available historical and archaeological information regarding this item, it does not appear to have a strong or special association with the life or works of a person or group of local or State importance.

G2B H52 is assessed as not having significance against this criterion

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The site is not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

Although the integrity of deposits at this location have not been confirmed, its proximity to a former highway alignment that was bypassed in the mid 1930s means that this is the only surviving archaeological site of a former Berry tenant estate farm which retains its original configuration with the 1856 and 1870s highway alignment. As such, it forms part of a complex of recordings (including G2B H25, G2B H26 and G2B H27), and it has the potential to contribute to an understanding of the history of road alignment modifications as well as the history and nature of Berry Estate tenant farms as a whole.

This item is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

As outlined above, this item is unusual as the only known local example of a former Berry tenant estate farm which retains its original configuration with the 1856 and 1870s highway alignment. It is also likely to be one of the less disturbed archaeological deposits associated with a Berry Estate tenant farm.

The potential archaeological deposits at G2B H52 are assessed as having local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Because this site appears to be a relatively rare example of a former Berry tenant estate farm which retains its original configuration with the 1856 and 1870s highway alignment, it is also important as a site that demonstrates the interrelationship between these early transport corridors and the locations of early farms.

The site is also important as an example of archaeological deposits for an early tenant farm that appears to potentially be relatively undisturbed.

Statement of heritage significance:

The potential archaeological deposits at G2B H52 relate to a nineteenth century Berry Estate tenant farm. This site is of local significance as a place that has the potential to yield information about tenant farms and the interrelationship between such sites and sequences of transport corridor modifications through the nineteenth and early twentieth centuries. It is also locally important as an example of a former tenant farm that maintains its original configuration with the 1856 and 1870s highway alignment and as a representative example of such a site.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The site of the former Berry Estate tenant farm structure at G2B H53 is not a place that could be described as important in the course, or patter, of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

On the basis of the available historical and archaeological information regarding this item, it does not appear to have a strong or special association with the life or works of a person or group of local or State importance.

G2B H53 is assessed as not having significance against this criterion

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The site is not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

While it appears likely that the potential archaeological deposit at this site have been disturbed by more recent vegetation clearance and driveway construction, potential remains for G2B H53 to yield information regarding late nineteenth century settlement. In particular, it has the potential to contribute to an understanding of the chronology, social status, living conditions and architecture of nineteenth century tenant farms on the Berry Estate.

The archaeological deposits at G2B H53 are assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Berry Estate tenant farms, both extant houses and places with potential archaeological deposit, are not locally rare or endangered.

Given the relatively limited extent of this site, this item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Given that this site has appears to have been disturbed by later phases of occupation, and given the apparently limited extent of deposits, it is not a particularly good example of its type.

This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The potential archaeological deposits at G2B H53 are locally significant as a site that may contribute to an understanding of life on Berry Estate tenant farms.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The archaeological deposits at G2B H59 are potentially directly associated with the original land grant of Anthony Finn. This grant is of local importance as the only early small-scale land grant amongst the larger Berry *et al* grants. It is also important as a grant made in relation to Anthony Finn's role in apprehending a bushranger.

Due to this site's place in the local pattern of land alienation G2B H59 is assessed as having local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The archaeological deposits at G2B H59 are on portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. Anthony Finn was an individual of local importance as someone granted land, due to his role in the apprehension of a bushranger, in an area dominated by larger estates.

The deposits at G2B H59 are provisionally – to be confirmed through additional archaeological/historical investigations confirming this as the site of the Finn settlement – to be of local significance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The archaeological deposits at G2B H59 are not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

This site appears to display relatively high levels of integrity in terms of the potential archaeological deposits. G2B H59 has the potential to yield information, through archaeological excavation/survey, to an understanding of early European settlement on a relatively small land grant. Investigations at this site may clarify the timing and nature of Finn's settlement and the subsequent occupation by the Woods. This is a period of local history, and a location, for which there are relatively few historical records; archaeological investigations would thus contribute significantly to an understanding of this aspect of local history.

The potential archaeological deposits at G2B H59 are assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Portion 181 was an unusual land grant as it was such a small parcel of land amongst much larger estates. The potential archaeological deposits at this site are also relatively unusual as an example of early to mid-nineteenth century occupation that appears to have been subject to limited disturbance from later phases of occupation.

The potential archaeological deposits at G2B H59 are assessed as having

local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

This item is important as an example of nineteenth century occupation on a small land grant. The potential archaeological deposits at this location appear to be a relatively well preserved example of a site with multiple phases of occupation dating back to the 1840s.

This item is assessed as having local significance against *criterion g* as a representative example of archaeological evidence for a small nineteenth century farm.

Statement of heritage significance:

The potential archaeological deposits at G2B H59 are of local significance as a site associated with early land alienation, in particular an unusually small land grant amongst a series of larger estates. The site also appears to be directly associated with Anthony Finn, an individual of local importance.

The potential deposits at G2B H59 have the potential to contribute to an understanding of the nature and phases of nineteenth century occupation. This site is also important as a relatively intact, rare and representative example of archaeological deposits relating to a local, small nineteenth century farm.

H.6 Miscellaneous site types

Recording ID: G2B H54 **Name/*Description*: Dry Stone Wall**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The dry stone wall at G2B H54 is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The dry stone wall at G2B H54 does not have strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

While the dry stone wall at G2B H54 is largely obscured by vegetation, dry stone walls are regionally (within the Illawarra) recognised as items with important aesthetic characteristics. As such, this item has the potential to be of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the dry stone wall at G2B H54. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The dry stone wall at G2B H54 has potential to yield information that is not readily available from other sources, given that it is a geographic outlier from the main distribution of walls and this may provide a revealing basis for comparison. It may be found that it reflects the traits of a separate builder, or owner. This item is assessed as having local significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

There are no other dry stone walls recorded on Toolijooa Ridge (although this does not mean that they do not exist). This recording is potentially the southernmost site of its type in the broader Illawarra region. Furthermore, dry stone walls built as retaining walls are rare: this recording currently acts as a retaining wall, although it is unclear whether it was originally built as such.

This item is potentially of local significance against *criterion f.*

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The dry stone wall at G2B H54 has been constructed using the ‘double dyke’ technique, which is characteristic of the Kiama and Foxground walls. It is locally important as the only known example demonstrating a construction technique that is locally characteristic.

This item is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The dry stone wall at G2B H54 is of local significance in terms of its aesthetic values, research potential, and its rarity as a fence type and regional outlier.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

This shed was not notable in the course or pattern of local cultural history. The item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

Based on currently available information, the shed G2B H60, does not have strong or special association with the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The shed G2B H60, is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the shed G2B H60. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The shed G2B H60, appears to have been constructed using materials and methods that are typical and conventional for its time. However, the design of the skids, towing attachments, and their method of attachment to the floor of the shed may not be represented or easily found in contemporary documentation. This component of the structure may have potential to contribute to an understanding of the economic, technical and social dynamics of works sites from the early to mid twentieth century. This item is assessed as having local significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The construction of sheds on skids is a common solution to the requirement for a periodically portable shed. The G2B H60 example, based on its design is suggestive of a shed used on a construction or similar work site where security and robustness was required. Owing to the lack of a suitable reference database, it has not been possible to determine if work-site sheds of this type, mounted on skids, and dating from around the middle of the twentieth century are rare. Certainly it is a reasonable proposition to consider that sheds of this type due to their function and context would have been subject to considerable use-wear, deterioration, and attrition/replacement. It is also likely that, as a category, they are absent or poorly represented in museum collections or reserves. With this background in mind, and taking a precautionary approach, this item is assessed as having local significance against this criterion.

Criterion (g):	*important in demonstrating the principal characteristics of a class of cultural place*	
	The G2B H60 shed is a relatively well preserved example of its type and is representative of the design and functional requirements of such a building.	
	This item is assessed as having local significance against this criterion.	

Statement of heritage significance:

The G2B H60 work-site shed on skids is a relatively well preserved and representative example of its type and demonstrates the design and functional requirements of such a structure. It is likely to be a rare example of this shed type, which is unlikely to be well documented, or represented in collections, museums or reserves. It is considered to have local significance under criteria e, f and g.

Recording ID: G2B H61 **Name/*Description*: Quarried Rock Outcrop, Broughton**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

This item is not notable in the course or pattern of local cultural history; it is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

There is no evidence for a strong or special association between this item and the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The quarried rock outcrop at Broughton is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the quarried rock at Broughton. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The rock outcrop does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Sandstone rock quarries such as this are not uncommon or rare sites. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The quarried rock outcrop at Broughton is a well preserved and representative example of a local quarry for stone, probably used for early road construction.

This item is assessed as having local significance against *criterion g*.

Statement of heritage significance:

Quarried rock at Broughton (G2B H61) is a locally representative example of a small sandstone quarry for rock, probably used in early road construction.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

This item is not notable in the course or pattern of local cultural history; it is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

There is no evidence for a strong or special association between this item and the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Poplar trees planted at Woodhill Mountain Road are important in demonstrating the aesthetic characteristics of a planned avenue of trees. This recording has landmark values in a local context.

The recording G2B H62 is assessed as being of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Poplar trees at G2B H62. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The trees at G2B H62 do not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The trees at G2B H62 are not rare or uncommon. There are numerous local examples of similar tree plantings. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The Poplar trees at G2B H62 are not important in demonstrating the principal characteristics of a tree planting; only six of the original nine trees are alive. This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The Poplar trees planted at G2B H62 are a locally significant landmark and aesthetic landscape component.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

Mark Radium Park is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

Mark Radium Park is named in commemoration of Jack McGee's show ring pony (Mark Radium), that held high jump records at Adelaide, Albury and Melbourne (1938). Between 1947 and 1955 Mark Radium was defeated only once in competition. Jack McGee and his pony are of sufficient local importance to have a park named after the pony, and as such, this item is assessed to be of local importance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

Mark Radium Park has landmark qualities as a local picnic area with native plantings, ornamental pond and associated landscaping.

This item is assessed as being of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Mark Radium Park. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

Mark Radium Park does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Recreation areas such as Mark Radium Park are a relatively common site type. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Mark Radium Park is not particularly notable as an example of a modern recreation area. This item is assessed as not having significance against this criterion.

Statement of heritage significance:

Mark Radium Park is listed on the Shoalhaven LEP heritage schedule as a place of local importance due to its aesthetic qualities and historical association with Jack McGee and his pony Mark Radium.

H.7 Cultural landscapes

Recording ID: SICPH CL **Name/*Description*: Southern Illawarra Coastal Plain and Hinterland Cultural Landscape**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The SICPH CL is of importance in the course of local history as an artefact of over 150 years of pastoral activity.

The cultural landscape contains readily identifiable evidence for a variety of historically significant themes including general land clearance and alienation, establishment and operation of the Berry Estate, development of nineteenth and twentieth century homesteads and development of the transport network that interlinked these places and joined them to places across the broader landscape of NSW.

The SICPH CL is assessed as being of local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

Creation of the SICPH CL has direct links to Alexander and David Berry through their roles in the establishment and operation of the Berry Estate. The evolution of this landscape can also be linked to important groups of people such as other early land grantees, tenant farmers and Robertson Land Act selectors, all of whom were important in local history.

The SICPH CL is assessed as being of local significance against *criterion b*; this is primarily due to the readily identifiable physical evidence of private towns, in particular Berry, and tenant farms created as components of the Berry Estate.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

One of the most significant aspects of the SICPH CL is the aesthetic value of the cleared pastoral landscape nestled at the base of the wooded Illawarra Escarpment. This striking contrast in natural landforms and differing extent of human impact creates a unique landscape quality. There is no comparable landscape displaying this aesthetic characteristic within NSW.

The SICPH CL is assessed as being of State significance against *criterion* c.

Criterion (d): *strong or special association with a particular community or cultural group*

The area encompassed by the SICPH CL has a strong and special association with the local Aboriginal community in terms of places with cosmological, ceremonial, traditional and historical importance. It includes elements such as Coolangatta Mountain and Toolijooa Ridge that are examples of places of particular significance to the local Aboriginal community. The SICPH CL also includes Aboriginal pathways, historical encampments and Aboriginal reserves.

The SICPH CL is assessed as being of local significance against *criterion d*.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The SICPH CL contains evidence for a variety of phases of human occupation, including evidence of a variety of activities and historical themes. Given that this southern portion of the Illawarra coastal plain hinterland has been subject to relatively limited impacts from twentieth century urban development, there is enormous potential for archaeological and historical research into this landscape at micro and macro levels. Such research would have the potential to contribute significantly to an understanding of settlement history within the Berry Estate, the Illawarra as a whole and the history of land use across NSW as a whole.

The SICPH CL is assessed as being of local importance in particular, and to a lesser extent State significance, against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The combination of nineteenth century landscape structure with the aesthetics of the landforms present in the SICPH CL makes this cultural landscape unique within NSW. The juxtaposition between the Illawarra Escarpment and the coastal plain is of itself unique within the State. Moreover, the Southern Illawarra component is the only portion of this landscape that has not been significantly impacted by urban infill over the past 50-100 years. As such, the SICPH CL is a rare and endangered landscape at local and State levels.

The SICPH CL is assessed as being of local and State significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The SICPH CL is important at local and State levels as a landscape that demonstrates readily identifiable and interpretable examples of nineteenth century private towns, tenant farms, private road transport corridors and the influence of these features on the modern landscape (eg the way in which the alignment of the current highway relates to homesteads and roads established by David and Alexander Berry). This item is an excellent example of a cultural landscape with multifaceted layers that are quite easily discerned by the viewer. It is also an excellent example of the relationship between European pastoral practices and broader topographic landforms.

Statement of heritage significance:

The Southern SICPH CL is of local significance in terms of its historical associations and importance in the pattern of local history. It is also locally significant in terms of its strong and special association with the local Aboriginal community.

More notably, it is of local and State significance in terms of its aesthetic qualities, which relate in part to the unique natural character of the junction of the coastal plain with the Illawarra escarpment, and in part from the striking contrast between the culturally modified elements of the landscape and the more natural elements. The clearly identifiable nineteenth century structure of the landscape also contributes to the aesthetic value of the SICPH CL.

The SICPH CL is a rare landscape type, both in terms of its natural features and also the retention of such clear examples of the late nineteenth and early twentieth century pastoral landscape and associated private towns. It is the only remaining such portion of the broader Illawarra cultural landscape that has not been substantially impacted by urban infill. As such it is also representative of its type and displays considerable research potential in terms of historical themes at local and State levels.

Appendix I

Statements of heritage impact

Statements of heritage impact

I.1 Introduction

Statements of Heritage Impact are provided in this section for all field recordings subject to direct impact (18), or indirect impact only, such as to their visual and landscape context (13 recordings).

The following items, not subject to direct or indirect impacts, are not covered in this section (G2B H20, 26, 27, 51, 52, 57 and 60).

I.2 Nineteenth century road remnants

Recording ID: G2B H19 **Name/*Description*: Remnant of Berry Estate road (west of Gembrook lane)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

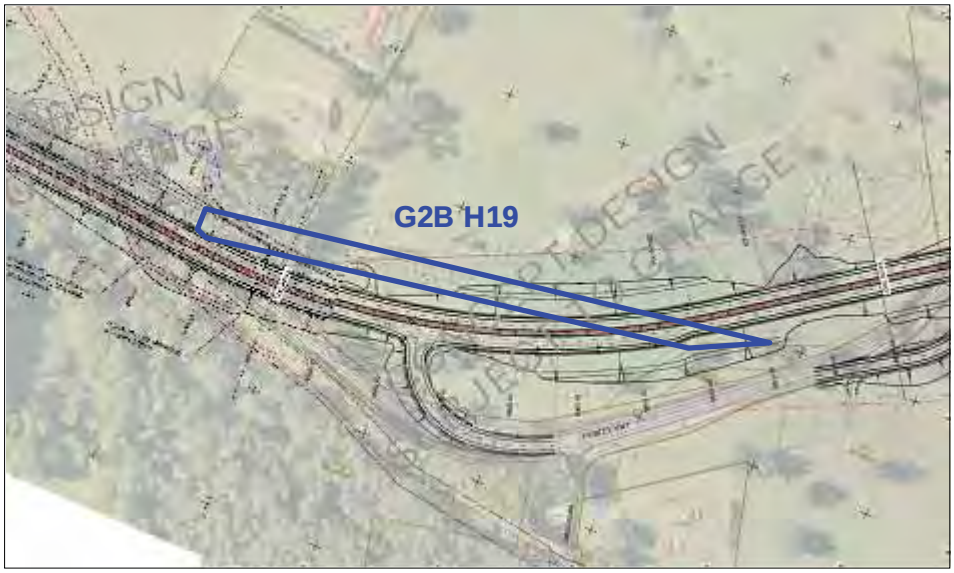


Figure I.1 Location of G2B H19 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, f & g.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.

- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and a section of raised carriageway. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

Recording ID: G2B H22 **Name/*Description*: Remnant of Berry Estate road (south of *Glenvale* homestead)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

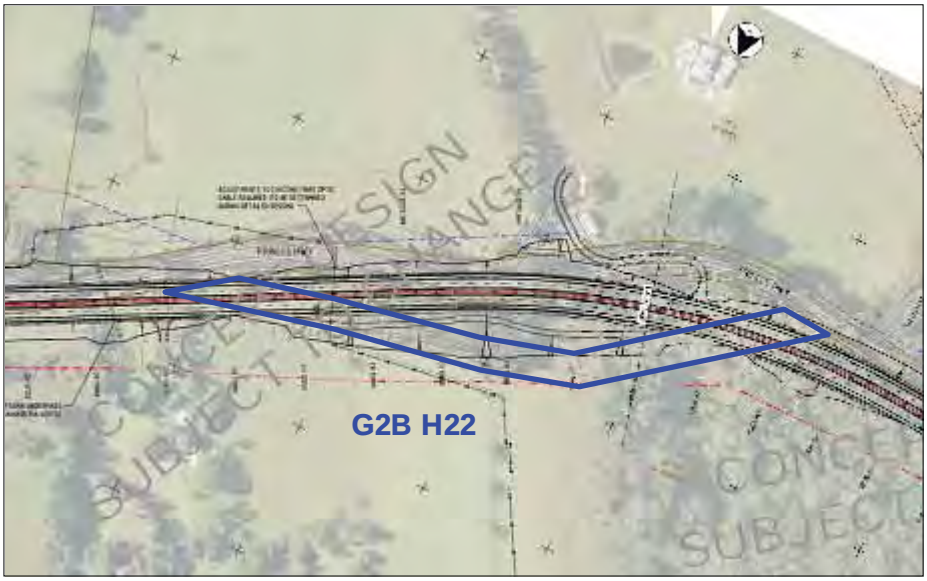


Figure I.2 Location of G2B H22 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, & f.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.
- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and a section of raised carriageway. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

Recording ID: G2B H23 **Name/*Description*: Remnant of Berry Estate road (east of *Glenvale* homestead)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass would result in the loss of the whole of the known extent of the item.

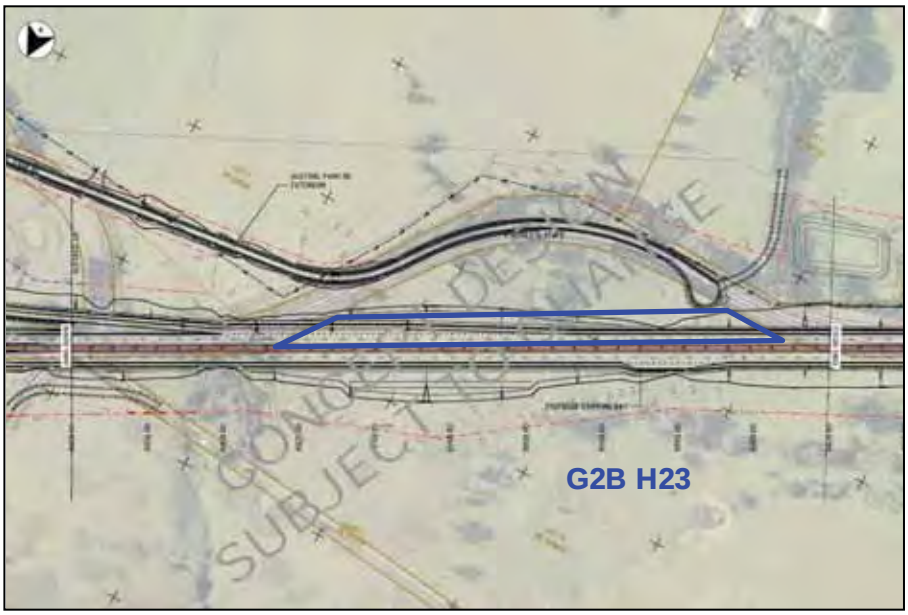


Figure I.3 Location of G2B H23 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, & f.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.
- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and a section of raised carriageway. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

Recording ID: G2B H30 **Name/*Description*: Remnant of Berry Estate road (eastern spur of Toolijooa Ridge)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass would result in the loss of the whole of the known extent of the item.

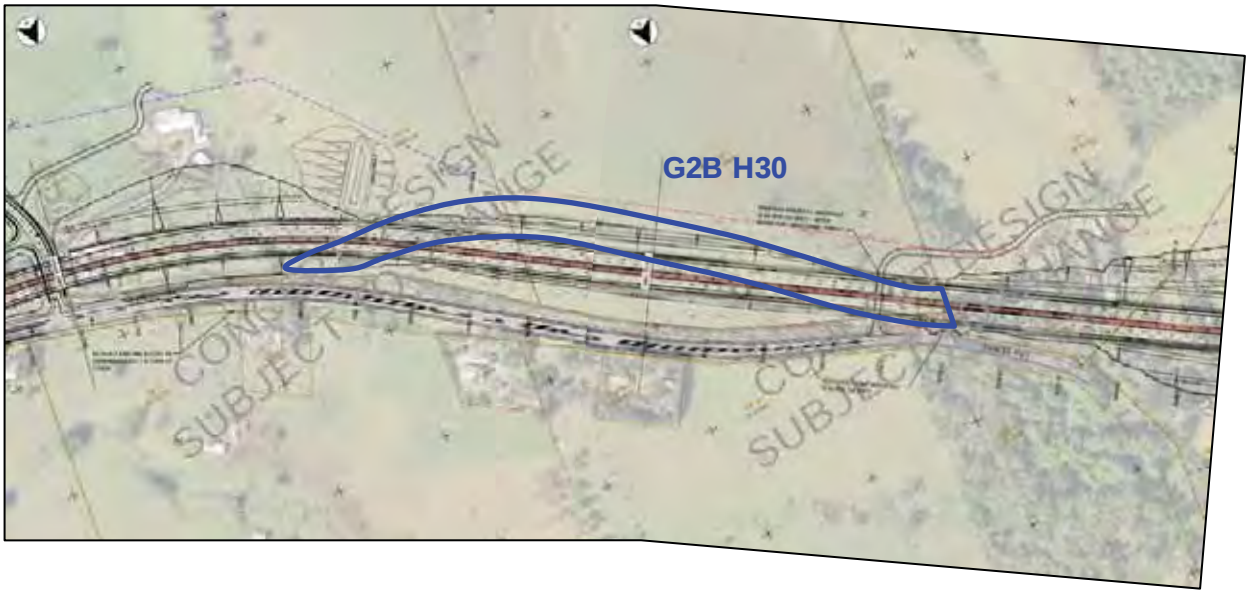


Figure I.4 Location of G2B H30 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, f & g.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.
- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item.

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the spurline to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment either to the north or south, which avoids direct impact to the heritage item. Both alternatives would require construction of major artificial embankments. A northern alternative would prevent the use of the existing highway as a service road.
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maintain the most effective vertical and horizontal carriageway alignment up to, and from, the planned Toolijooa cutting.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass and an associated service road would result in the loss of the whole of the known extent of the item.

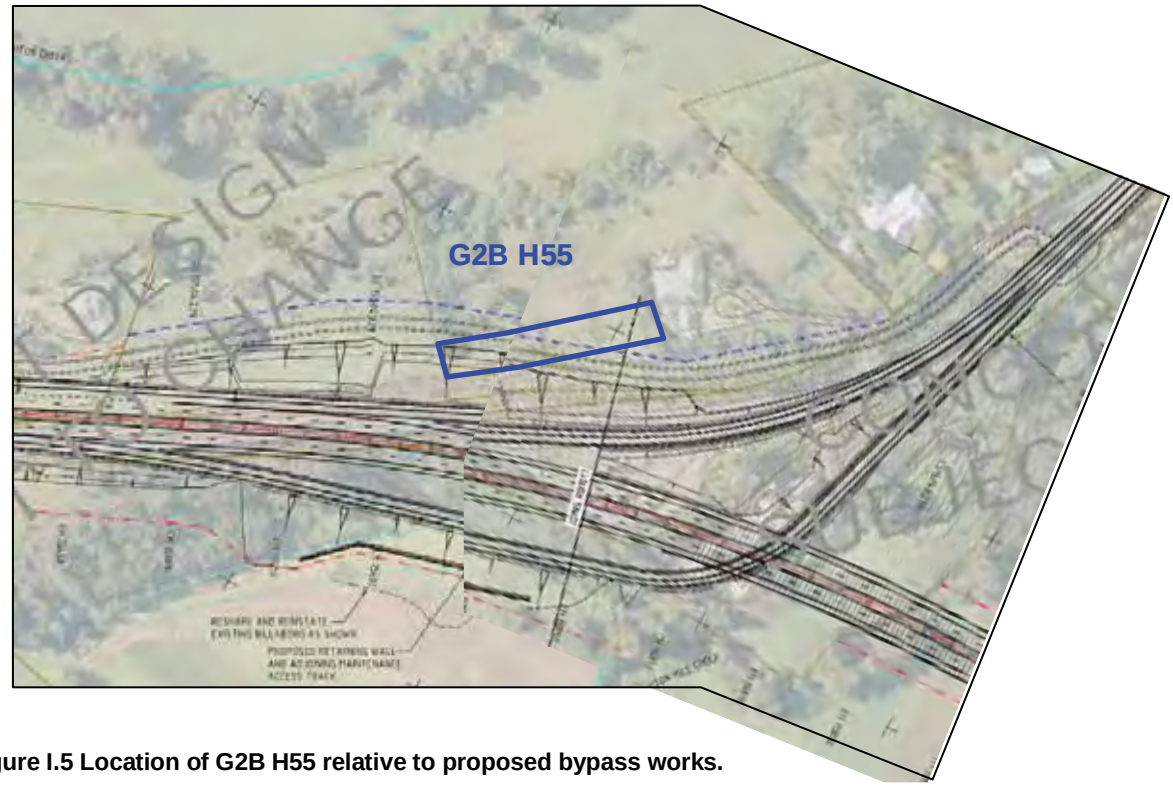


Figure I.5 Location of G2B H55 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, f & g.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.
- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass and service road across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Provide access to private property independent of the bypass carriageway.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

I.3 Twentieth century highway remnants

Recording ID: G2B H12 **Name/*Description*: Remnant portion of twentieth century highway (Stewarts Hill cutting and wayside stop, northern entry to Berry)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass would result in the loss of the whole of the known extent of the item.

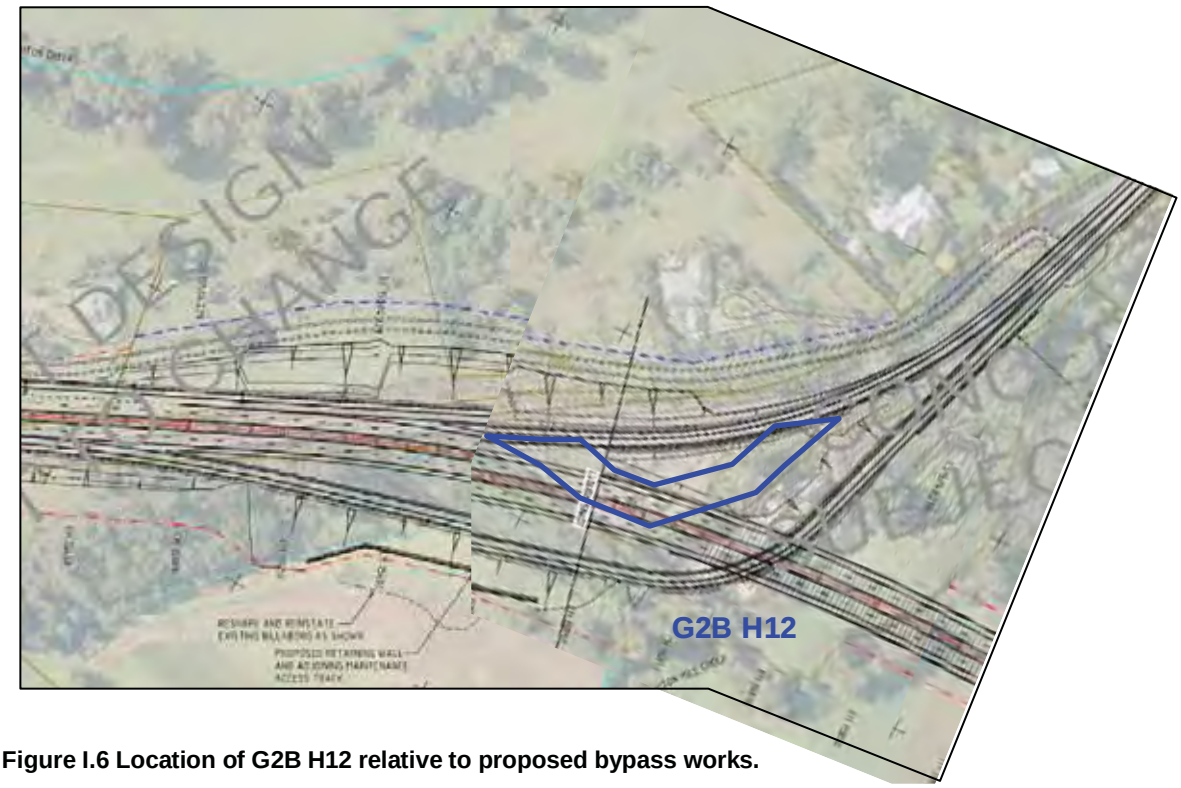


Figure I.6 Location of G2B H12 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.
- There are no aspects of the proposal which respect or enhance the significance of this particular item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass in the area of this road remnant would involve the extension and widening of the existing cutting, and the construction of a north bound on-ramp. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of a remnant bitumised road platform, excavated bench, and boundary fence. Apart from the fence line, there are no existing structures related to this heritage item.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence, however none of these are likely to have significance above the assessment criteria thresholds:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the low significance of the item, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the low significance assessment for the item (below the criteria threshold), no further heritage related management action is recommended for this item.

Recording ID: G2B H15 **Name/*Description*: Remnant portion of twentieth century highway (adjacent to *Mananga* Homestead)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This remnant section of highway would continue its current function as a service road but would be directly impacted in two locations, at its northern end by construction of an off-ramp and an additional service road, and towards its southern end by construction of a new intersection with the current highway/new off-ramp. Construction of a south bound off-ramp, along the alignment of the current highway, and an additional service road would result in direct impact to a small proportion of the remnant highway at its far northern end (an interval of up to 30 metres, and north of the driveway to A40A Princes Highway). A new, squared-off intersection with the off-ramp would be constructed near the southern end of the remnant. This would alter the original alignment of the remnant to a certain degree but maintain the integrity of the more significant and better conserved portion in front of the Mananga homestead and gardens. The addition to the remnant of a new service road for nine allotments would mean greater vehicle use of the remnant, and a higher frequency of maintenance and possible upgrading.

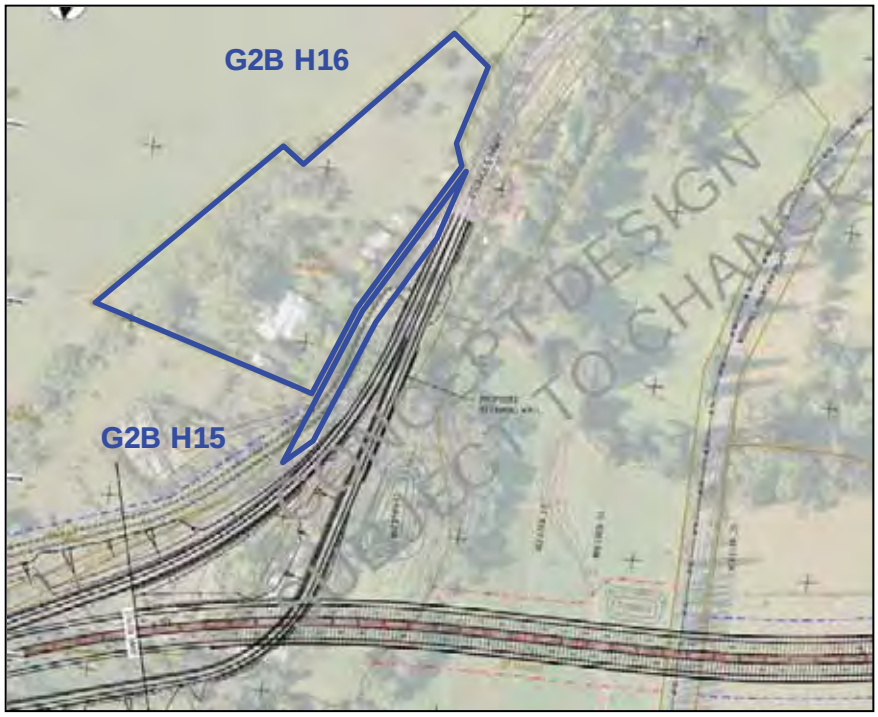


Figure I.7 Location of G2B H15 relative to proposed bypass works and item G2B H16.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria f & g.
- Substantial impact to the better maintained and most significant portion of the road remnant, (which is adjacent to the Mananga homestead and outbuildings), would be avoided. The alignment of the remnant, which remains the same as the original road at the time of the homestead construction, would be maintained as an actively used road. This would maintain the historical context and integrity of the property frontage.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The visual impact of the off-ramp and service road additions would only be marginally greater than the existing situation caused by the current highway carriageway and associated cutting. Although the intrusion of modern infrastructure would be marginally closer to the Mananga property boundary, there would remain an effective spatial margin, and visual barrier provided by existing fences and planted vegetation.

Impact on existing structures

- This item consists of a remnant bitumised road platform. There are no existing structures related directly to this heritage item.

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of this road remnant is difficult to determine. The subsurface foundation of the carriageway and the constructed road surface, may constitute a relic.
- There are known archaeological deposits situated on the western side of this road remnant. These are included in a separate recording G2B H14. Please refer to the Statement of Heritage Impact for that recording for an analysis of construction impacts to these deposits.

Summary

- Construction of the bypass would result in direct impact to a minority proportion of the road remnant, and avoid impact to the most significant portion. Impact to contextual values would be marginal only.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass and service road across this heritage item is required in order to:
  - Avoid direct impact to the Mananga homestead property.
  - Provide access to private property independent of the bypass carriageway.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The only alternative to impacting this recording would be to move the bypass alignment further to the north. This would require either an extensive area of landfill and/or an extensive additional bridge interval. This would also result in additional loss of agricultural land.
- This alternative has been rejected based on the relative significance of the portion of road remnant subject to impact, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Avoid use of bridges where a viable alternative exists.
  - Maximise the use of the existing highway alignment and easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Impact to this road remnant would be limited to essential works within the construction footprint at the northern and southern ends of the remnant.
- Direct impact to the road remnant adjacent to the Mananga property would be minimised.
- It is proposed to conduct an archival recording of the item, (relative in scope to the type and quality of information which can be recovered), prior to construction impact.

Recording ID: G2B H18	Name/*Description*:	Remnant portion of twentieth century highway (close to Tindalls Lane intersection with Highway)

Statement of Heritage Impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

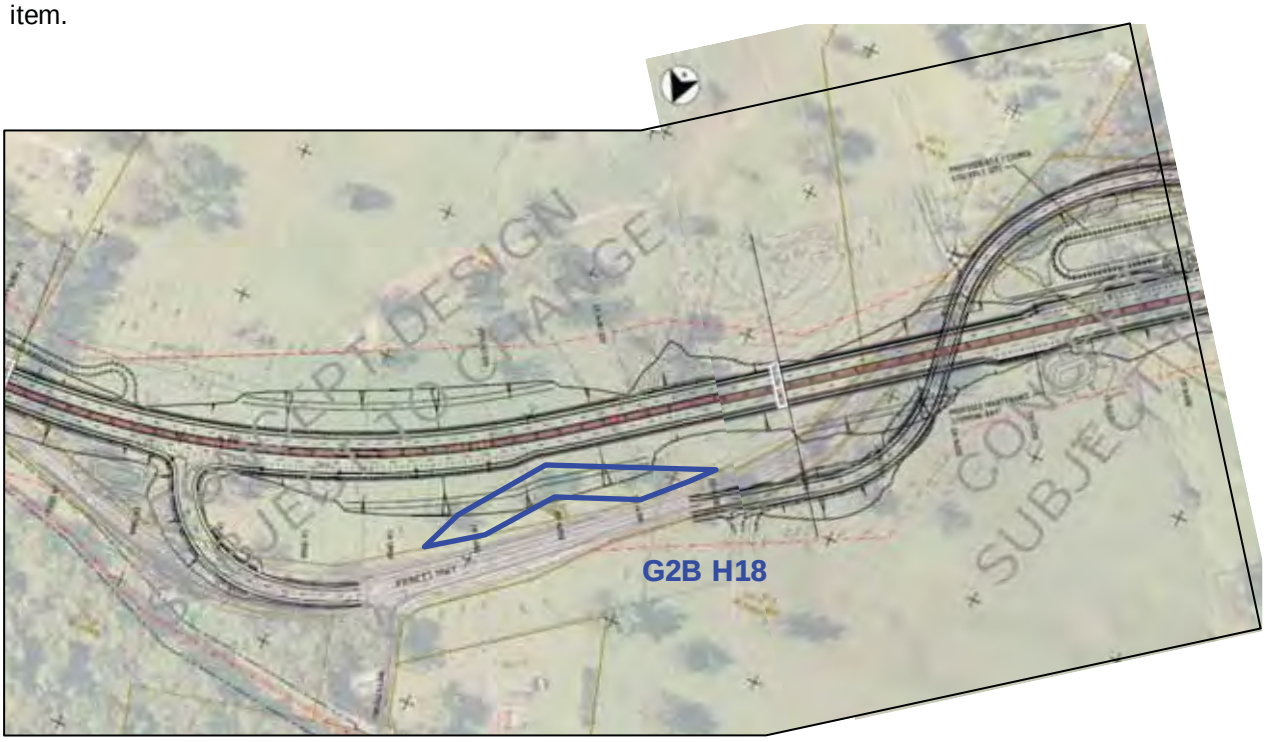


Figure I.8 Location of G2B H18 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and changes to the existing highway carriageway. This would not only remove the remnant road, but also substantially alter the immediate landscape setting and visual context.

Impact on existing structures

- This item consists of a remnant road platform, indicated by eroded low ground relief. There are no existing structures related to this heritage item.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence, however none of these are likely to have significance above the assessment criteria thresholds:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.

- This alternative has been rejected based on the low significance of the item, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the low significance assessment for the item (below the criteria threshold), no further heritage related management action is recommended for this item.

Recording ID: G2B H21	Name/*Description*:	Remnant portion of twentieth century highway (south of *Glenvale* homestead)

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass would result in the loss of the whole of the known extent of the item.

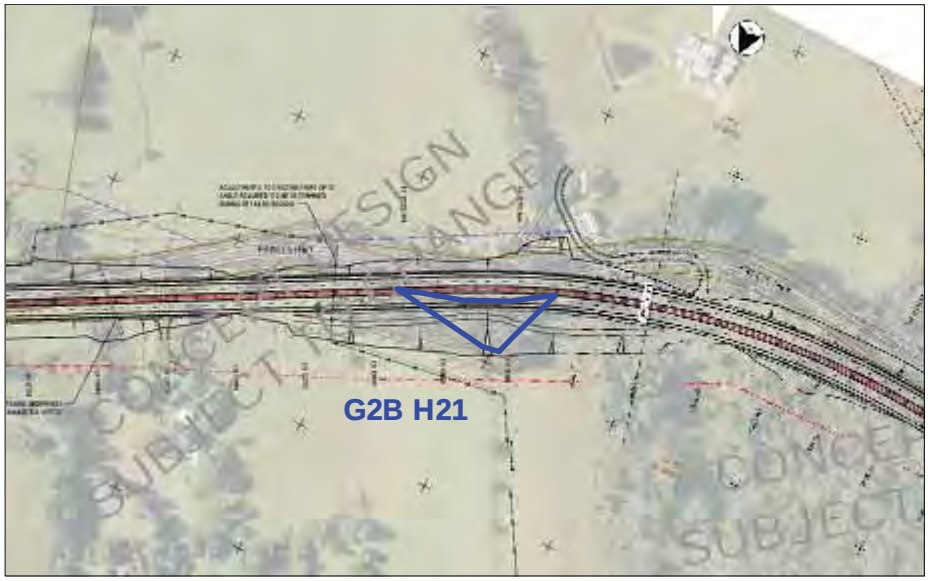


Figure I.9 Location of G2B H21 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion e.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential upon which the significance assessment is based. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and replacement of the existing highway carriageway. This would not only remove the remnant road, but also the immediate landscape setting and visual context.

Impact on existing structures

- This item consists of a remnant road platform and upslope cutting. There are no existing structures related directly to this heritage item.

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of this road remnant is difficult to determine. The subsurface foundation of the carriageway and the constructed road surface may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise impact to native vegetation.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- Alternatives to impacting this recording would be to move the bypass alignment either further north or south. The northern alternative would cause substantial impact to the contextual values of the Glenvale homestead, impact native vegetation, and require a more extensive cutting. The southern alternative would have high property infrastructure impacts.
- The alternatives have been rejected based on the significance of the item, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise impact to native vegetation.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to conduct an archival recording of the item, (relative in scope to the type and quality of information which can be recovered), prior to construction impact.

Recording ID: G2B H24	Name/*Description*:	Remnant portion of twentieth century highway (west of *Sedgeford* homestead)

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

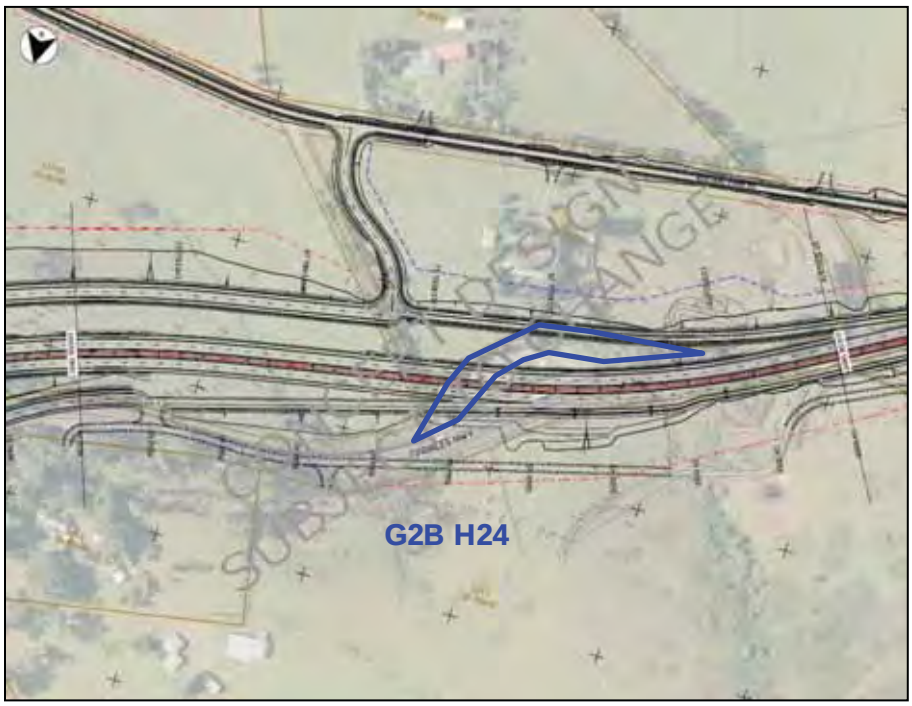


Figure I.10 Location of G2B H24 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.
- There are no aspects of the proposal which respect or enhance the significance of this particular item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and replacement of the existing highway carriageway. This would not only remove the area of the remnant road, but also the immediate landscape setting and visual context.

Impact on existing structures

- There are no existing structures related to this heritage item.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Avoid impact to Sedgeford homestead.
  - Maximise the use of the existing highway alignment and easement.
  - Maintain horizontal and vertical design standard.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence, however none of these are likely to have significance above the assessment criteria thresholds:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The alternative would be to construct the bypass on an alignment further south, which avoids direct impact to the heritage item and to Sedgeford to the northeast.

- This alternative has been rejected based on the low significance of the item, impact to residential buildings to the south of the item. and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the poor condition and low significance assessment for the item (below the criteria threshold), no further heritage related management action is recommended for this item.

I.4 Standing buildings and structures

Recording ID: G2B H10 **Name/*Description*: Victorian Cottage**
72 North St. Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The footprint of a reinforced soil noise barrier and an adjacent footpath on the south side of the southbound off-ramp for the south Berry interchange, will encroach to within two metres of the existing cottage building. Associated property acquisition would include the whole cottage.

Construction of the bypass would result in direct impact to the whole cottage and the front (northern) half of the urban lot. Removal of the house is required either through demolition or the full or partial salvage of the structure.

Figure I.11 Location of G2B H10 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.
- There are no aspects of the proposal which respect or enhance the significance of this particular item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass would not only remove the cottage, but also the immediate landscape setting and visual context. The noise barrier would obscure existing views to the north across pastoral farmland.

Impact on existing structures

- All structures being part of this item would be directly impacted.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- Construction of the bypass would result in direct impact to the whole of the cottage and associated front grounds.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass close to this heritage item is required in order to:
  - Minimise land take and property severance.
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maximise the use of the existing highway alignment and easement (especially with regard to aligning with the existing carriageway south of Mark Radium Park) .

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.
- What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The alternative would be to construct the bypass on an alignment further to the north and or east.
- This alternative has been rejected based on the low significance of the item, and the poor balance of outcomes which would result relative to the objectives to:

- Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the low significance assessment for the item and the absence of direct impact, no further heritage related recording or documentation is recommended for this item.

Recording ID: G2B H11 **Name/*Description*:** ***GlenDevan***
Federation House
77 North St. Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in direct impact to the whole of the known extent of the house and surrounding lot. Removal of the house and plantings is required either through demolition or the full or partial salvage of the structure (and/or plantings).

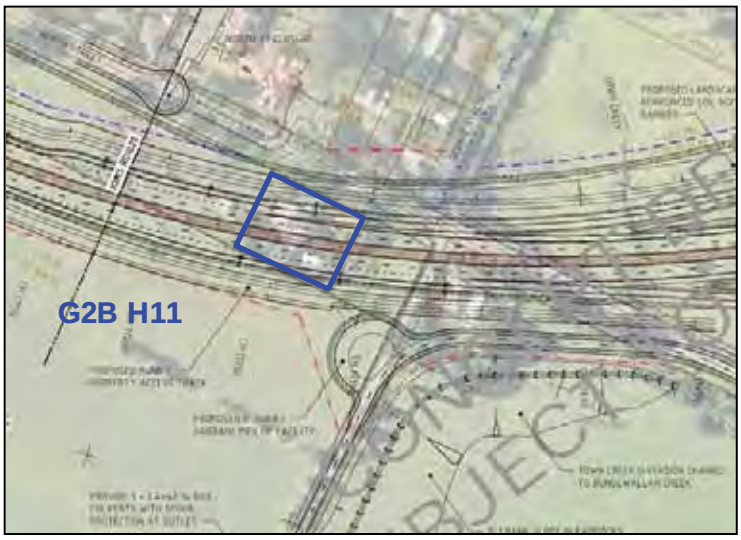


Figure I.12 Location of G2B H11 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion g.
- It is proposed to conduct an archival recording of the house prior to any direct impact. The creation of the record addresses the need to reduce the loss of local representative heritage significance which would result from the demolition of the item. The resulting record would respect those values and provide a degree of mitigation

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass would remove the house and grounds, as well as its immediate landscape setting and visual context.

Impact on existing structures

- All structures being part of this item would be directly impacted.

Impact on relics

- Based on the local level of assessed significance for this item (criterion g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. All such relics would be directly impacted by the bypass.

Summary

- Construction of the bypass would result in direct impact to the whole of the house and associated grounds.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.
  - Maximise the use of the existing highway alignment and easement (especially with regard to aligning with the existing carriageway south of Mark Radium Park) .

Will any known or potentially significant archaeological deposits be subject to development impact?

- There is potential for archaeological deposits to be associated with this heritage item, notably refuse dumps, under floor deposits, and the remains of former outbuildings. All would be directly impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north and/or east, or to the south. A southern alternative is unviable as it would require the demolition of multiple urban town lots, including St Patrick's former convent and St Patrick's Church (both of which are of local heritage significance). A northern and/or more eastern alternative would exclude the use of the North Street corridor and cause significant property severance.

- The alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to conduct an archival recording of the house and grounds prior to any development impact. Ground disturbance in the area of G2B H11 would be monitored by an archaeologist with the aim of recording any features relevant to the archival recording, and recovering any significant relics.
- It is also recommended that RMS consider providing financial and/or logistical support in the event that an agent proposes to conserve all or part of the G2B H1 structure by moving it to a new location within or near Berry. In the event of simple demolition, suitable materials (such as bricks and stone masonry) would be recovered and reused (with commemorative identification) in appropriate local, infrastructure such as interpretive or entrance features, way-side stop facilities, landscaping or artwork.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The cottage would not be directly impacted. The bypass works would be situated between 90 and 45m of the cottage, and consequently pose a loss of contextual heritage value.

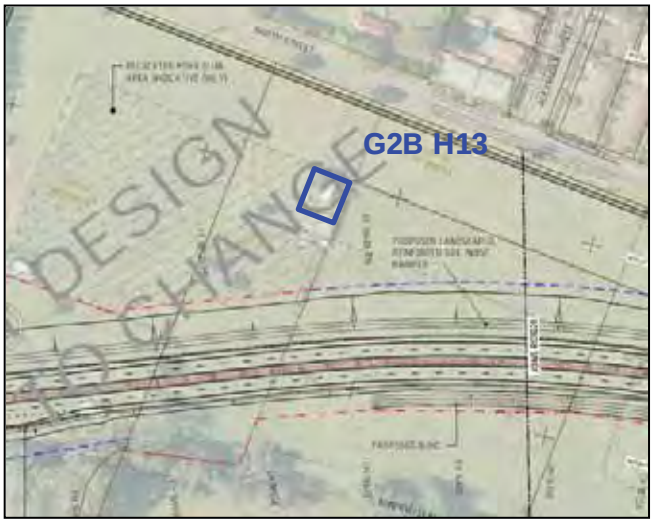


Figure I.13 Location of G2B H13 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion g.
- One of the determining factors for the selection of the bypass alignment was the avoidance of direct or close indirect impact to this Cottage residence. Previously contemplated alignment proposals, would have directly impacted the structure, or traversed the front grounds, resulting in a severe loss of contextual values.
- The visual impact of the bypass, from the south, would be mitigated by the construction of a landscaped barrier on the southern and eastern side of the bypass adjacent to Berry. This would provide a visual barrier that was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. The upper portion of the existing escarpment vista would be unaffected for viewers positioned further away from the barrier.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- The main bypass carriageway would be constructed within 65m of the rear of this cottage. An associated landscaped noise barrier would be positioned on the southern side and extend to within 45 metres of the cottage. This would foreshorten the lower portion of the existing pastoral views to the north and west. Views from the cottage of the upper escarpment slopes would be unaffected by the barrier.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criterion g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would impact upon the visual context of the cottage with foreshortening of the valley floor views to the north and west.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the relative proximity this heritage item is required in order to:
  - Minimise land take and property severance.
  - Minimise impact to the sporting fields to the east, by locating the bypass on the north of Bundewallah Creek and then crossing the creek west of the fields and turning south to run parallel with the North Street corridor.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- The visual impact of the bypass, from the south, would be mitigated by the construction of a landscaped barrier on the southern and eastern side of the bypass adjacent to Berry. This would provide a visual barrier that was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. The upper portion of the existing escarpment vista would be unaffected for viewers positioned further away from the barrier.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The complex (including the associated land holding) would not be directly impacted. Construction of a south bound off-ramp from the bypass would pass within 30 metres of the property boundary and would approximate the alignment of the existing highway. An additional service road would be appended to the northern end of a highway remnant which acts as the current access to the Mananga homestead and adjoining lot. There would a marginal loss of contextual heritage value.

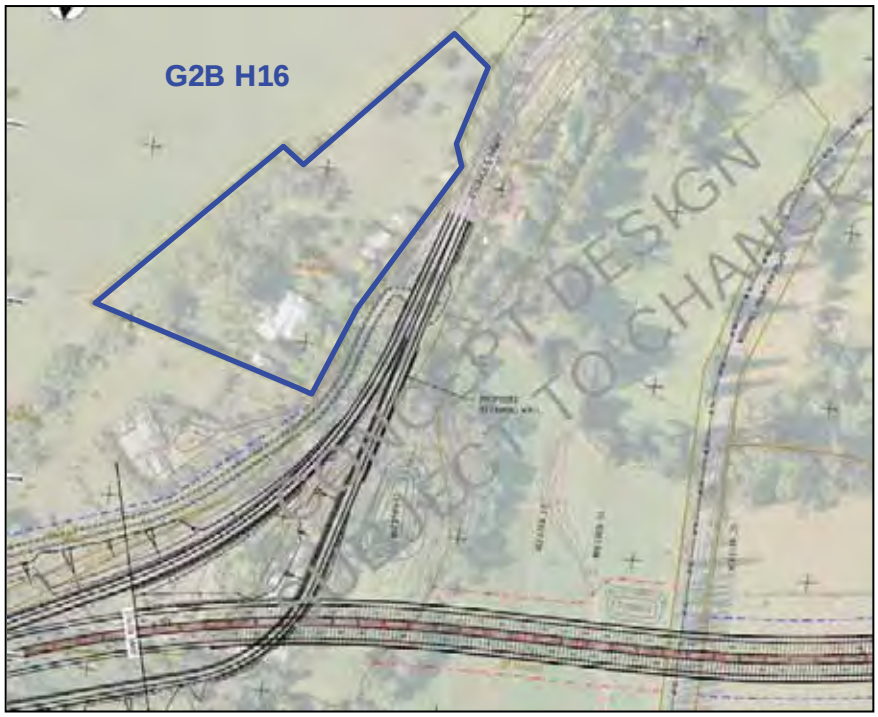


Figure I.14 Location of G2B H16 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, c, e, & g.
- One of the determining factors for the selection of the bypass alignment was the avoidance of direct impact to the Mananga homestead and property, and the minimisation of indirect impacts. A former alignment proposal, would have traversed the rear grounds of the homestead, resulting in a severe loss of contextual values, and impact to archaeological deposits.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The visual impact of the new access road, bypass off-ramp, and carriageway would only be marginally greater than the existing situation created by the current highway carriageway and neighbouring lot driveway. There would remain an effective spatial margin, and visual barrier provided by existing fences and planted vegetation.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria a, b, c, e & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would marginally impact upon the contextual values of the complex.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass works in the relative proximity this heritage item is required in order to:
  - Avoid direct impact to the Mananga homestead property.
  - Provide for car access to nine lots situated further to the northeast.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.
- What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The only alternative to impacting this recording would be to move the bypass alignment further to the north. This would require either an extensive area of landfill and/or an extensive additional bridge interval. This would also result in additional loss of agricultural land.

- This alternative has been rejected based on the relative significance of the portion of the remnant subject to impact, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Avoid use of bridges where a viable alternative exists.
  - Maximise the use of the existing highway alignment and easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H17 **Name/*Description*:** ***Hillview* Homestead**
Former Berry Estate homestead
A111 Princes Highway. Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The homestead would not be directly impacted. The bypass works would be situated approximately 38m from, and upslope of the front of the homestead. A service road would be situated 30 metres away. The boundary of the bypass easement would be approximately 14m from the front of the homestead. This cartilage is a little larger than a former front yard enclosure around the homestead evident in a 1958 aerial photograph (refer Figures 6.115 & 6.116). Some garden plantings at the front of the cottage would be directly impacted. All of these plantings post date 1960. Due to the elevated bypass carriageway and associated embankments, there would be a substantial loss of contextual heritage value on the front (entrance) side of the homestead.

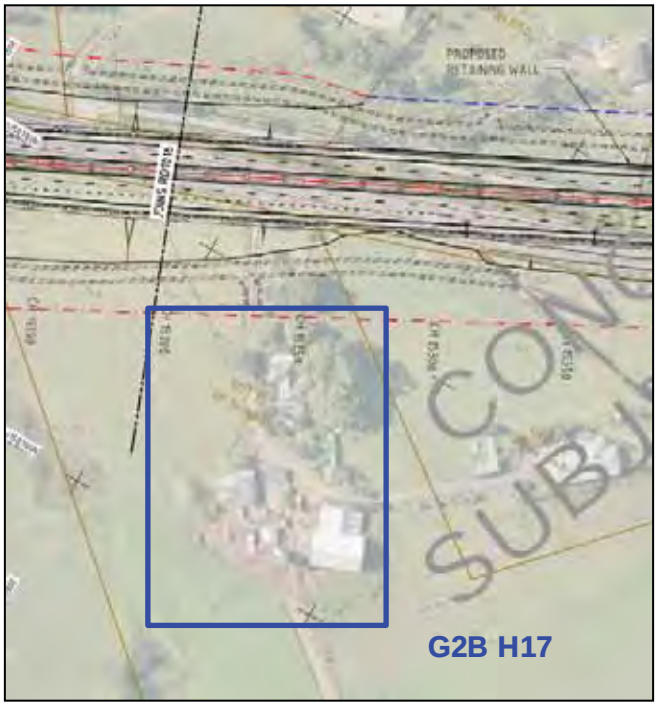


Figure I.15 Location of G2B H17 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e, f & g.
- One of the determining factors for the selection of the bypass alignment was the avoidance of direct impact to the Hillview homestead.
- The original southern entrance to the property will be maintained by the proposed service road access.
- The distance between the bypass easement boundary and the homestead is in excess of the front yard enclosure evident in 1958.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass works would be situated approximately 38m from the homestead, and would include the carriageway on an elevated embankment. The carriageway and embankment would place a visually intrusive landscape element into the front (southern) aspect of the homestead and obscure the original relationship of the building with the highway.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria e, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would substantially impact upon the south facing contextual values of the homestead.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the indirect impact to this recording would be to move the bypass alignment either to the north or south. The southern alternative would involve direct impact to three residences together with extensive landfill and earthworks. The northern alternative would require a major alignment change which would involve direct impact to two farmhouses, significant property severance, and require an alternative crossing of Broughton Mill Creek and Woodhill Mountain Road. .
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.
- It is recommended that, where feasible, the existing front yard plantings which would fall within the bypass easement (and particularly the Oak tree) should be retained. This may require a minor deviation of the proposed service road.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Neither the homestead nor its grounds would be directly impacted. The existing highway carriageway is located along the southern boundary of the homestead grounds, and the bypass works would not encroach further from this alignment. The eastern half of the current highway carriageway would be reused as a service road, the western portion would be modified as upslope end of an off-ramp onto that road. Existing tree plantings provide a visual buffer and barrier between the homestead and grounds, and the highway easement. There would be considerable impact to local landscape context values to the south of the existing highway, where construction of the bypass carriageway would involve a substantial cutting and downslope embankment. The main carriageway would be situated approximately 90 metres to the south of the homestead, and the off-ramp, approximately 70 metres.

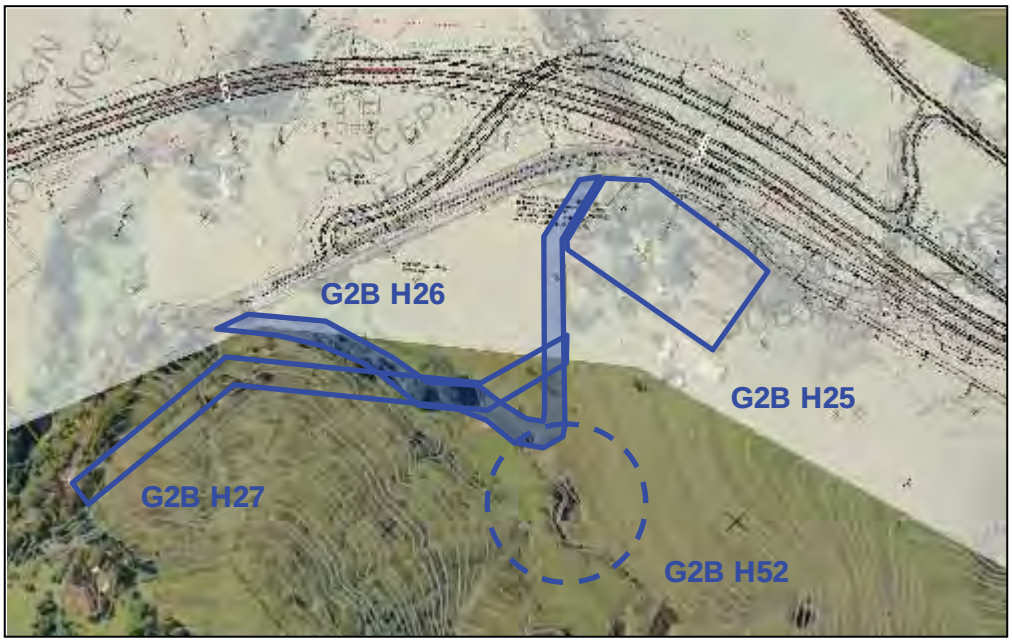


Figure I.16 Location of G2B H25 relative to associated recordings in the 'Bink's Corner' group, and the proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria b & g.
- One of the determining factors for the selection of the bypass alignment was the avoidance of direct impact to the Sedgeford homestead and grounds. A former alignment proposal, which was shorter and therefore cheaper, would have required demolition and removal of both the buildings and grounds.
- The spatial relationship between the homestead, its grounds, and the current and a former highway alignment (G2B H26), is a valuable component of the heritage and interpretive values of the Bink's Corner grouping of heritage items (G2B H25, 26, 27 & 52). The bypass design respects this relationship by allowing for the continued vehicle use of the existing highway as a service road, and avoiding direct impacts on the eastern and northern side of the existing highway.

- The construction of the bypass in relative proximity of the Bink's Corner grouping of heritage items, enhances the interpretive value of the road remnants by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) examples.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- There would be considerable impact to local landscape context values to the south of the Sedgeford grounds (boundary runs adjacent to the existing highway), where a substantial cutting and downslope embankment would be constructed. The main carriageway would be situated approximately 90 metres to the south of the homestead, and the off-ramp, approximately 70 metres. Existing tree plantings would provide a visual buffer and barrier between the homestead, its grounds, and the highway easement.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria b & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would substantially impact upon the contextual values of the homestead.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Avoid direct impact to the Sedgeford homestead and grounds, and the Brookside homestead, 400 metres to the northeast.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the indirect impact to this recording would be to move the bypass alignment either substantially to the north, or further south. The northern alternative is limited by a major ridge slope, with the consequence that the nineteenth and twentieth century road remnants (G2B H27 and 26) would be directly impacted. The southern alternative would require a major alignment change which would involve direct impact to potentially two farmhouses, and significant property severance.
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H28 **Name/*Description*:** ***Brookside* homestead A540 Princes Highway Broughton Village**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The bypass carriageway, which at this point is a bridge over Broughton Creek, would be situated approximately 75 metres to the southeast (and to the rear) of the *Brookside* homestead building. A separate, recently constructed cottage (incorporating some recycled materials) would be within 45 metres of the carriageway. The bridge is approximately 190 metres in length and would form a dominant visual backdrop in south and east directed views of the homestead. The bridge would cross the Broughton Creek at an oblique angle and would be angled upwards towards a spur in the southwest.

The northern property boundary of the required bypass easement passes through the rear storage shed and associated former dairy platform, and a former building platform on basal slopes on the opposite side of a small tributary southwest of the homestead grouping. The resumed land for the bypass easement would also include the former orchard and pump remains.

Construction of the bypass would require the demolition of the storage shed, possible impact to the former building platforms, and a substantial impact to local landscape context values to the east and south.

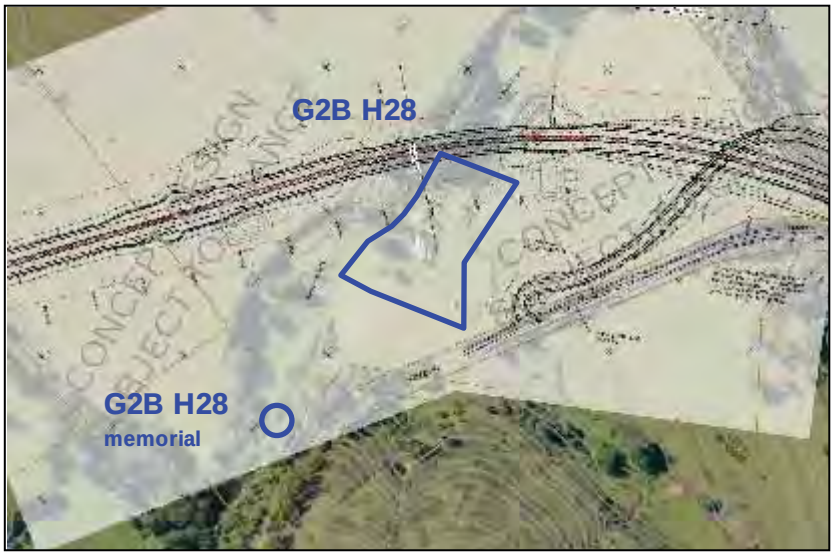


Figure I.17 Location of G2B H28 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e & g.
- One of the determining factors for the selection of the bypass alignment was the minimisation of direct impact to the Brookside homestead. A former alignment proposal, which was shorter and therefore cheaper, would have required demolition of the homestead.

- It is proposed to conduct an archival recording of this item prior to any impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- There would be a substantial impact to the landscape context values of this item. The bridge and adjoining carriageway embankments would form an immediate backdrop and a dominant twenty-first century, visually intrusive element to the context of the homestead. This would significantly detract from the current early twentieth century character of the homestead, and dramatically shift the aesthetic values of its context. The maintenance of the creek corridor, and the visual continuity of viewsheds via the under-bridge space, are important moderating elements to this impact. Both the creekline and the bypass present strong directional landscape elements which could be appreciated as complementary and aesthetic landscape elements.

Impact on existing structures

- The bypass would directly impact the storage shed and associated small outbuilding.

Impact on relics

- Based on the local level of assessed significance for this item (criteria b & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. The incorporated elements of a former dairy, now part of the storage shed, would be impacted by the project. In the event that the construction of easement boundary fencing requires levelling and ground preparation, then archaeological deposits associated with former dairy and out-building platforms would be impacted.

Summary

- The bypass would directly impact upon a storage shed, remnants and traces of a former dairy complex, and substantially impact upon the contextual values of the homestead.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass in the proximity of this heritage item is required in order to:
  - Minimise direct impact to the Brookside homestead group and avoid direct impact to the Sedgeford homestead and grounds, 400 metres to the southwest.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There is potential for archaeological deposits to be associated with the platforms for a former dairy complex and former outbuilding, which would be subject to direct impact.
- What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The alternatives to the impact to this recording would be to move the bypass alignment either to the east, or west. The eastern alternative would require a major alignment change involving a substantially longer carriageway and significant land take and property severance issues. The western alternative could not reduce indirect impacts due to limited space imposed by a major ridge slope. A consequence is that the nineteenth and twentieth century road remnants (G2B H27 and 26) would be directly impacted. These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to impact, it is proposed to conduct an archival recording at the Brookside homestead (G2B H28), inclusive of those features subject to direct impact, and the homestead building which incorporates structures previously moved from site G2B H59.
- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.

- The natural character of the Broughton Creek and its banks in the vicinity of the bypass bridge, immediately south of the Brookside homestead, would be maintained and enhanced as much as feasible. The aim of this strategy is to ameliorate impact to the landscape context by maintaining and reinforcing the visual quality of the creek corridor. This can be achieved by maintaining and augmenting native bank side vegetation, and maximising the distance between the banks and bridge abutments.
- Where there is no anticipated direct construction impact to components of this site, it is recommended that measures be instigated, where and as considered warranted, to protect these components from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This heritage listed bridge would not be directly impacted by the project development. A new bypass bridge would be constructed immediately downstream of the existing bridge. The function and integrity of the existing bridge would be maintained through the retention of the existing highway carriageway as part of a local service road between the Toolijooa Rd intersection and *Sedgeford*.

The landscape context of the bridge would be substantially altered by the addition of the new and higher bypass bridge on its downstream side.

Figure I.18 Location of G2B H29 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, c, f & g.
- The existing bridge structure would not be directly impacted by the development.
- The construction of the bypass bridge immediately adjacent to the existing bridge would provide an interpretive opportunity to contrast and compare differences and developments in concrete bridge construction. The continued use of this crossing point continues a practise first established by perhaps the first European pathway along the valley floor, indicated on the 1860s county map (refer Figure 6.216 & 217).
- The reduction in vehicle traffic on the existing highway provides an opportunity to make it easier for visitors to stop and inspect the heritage bridge.

- It is proposed to promote, interpret and present the cultural values of this site to a public audience using formats, locations and strategies defined in a Heritage Interpretation Plan (HIP) to be developed as part of the project. This would recognise and enhance the heritage significance of the site by promoting the largely un-appreciated heritage of concrete structures and the development of highway bridge design. Such a program could potentially integrate interpretation with other related items, such as the 'Bink's Corner' highway remnants (refer Statements of Heritage Impact for G2B H19, 22, 23, 30 and 55).

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- The construction of the new bypass bridge would pose a substantial change to the landscape context of this item. The consequential loss of aesthetic quality is however, compensated by the interpretive opportunity and functional continuity represented by the new bridge. The new bridge

Impact on existing structures

- The bypass would not directly impact the heritage bridge.

Impact on relics

- Based on the local level of assessed significance for this item (criteria b & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. There are no known or suspected relics within the area of the adjacent bypass.

Summary

- The bypass would not directly impact the heritage bridge. The landscape context of the bridge would be substantially altered by the proximity of the new bypass bridge. This indirect impact is however, compensated for by the functional continuity of the new bridge, and the interpretive opportunities.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Minimise disturbance to the ecological values of the Broughton Creek corridor.
  - Minimise the extent of excavation and batter length (and therefore also visual impact) associated with the Toolijooa Ridge cutting.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or suspected archaeological deposits within the area of the adjacent bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the indirect impact to this recording would be to move the bypass alignment further downstream (south). This would involve direct impact to a farmhouse, the creation of a new disturbance corridor across the Broughton Creek riparian vegetation/corridor, and potentially greater excavation along the Toolijooa Ridge cutting in order to accommodate horizontal design (curve) requirements. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise disturbance to the ecological values of the Broughton Creek corridor.
  - Minimise the extent of excavation and batter length (and therefore also visual impact) associated with the Toolijooa Ridge cutting.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to promote, interpret and present the cultural values of this site to a public audience using formats, locations and strategies defined in a Heritage Interpretation Plan (HIP) to be developed as part of the project. This would recognise and enhance the heritage significance of the site by promoting the largely un-appreciated heritage of concrete structures and the development of highway bridge design. Such a program could potentially integrate interpretation with other related items, such as the 'Bink's Corner' highway remnants (refer Statements of Heritage Impact for G2B H19, 22, 23, 30 and 55).
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H45 **Name/*Description*: *Glenvale* homestead**
A371 Princes Highway, Broughton

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Neither the homestead nor its grounds would be directly impacted. The closest sections of the bypass are situated on the same corridor of the existing highway. The construction footprint of the bypass comes within 150 metres of the homestead. Existing tree plantings provide a visual buffer and barrier between the homestead, its grounds, and the bypass easement. There would not be an appreciable impact to landscape context values of the homestead.

The listing of the *Glenvale* homestead on the Shoalhaven Local Environmental Plan Heritage Schedule includes the whole property, and the southern margin of the property would be discontinuously and directly impacted by the bypass development. Included in this category is direct impact to two remnants of the 1856 Berry Estate Road (G2B H22 & 23). These remnants are likely to have been contemporary with the *Glenvale* homestead and their loss would therefore pose an impact to the associative heritage values of the homestead.

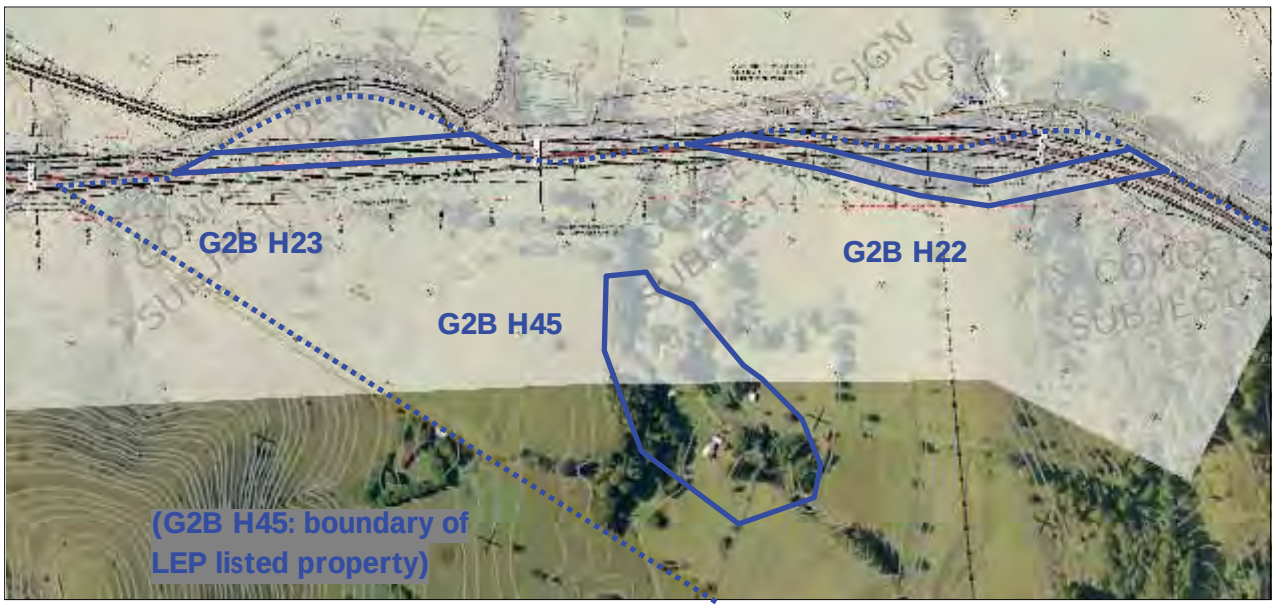


Figure I.19 Location of G2B H45 relative to associated recordings and proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e, f & g.
- The construction of the bypass would not directly impact this item.
- It is proposed to conduct an archival recording of two Berry Estate road remnants prior to any direct impact. The creation of the record respects and addressed the research potential of the spatial relationship between the homestead and early estate roadway. It would also provide a degree of mitigation for the loss of associative and contextual values.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- There would not be any appreciable impact to the contextual landscape values of the homestead. Existing tree plantings would provide a visual buffer and barrier between the homestead, its grounds, and the bypass easement.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria e, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The homestead and grounds would not be directly impacted by the bypass. The indirect impacts of the bypass would not be appreciable given the extent of the visual and spatial buffers around the homestead. Direct impact to two remnants of the Berry Estate road on the same property holding would impact on associative heritage values shared by these items.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with the homestead which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative to the indirect impact to this recording would be to move the bypass alignment further to the north. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements: and
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H47 **Name/*Description*: Former St Patrick's Convent and St Patrick's Church, *80 North St, Berry***

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The church and former convent and their grounds would not be directly impacted. The grounds of these two associated buildings comprises Lot 1 DP86897, approximately 0.8 hectares. The lot is bounded in the north by North Street, which provides rear access to both buildings. The bypass works in the vicinity of this item would be limited to the North Street easement, and further to the north.

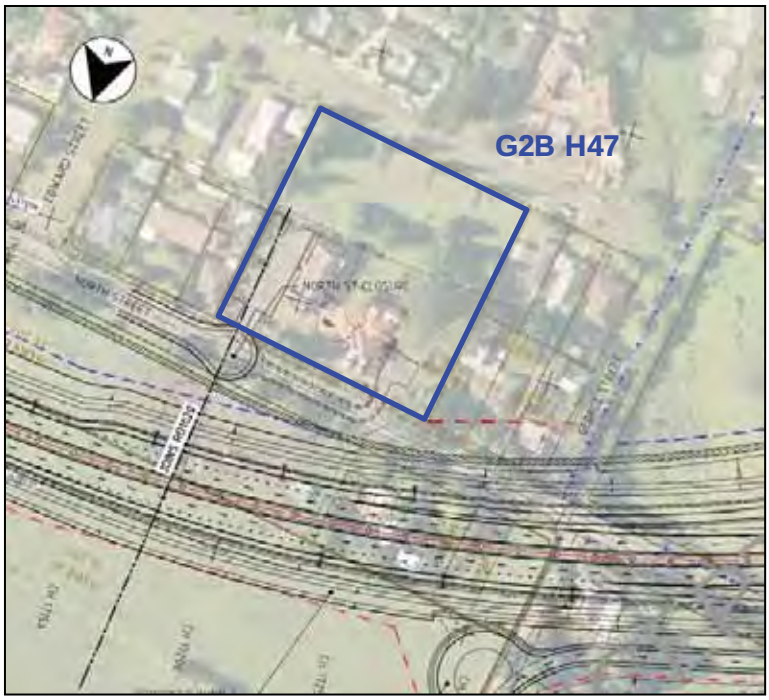


Figure I.20 Location of G2B H47 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- These items have an assessed local level of significance under criteria d, f & g.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Despite the proximity of the bypass, the integrity of the large town lot on which the church group is situated would not be compromised. The contextual values of these buildings would not be significantly impacted based on the following reasons:
  - The 'front' and entrance aspects of both the church and former convent buildings are to the south and east.
  - An existing high boundary fence and associated border vegetation along the North Street frontage obscures potential short and mid-distance vistas to the north. This indicates that these components of the site's context are not an important part of current usage or appreciation of the site.
  - Relative to the surrounding urban lots, the spatial buffer around each building is already substantial.

Impact on existing structures

- The bypass would not impact existing structures on this lot.

Impact on relics

- Based on the local level of assessed significance for this item (criteria d, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass works would not directly impact this item. The indirect impacts of the bypass would not be appreciable given the southerly aspect of the heritage buildings, the existing spatial buffers and visual barriers.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass close to this heritage item is required in order to:
  - Minimise land take and property severance.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Neither the farmhouse nor its grounds would be directly impacted. The closest section of the bypass carriageway is 100 metres to the south. Existing tree plantings provide a visual buffer and barrier between the homestead, its grounds, and the bypass easement. An open field is situated between the farmhouse grounds and the bypass. There would not be an appreciable impact to the landscape context values of the farmhouse.

Figure I.21 Location of G2B H49 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e & g.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- There would not be any appreciable impact to the contextual landscape values of the farmhouse. Existing tree plantings would provide a visual buffer and barrier between the homestead, its grounds, and the bypass easement. At least 200 metres of an open field system separates the homestead grounds from riparian vegetation situated to the south and west.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria e & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The farmhouse and grounds would not be directly impacted by the bypass. The indirect impacts of the bypass would not be appreciable given the extent of the visual and spatial buffers around the homestead.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Minimise impact to the Berry sporting fields.
  - Minimise land take and property severance.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with the farmhouse which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the indirect impact to this recording would be to move the bypass alignment further to the south. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise impact to the Berry sporting fields.
  - Minimise land take and property severance.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The cottage is located on the northern side of the current highway and would not be directly impacted. The bypass carriageway would be situated on an embankment, on the southern side of the current highway, within 35 metres of the cottage. The current highway would be retained as a service road. The construction of the carriageway on an elevated embankment to the northwestern corner of the cottage would pose an impact to the visual and landscape context of the item.

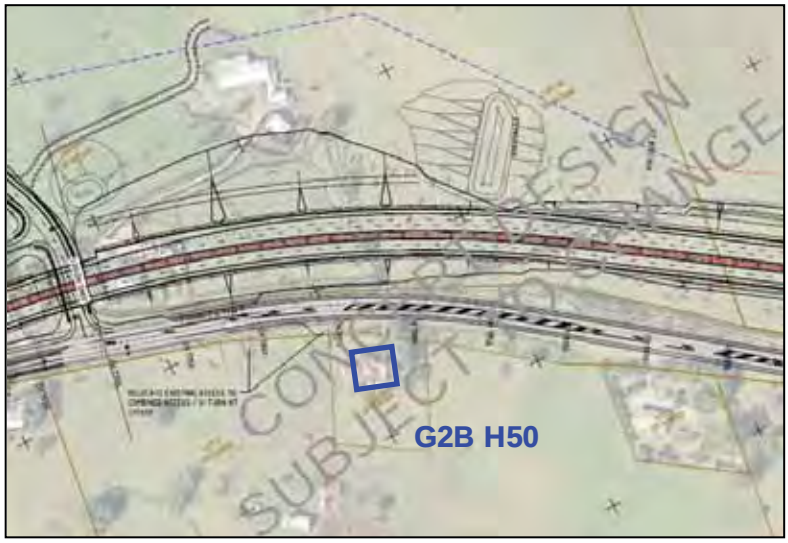


Figure I.22 Location of G2B H50 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- The construction of the carriageway on an elevated embankment to the northwestern corner of the cottage would pose an impact to the visual and landscape context of the item.

Impact on existing structures

- The bypass would not impact existing structures on this lot.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- The bypass would substantially impact upon the contextual values of the cottage.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass close to this heritage item is required in order to:
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the spurline running adjacent to the cottage, to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.
  - Provide for a suitable degree of carriageway elevation to accommodate an underpass for the Toolijooa Road intersection.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the south or north.
- These alternatives have been rejected based on the low significance of the item, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the spurline running adjacent to the cottage, to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.
  - Provide for a suitable degree of carriageway elevation to accommodate an underpass for the Toolijooa Road intersection.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the low significance assessment for the item and the absence of direct impact, no further heritage related management is recommended for this item.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The concept design allows for the retention of that portion of the existing Schofields Lane which is adjacent to and parallels the eastern boundary of the *Graham Park* property. This section includes the *Graham Park* entrance gates and sculpture which are an important, and publically accessible heritage feature of the former research station. This retention would be possible due the concept design specification for a new highway intersection with Schofields Lane 50 metres to the north.

As a consequence of the retention of the current Park entrance and adjacent portion of Schofields Lane, there would be no direct impact to the significant fabric of the *Graham Park* site.

The edge of construction works for the bypass carriageway would extend to approximately 20 metres of the eastern boundary of Graham Park. This would not pose an appreciable impact to the visual and contextual values of the site.

Figure I.23 Location of G2B H51 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed State level of significance under criteria a, b, c & g, and local significance under criteria a, c, e, f & g.
- The relocation of the bypass intersection with Schofields Lane has the consequence that the existing portion of Schofields Lane which includes the Graham Park entrance can be retained and continue to function. This will maintain the heritage values and integrity of the entrance way. Previously considered options for this intersection would have required a new entrance to the facility, and possibly also repositioning of the entrance feature.

- It is proposed that the design of any access roadworks in the vicinity of the *Graham Park* entrance should not exclude the capacity for visitors to pull over and safely inspect the entrance feature. If necessary, allowance should be made in the design for the potential future installation of interpretive signage.
- The increased proximity of the highway, and the associated vegetation clearance would make the entrance sculpture more visible to bypass users. This could both increase public awareness and curiosity about the site.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Despite the proximity of the bypass, the contextual landscape and visual values of this item would not be appreciably compromised. The contextual values of the former research station would not be significantly impacted based on the following reasons:
  - The bypass at this point simply duplicates the existing carriageway on its northern side.
  - Despite the proximity of the required bypass construction footprint, the area immediately in front of the existing Graham Park already consists of a public road, being an alteration to the Schofields Lane alignment and intersection with the highway, constructed sometime between 1992 and 2006.
  - The existing circular driveway behind the entrance provides an effective open space buffer (17 metres) in front of the former station buildings.

Impact on existing structures

- The bypass would not directly impact any of the significant structures which form part of Graham Park.

Impact on relics

- Based on the State and local level of assessed significance for this item (criteria a, b, c, e, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. There are no known relics which would be directly impacted by the bypass development.

Summary

- The bypass would not directly impact significant items, and would have no appreciable impact on contextual values.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass in the proximity of this heritage item is required in order to:
  - Maximise the use of the existing highway easement.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the close proximity of the bypass to this recording would be to move the bypass alignment to the east. This would directly impact upon a modern farmhouse and native vegetation. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is recommended that the design of any access roadworks in the vicinity of the *Graham Park* entrance should not exclude the capacity for visitors to pull over and safely inspect the entrance feature. If necessary, allowance should be made in the design for the potential future installation of interpretive signage.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.
- During the period of bypass construction, temporary fencing would be erected around the feature to identify a 'no-go' area.

Recording ID: G2B H56 **Name/*Description*:** ***Broughton Mill* (disused) Homestead and Dairy**
117 North St Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This disused homestead and dairy would not be directly impacted. The bypass would be situated approximately 50 metres to the south of the site, and consequently pose a loss of landscape context value.

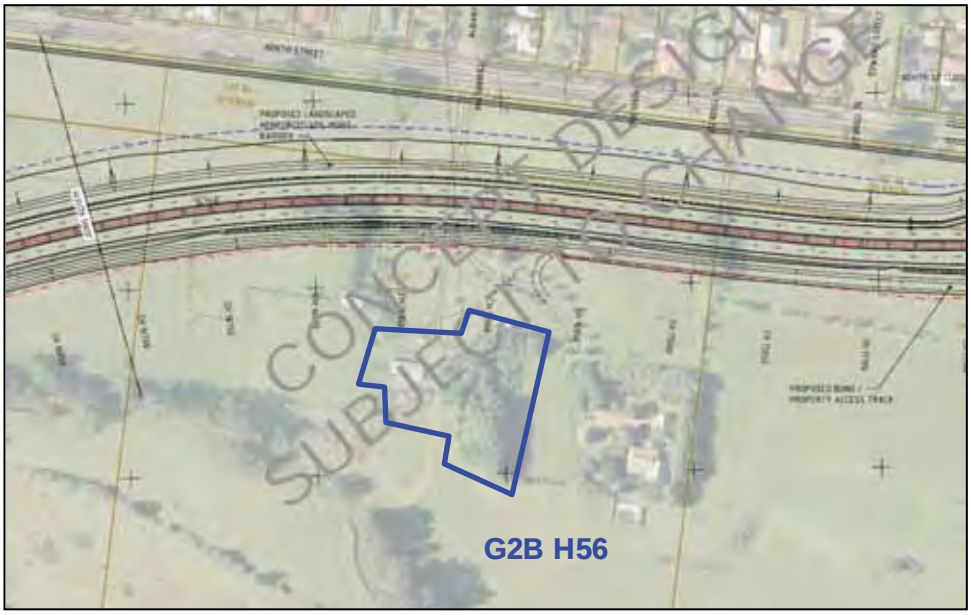


Figure I.24 Location of G2B H56 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e & g.
- The bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass works would be situated relative closely to the east and south of this item, coming as close as 50 metres to the south. This would place a visually intrusive landscape element into the current pastoral context of the homestead and dairy.
- This impact is substantially lessened by the fact that the homestead is now disused and in a ruinous state. The ruin is obscured by dense vegetation, and there are currently no practical outward looking vistas available from the building. Similarly, views towards the homestead provide no obvious indication of its presence.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criterion g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would impact upon the landscape contextual values of the homestead and dairy to the south and east.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the relative proximity this heritage item is required in order to:
  - Minimise land take and property severance.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Minimise impact to the sporting fields to the east, by locating the bypass on the north of Bundewallah Creek and then crossing the creek west of the fields and turning south to run parallel with the North Street corridor.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H58 **Name/*Description*: Uniting Church Hall (former Wesleyan Chapel) 60 Albert St Berry**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This former church building, until recently situated on the south side of North Street, and now re-positioned 50 metres to the south and, facing Albert Street, would not be directly or indirectly impacted. The building entrance now faces south, away from the bypass, and vistas from the building no longer include the pastoral view on the north side of North Street. The bypass would be situated 200 metres away to the northwest. Existing buildings occur between the former chapel and the bypass.

Figure I.25 Location of G2B H58 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, d, f & g.
- The construction of the bypass would not directly or indirectly impact this item.
- One of the determining factors for the selection of the bypass alignment was the avoidance of indirect impact to this building in its former location. Previously contemplated alignment proposals, would have had an indirect impact due to construction in close proximity next to North Street.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The visual and landscape context of this former church building would not be impacted by the bypass. This conclusion is based on the following points:
  - The bypass would be situated 200 metres away, on the opposite side of North Street.
  - The recent re-positioning of this building means that the entrance now faces south, away from the bypass, and the front of the building forms part of the Albert Street frontage.

- Buildings and an avenue of mature tree plantings are situated between the former chapel and North Street, and these provide a considerable visual buffer and boundary.

Impact on existing structures

- The bypass would not impact existing structures on this lot.

Impact on relics

- Based on the local level of assessed significance for this item (criteria a, d, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- This item would not be impacted, either directly or indirectly by the bypass.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass relative to this heritage item is required in order to:
  - Minimise land take and property severance.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Minimise impact to the sporting fields to the east, by locating the bypass on the north of Bundewallah Creek and then crossing the creek west of the fields and turning south to run parallel with the North Street corridor.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north and northwest.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- This item would not be impacted, either directly or indirectly by the bypass.

I.5 Known or potential archaeological deposits

Recording ID: G2B H14 **Name/*Description*: Archaeological Deposit Former buildings at northern end of Broughton Creek township, Princes Highway, Berry**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The north Berry interchange would include a south bound off-ramp positioned along the current highway alignment. Construction of the off-ramp would include widening and other works along the existing carriageway. This would encroach upon the G2B H14 archaeological deposit which extends up to the edge of the existing road shoulder on the eastern side. The degree of encroachment would vary and may extend up to five metres from the current shoulder edge.

An associated northbound on-ramp would be constructed on the western side of the existing highway alignment. This ramp would diverge from the current alignment opposite the *Mananga* homestead and descend to a level below the main bypass carriageway bridge. This alignment probably includes the location of the Berry butter factory building and the original (now filled) steep slope to Broughton Mill Creek. The latter may have been a refuse disposal area for the factory. Construction related excavation in this area may impact archaeological deposits which potentially remain beneath the existing road platform and the adjacent slopes.

The intersection of the new off-ramp with the former 1955 highway remnant (G2B H15), would be moved 100 metres further north, allowing the construction of a safer 90 degree angle of approach. This would involve direct impact to a roughly 190 m^2 (12.5 x 15 metres) portion of the G2B H14 archaeological deposit

Figure I.26 Location of G2B H14 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, e, f & g.
- It is proposed to conduct a program of archaeological salvage excavation within those portions of the G2B H14 deposit subject to direct impact. The archaeological record generated by this action would address the need to realise the research, interpretation and information potential of the deposit. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the interchange and associated on and off-ramps would not impact upon the visual and landscape context of the archaeological deposit to any greater degree than has already occurred since the 1955 upgrade. Existing elements which are important to the landscape and visual context of the deposit are the former 1955 highway alignment (and now service road) G2B H15, and the Mananga homestead and grounds (G2B H16). The Mananga homestead and grounds will not be directly impacted. The significant portion of the remnant highway, that section adjacent to the Mananga homestead, will also remain intact.

Impact on existing structures

- This item does not include above ground structures.

Impact on relics

- Based on the local level of assessed significance for this item (criteria a, e, f & g), the sub-surface artefacts and archaeological deposits which comprise this item comply with the definition of a relic.
- The loss of deposit outlined in the first question corresponds to impact to relics.

Summary

- Construction of the bypass would result in direct impact to two known areas of archaeological deposit (a margin adjacent to the existing highway and 190 m^2 under a new access road intersection), and to potentially occurring deposits underlying the existing highway and adjacent slopes.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass and service road across this heritage item is required in order to:
  - Avoid direct impact to the Mananga homestead property.
  - Provide access to private property independent of the bypass carriageway.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- Construction of the bypass would result in direct impact to two known areas of archaeological deposit (a margin adjacent to the existing highway and 190 m^2 under a new access road intersection), and to potentially occurring deposits underlying the existing highway and adjacent slopes.
- Impact to archaeological deposits is outlined in the answer to the first question.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The only alternative to impacting this recording would be to move the bypass alignment further to the north. This would require either an extensive area of landfill and/or an extensive additional bridge interval. This would also result in additional loss of agricultural land.
- This alternative has been rejected based on the relative significance of the portion of the remnant subject to impact, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Avoid use of bridges where a viable alternative exists.
  - Maximise the use of the existing highway alignment and easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that prior to development impact, a program of archaeological salvage be conducted within those portions of the deposit subject to direct impact.
- For those sections of the deposit not subject to direct impact, it is recommended that measures be instigated, where and as considered warranted, to protect them from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H48	Name/*Description*:	**Potential Archaeological Deposit Site of former Berry Estate Tenant Farm 161 Princes Highway Broughton Village**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Two mature tree plantings mark the approximate location of this former homestead site. Based on an assessment of the tree locations and locally elevated micro-topography, it is estimated that the potential area in which the homestead was located falls outside of, but immediately adjacent to, the proposed bypass and associated easement.

A modern farmhouse has been constructed on the site of the former G2B H48 homestead. In the event that this building needs to be demolished, there could be an associated risk of impacting archaeological deposits related to the earlier occupation of the former homestead, and to the remnant tree plantings.

The bypass would be situated approximately 50 metres to the southeast of this item, and consequently pose a loss of landscape context value.

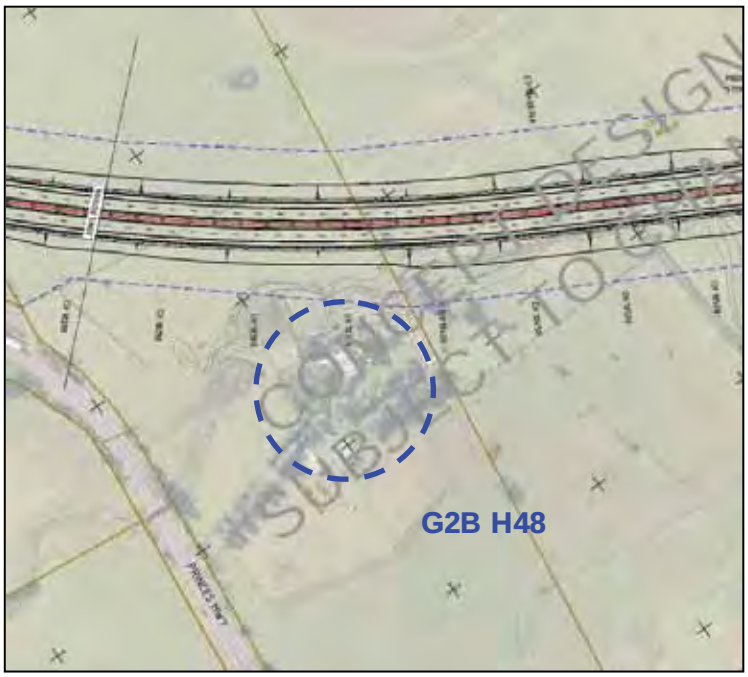


Figure I.27 Location of G2B H48 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion e, subject to confirmation through test excavation.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass works would be situated relatively close to this item, coming as close as 50 metres. This would place a visually intrusive landscape element into the current pastoral context of the site. This impact is substantially lessened however by the fact that the site has already been substantially impacted by the construction of a modern farmhouse and its grounds. The significance of this item is based on its potential research value through archaeological investigation. The impact of the bypass on the landscape context of this item would not have a significant impact on this value.

Impact on existing structures

- This item does not include above ground structures. No structures associated with this recording would be impacted by the bypass.

Impact on relics

- Based on the local level of assessed significance for this item (criterion e), the sub-surface artefacts and archaeological deposits which may comprise this item would comply with the definition of a relic.
- It is considered unlikely that construction of the bypass poses a risk to relics given the distance from the former homestead and the lower ground surface of the construction footprint.
- If, due to constraints on re-sale and re-use, demolition of the current farmhouse becomes necessary, then there would be potential for the demolition to impact remnant archaeological deposits, and the remnant tree plantings.

Summary

- Construction of the bypass would result in the minor loss of contextual values, but is unlikely to result in direct impact to the deposit unless demolition of the modern farmhouse is required to satisfy re-sale constraints.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The close proximity of the bypass to this heritage item is required in order to:
  - Minimise disturbance to the ecological values of the Broughton Creek corridor.
  - Minimise the extent of excavation and batter length (and therefore also visual impact) associated with the Toolijooa Ridge cutting.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- It is considered unlikely that construction of the bypass poses a risk to potential archaeological deposits given the distance from the former homestead and the lower ground surface of the construction footprint.
- If, due to constraints on re-sale and re-use, demolition of the current farmhouse becomes necessary, then there would be potential for the demolition to impact remnant potential archaeological deposits.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the close proximity of the bypass to this item would be to move the bypass alignment further south. This would involve a new disturbance corridor across the Broughton Creek riparian vegetation/corridor, and potentially greater excavation along the Toolijooa Ridge cutting in order to accommodate horizontal design (curve) requirements. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise disturbance to the ecological values of the Broughton Creek corridor.
  - Minimise the extent of excavation and batter length (and therefore also visual impact) associated with the Toolijooa Ridge cutting.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that in the event that construction related impacts are to occur at the G2B H48, then an archaeological program of monitoring and/or salvage excavation, as appropriate, be conducted with the aim of recording and recovering any artefacts or other information which relates to the former Berry Estate tenant farm at this location.
- In the event that demolition of the modern farmhouse is required, it is recommended that a program of archaeological monitoring by an archaeologist be conducted with the aim of recording and recovering any artefacts or information which relate to the former Berry Estate tenant farm.
- It is recommended that the remnant tree plantings, which predate the modern farmhouse, be conserved and protected from damage.

Recording ID: G2B H53 **Name/*Description*: Potential Archaeological Deposit Site of former Berry Estate Tenant Farm 403 Princes Highway Broughton Village (Toolijooa Ridge)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

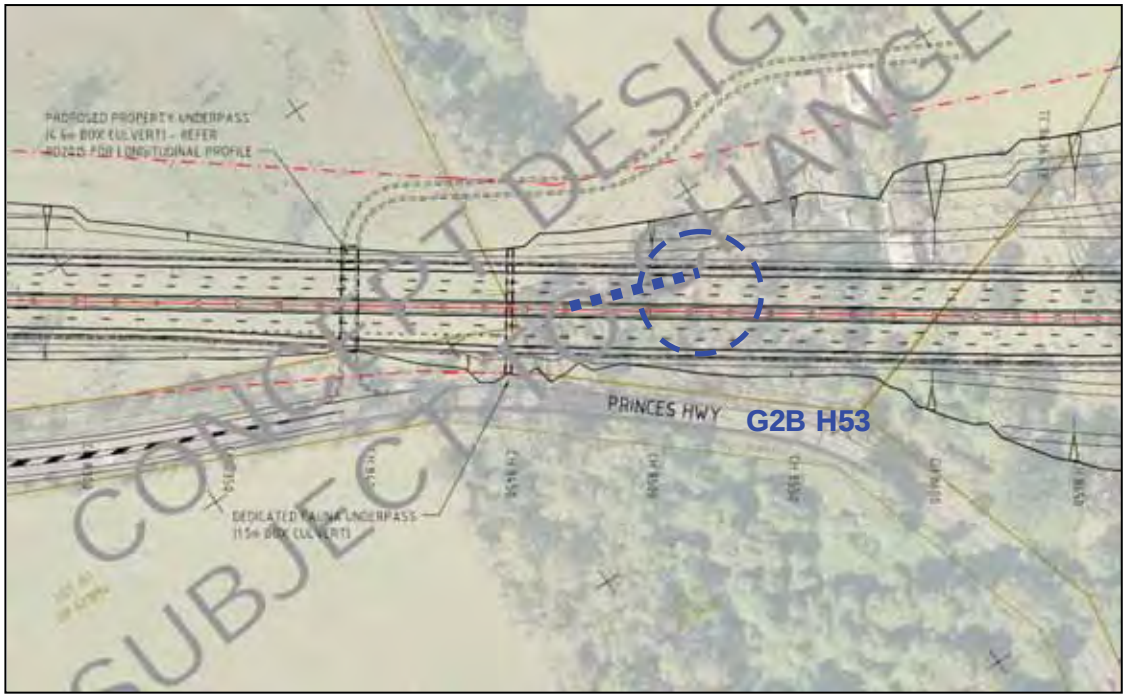


Figure I.28 Location of G2B H53 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion e.
- It is proposed to conduct a program of archival recording and archaeological salvage excavation, as appropriate, at G2B H14. The archaeological record generated by this action would address the research, interpretation and information potential of the deposit. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass would involve the creation of a number of substantial cuttings. These would not only remove the potential archaeological deposit and alignment of stones, but also their immediate landscape setting and visual context.

Impact on existing structures

- This item includes an alignment of stone rubble which may be the eroded or disturbed remnants of a dry stone wall. This feature would be directly impacted by bypass construction.

Impact on relics

- Based on the local level of assessed significance for this item (criterion e), the sub-surface artefacts and archaeological deposits which may potentially be present at this site would comply with the definition of a relic.
- All relics which constitute this item would be directly impacted.

Summary

- Construction of the bypass would result in the complete loss of the potential archaeological deposit and alignment of rock rubble which constitute this item.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the spurline to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- All potential archaeological deposits occurring at this site would be subject to direct impact.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment either to the north or south, which avoids direct impact to the heritage item. Both alternatives would require construction of major artificial embankments. A northern alternative would prevent the use of the existing highway as a service road. A southern alternative would require a much deeper and larger cutting through the upper portion of Toolijooa Ridge.

- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maintain the most effective vertical and horizontal carriageway alignment up to, and from, the planned Toolijooa cutting.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that prior to development impact, a program of archival recording and archaeological salvage excavation be conducted at this site, as appropriate, and as required by the nature and significance of the relics encountered.

Recording ID: G2B H59	Name/*Description*:	**Archaeological Deposit and Remnant Plantings Site of homestead on former Portion 181, Broughton Village**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This site would not be subject to direct impact from the bypass. The bypass would be situated over 100 metres to the west.

The bypass would be clearly visible from the site, given its lower elevation and the surrounding pasture. The bypass would have an indirect impact on the heritage values of the wider landscape context of the site.

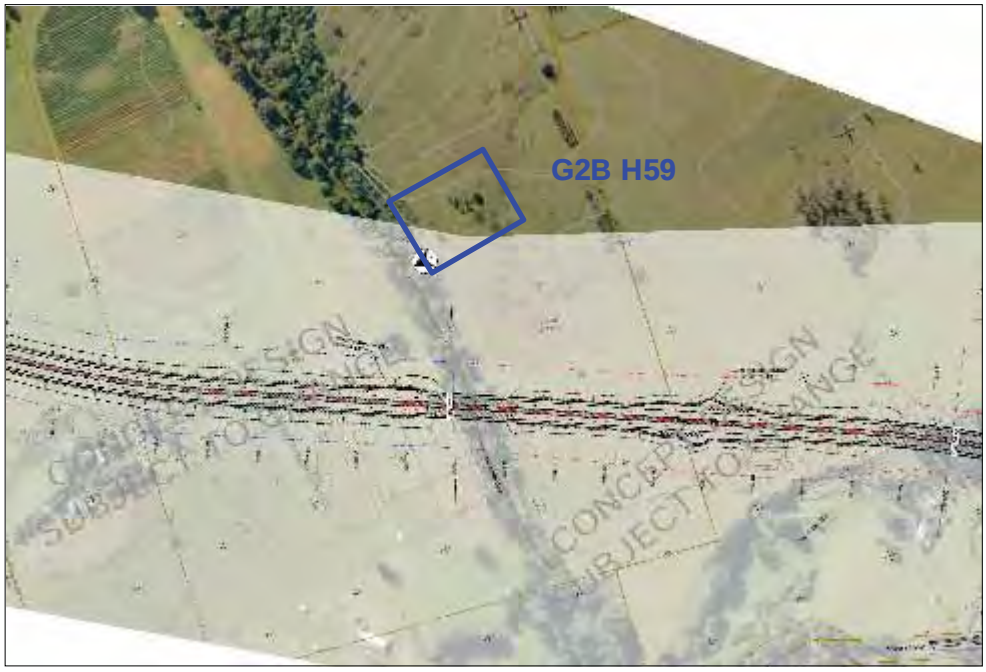


Figure I.29 Location of G2B H59 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, f & g.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass works would be situated in relative proximity to this item. This would impose a modern and intrusive element into the wider pastoral and largely nineteenth century landscape context of the site.

Impact on existing structures

- No structures associated with this recording would be impacted by the bypass.

Impact on relics

- Based on the local level of assessed significance for this item (criteria a, b, e, f & g), the above and below ground artefacts and archaeological deposits which comprise this item would comply with the definition of a relic. No relics would be directly impacted by the bypass.

Summary

- Construction of the bypass would pose an indirect impact to the heritage values of the wider landscape context of the site.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The relative proximity of the bypass to this heritage item is required in order to:
  - Minimise direct impact to the Brookside homestead group and avoid direct impact to the Sedgeford homestead and grounds.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- No known or potential archaeological deposits associated with this item would be subject to development impact.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the relative proximity of the bypass to this item would be to move the bypass alignment further to the west. This would require major, if not full direct impact to the Brookside (G2B H28) and Sedgeford (G2B H25) homesteads. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise direct impact to the Brookside homestead group and avoid direct impact to the Sedgeford homestead and grounds.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

I.6 Miscellaneous sites

Recording ID: G2B H61 **Name/*Description*: Quarried rock outcrop**
A350 Princes Highway
Broughton

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item. Although the footprint of the bypass carriageway is situated immediately adjacent to this site, it's location on a drainage line which would be directly impacted by culvert works means that full direct impact is most likely.

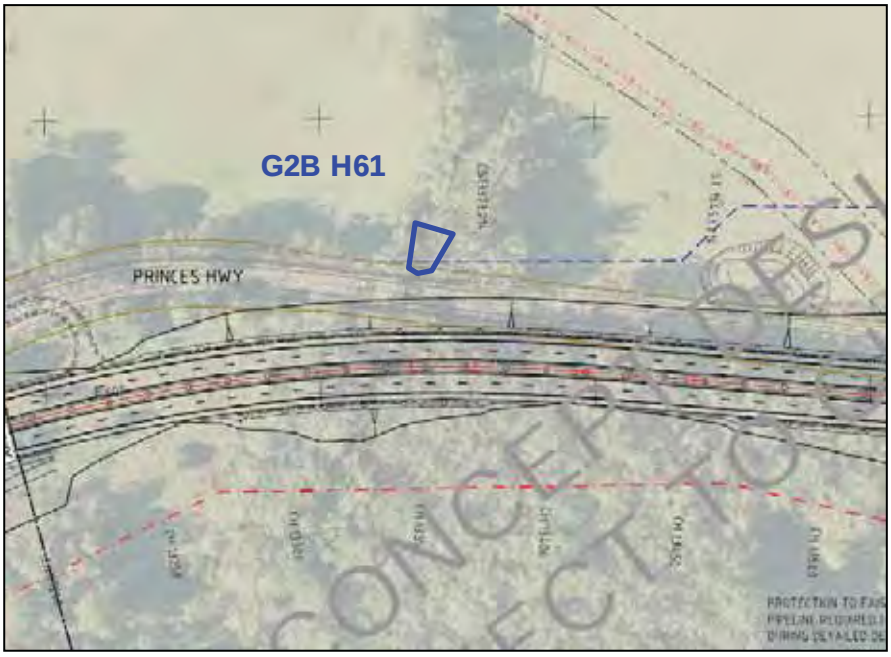


Figure I.30 Location of G2B H61 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion g.
- It is proposed to conduct an archival recording of this item prior to construction impact. The archaeological record generated by this action would address the research potential and representative value of the site. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass and any associated culvert works would result in both the loss of the site, and its immediate landscape setting and visual context.

Impact on existing structures

- This item does not include above ground structures.

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude 'works' (refer Section 8.1.5 of this report), the 'relic' status of this quarried rock face is difficult to determine.
- Apart from the quarry and stone extraction marks, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the complete loss of the heritage item, and its context.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.

Will any known or potentially significant archaeological deposits be subject to development impact?

- All potential archaeological deposits occurring at this site would be subject to direct impact.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item. A more northern alignment would impact native vegetation, both northern and southern alignments would have property severance implications.
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that prior to development impact, an archival recording of the site be conducted.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would not involve direct impact to the remaining six poplar trees in this avenue, (which originally included nine trees). The bypass would be constructed in close proximity to the northern most tree, at right angles to the alignment.

A younger and more densely planted avenue of poplar trees, extends to the north of the northern most recorded tree in the G2B H62 avenue. Some of these trees would be directly impacted by the project. This younger avenue does not form part of the G2B H62 recording.

Figure I.31 Location of G2B H62 relative to proposed bypass works (dead or removed trees are shown by a dashed circle).

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This tree avenue has an assessed local level of significance under criterion c.
- The bypass avoids impact to this avenue
- It is proposed to temporarily fence the northern most tree for the duration of construction works in order to protect the root zone and prevent accidental impacts.
- Any post construction planting of the bypass easement in the area of the tree avenue (Woodhill Mountain Road) would aim to reinforce and replicate the existing landscape character created by the planted avenues of poplar trees.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass would interrupt the intended visual structure and rhythm of the tree avenue, which parallels Woodhill Mountain Road. The visual impact of the avenue is currently reinforced by younger plantings of poplar trees which are situated on both sides of Woodhill Mountain Road and extend to the north of the original avenue. These younger poplars are not included in the Shoalhaven LEP heritage listing upon which the G2B H62 recording is based. The bypass would directly impact an avenue interval of approximately 50 metres (approximately twelve trees along the eastern road side). This, together with the construction of the bridge at right angle to the avenue would pose a substantial visual interruption to the lengthwise appreciation of the whole avenue.
- The current effectiveness of the whole avenue (inclusive of unlisted trees) is lessened by:
  - The truncation of most of the trees on the west side of road to allow for overhead powerline clearance.
  - Gaps in the avenue and variable planting intervals.
  - Varying tree heights due to multiple stages of planting.

Impact on existing structures

- There are no existing structures related to this heritage item.

Impact on relics

- Based on the local level of assessed significance for this item (criterion c), the trees which comprise this item would comply with the definition of a relic. None of the trees in the G2B H62 recording will be directly impacted.

Summary

- Construction of the bypass would not directly impact upon the G2B H62 tree avenue, however there would be impacts to the visual context of the avenue and to the appreciation of the avenue.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass in close proximity to this heritage item is required in order to:
  - Minimise property severance and loss of agricultural land.
  - Minimise visual and noise impacts as identified by Berry Community focus groups
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Minimise impact to the sports fields on the south side of Bundewallah Creek.
  - Maximise the use of the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this item.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass further north of the avenue. This however would involve greater loss of agricultural land due to field severance.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise property severance and loss of agricultural land.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Minimise impact to the sports fields on the south side of Bundewallah Creek.
  - Maximise the use of the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to temporarily fence the northern most tree for the duration of construction works in order to protect the root zone and prevent accidental impacts.
- Any post construction planting of the bypass easement in the area of the tree avenue (Woodhill Mountain Road) would aim to reinforce and replicate the existing landscape character created by the planted avenues of poplar trees.

Recording ID: G2B H63 **Name/*Description*: *Mark Radium Park***
Victoria Street, Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of a southbound on-ramp for the southern Berry interchange would require the loss of a narrow margin of land from the western boundary of the park, adjacent to the current Princes highway. This margin may be as wide as 25 to 30 metres at its southern end, and narrower at its northern end.

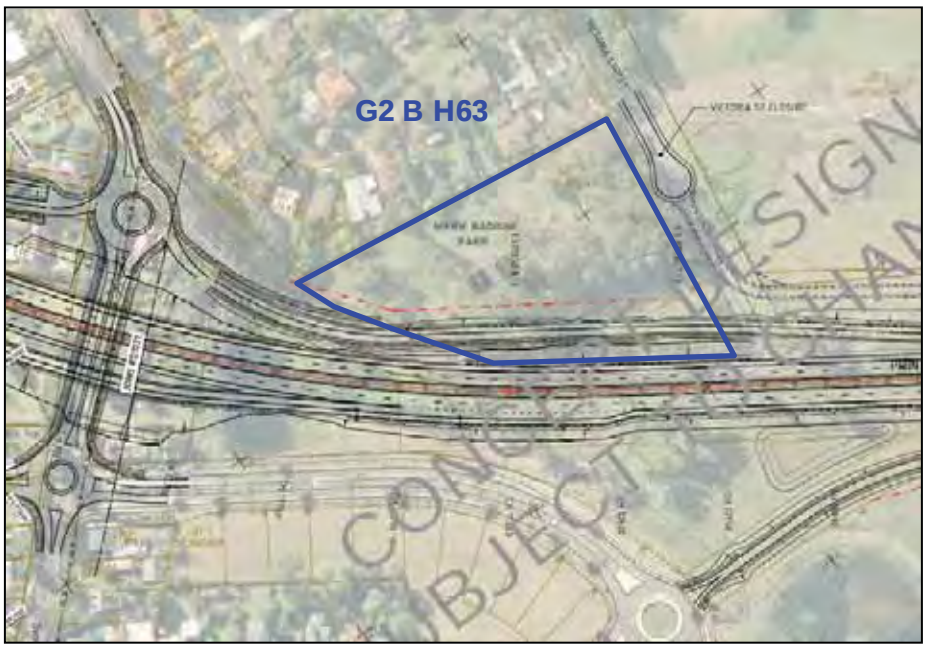


Figure I.32 Location of G2B H63 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This Mark Radium park has an assessed local level of significance under criteria b & c.
- The bypass minimises impact to the park by re-using as much of the original highway carriageway as possible.
- The change in use of the existing highway from main single carriageway to an on-ramp, means that this bordering roadway will undergo a reduction in vehicle traffic with possible positive results for the public amenity and safety of the park.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass development will reduce the width of the park and create a wider corridor of carriageways and ramps along its western boundary.

Impact on existing structures

- The bypass may impact the western abutment of a low wall which impounds an ornamental pond located in the southwestern portion of the park.

Impact on relics

- Based on the local level of assessed significance for this item (criteria b & c), those components of the park which constitute the significant fabric of the item would comply with the definition of a relic. It is debatable if any of the specific park items to be impacted by the bypass - a number of trees, other plantings, footpaths and potentially the ornamental pool wall, could be considered the significant fabric of the park.

Summary

- Construction of the bypass would result in the loss of a margin of land along the western park boundary, and visual impact associated with a wider highway corridor.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Fulfil the requirements of the proposed southern interchange for Berry.
  - Minimise impacts to urban lots.
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.
  - Maximise the use of the existing highway alignment.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this item.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The only alternative would be to move the main carriageway further to the west. This would have a substantial impact to the Huntingdale Park Estate.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Fulfil the requirements of the proposed southern interchange for Berry.
  - Minimise impacts to urban lots.
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.
  - Maximise the use of the existing highway alignment.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to minimise construction impact to Mark Radium Park wherever feasible.
- Where there is no anticipated direct impact to Park components, it is recommended that measures be instigated, where and as considered warranted, to protect these components from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would probably result in direct impact to at least the southern end of the wall, and possibly a greater portion, depending on the batter and stepping requirements of the northern face of the cutting through Toolijooa Ridge.

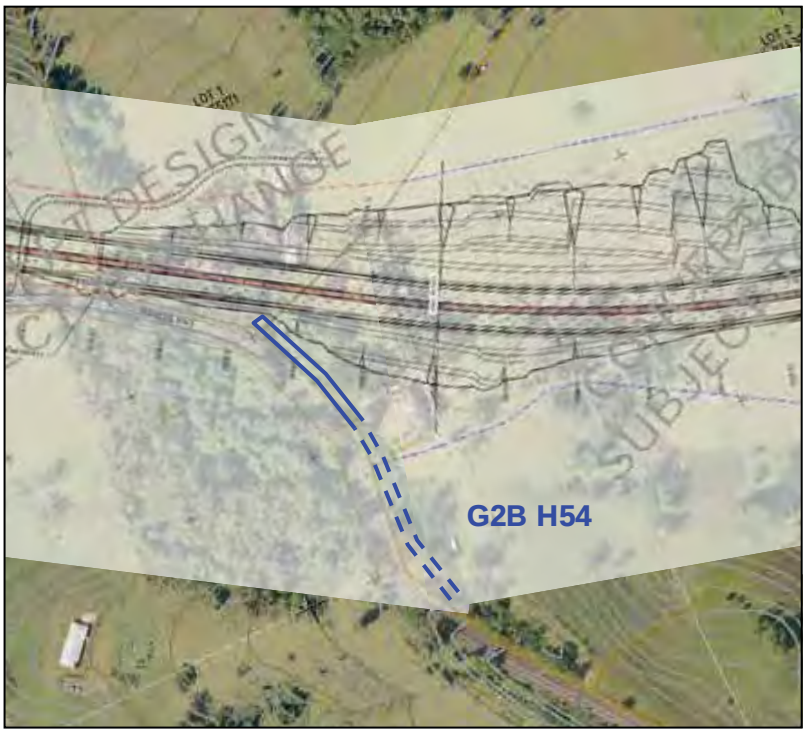


Figure I.33 Location of G2B H54 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria c, f & g.
- It is proposed to avoid direct impact to the wall wherever feasible, and to actively conserve and manage the feature.
- It is proposed to conduct an archival recording of the wall prior to any construction impact. The archaeological record generated by this action would address the research potential and representative values of the site. The record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass would involve the creation of a large, deep and visually imposing cutting immediately adjacent to the wall. Despite this, the immediate landscape context of the wall would be retained, due to the retention of the existing highway carriageway as a local access and service road. The wall is situated

upslope of this carriageway and probably served as a boundary wall for the original road easement.

Impact on existing structures

- Construction of the bypass would probably result in direct impact to at least the southern end of the wall, and possibly a greater portion, depending on the batter and stepping requirements of the northern face of the cutting through Toolijooa Ridge.

Impact on relics

- Based on the local level of assessed significance for this item (criteria c, f & g), the above and below ground elements of the wall, together with any sub-surface artefacts and archaeological deposits would comply with the definition of a relic.
- Those elements of this site that may be subject to direct impact (a portion of the wall at its southern end, and potentially any archaeological remains within the fill on the upslope side of the wall), would all constitute relics.

Summary

- Construction of the bypass would probably result in direct impact to at least the southern end of the wall, and possibly a greater portion. Despite this, the majority of the immediate context of the wall would probably be retained as part of the continuing function of the current highway as a service road.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the adjacent spurline to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.

Will any known or potentially significant archaeological deposits be subject to development impact?

- The upslope fill behind the wall may include archaeological material, and would be impacted if and where the wall itself was directly impacted.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment either to the north or south. Both alternatives would require construction of major artificial embankments downslope of the wall. A northern alternative would prevent the use of the existing highway as a service road. A southern alternative would require a much deeper and larger cutting through the upper portion of Toolijooa Ridge.
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maintain the most effective vertical and horizontal carriageway alignment up to, and from, the planned Toolijooa cutting.
  - Allow the retention of the existing highway as a service road.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to avoid direct impact to the wall wherever feasible, and to actively conserve and manage the feature.
- It is proposed to conduct an archival recording of the wall prior to any construction impact.
- Any rock material displaced from the wall as a result of construction works, should be retained for use in the repair and conservation management of the original wall.

I.7 Cultural landscapes

Recording ID: SICPH CL **Name/*Description*: Southern Illawarra Coastal Plain and Hinterland**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

- The bypass would impose a modern structural component onto the landscape. The formal traits of the bypass would contrast with those of the existing landscape:
  - The horizontal alignment of the bypass would be curvilinear within the constraints of standardised and even radius curves. This would contrast with most of the existing broad scale man made landscape features which are based on grids, right angles, or straight intervals joined by relatively tight curves.
  - The vertical alignment of the bypass would be gradual and incremental, and would include ramps, embankments and cuttings to maintain standard rates of climb or descent. This is in contract to most of the existing broad scale man made landscape features which are more reflective of natural gradients and elevations.
  - The width of the bypass corridor (including the carriageways, ramps and associated easement) would vary from around 100 metres to up to 200 metres. This is in major contrast to existing man made corridors which are nearly all less than 50 metres in width.
  - Unlike the alignment of existing roads which, through their curves, and opportunistic alignments, manifest the natural topography they are traversing, the bypass alignment would create its own topography of cuttings and embankments as required by limited tolerances in vertical and horizontal alignment. As a consequence the bypass may run contrary to the natural flow of ridges, valley orientation, and slope contours.
- Whereas the overwhelming character of property boundaries, field delineation, artificial lowland drainage, and secondary and minor roads is one of a grid and rectangular divisions, the bypass would superimpose this patchwork with a visually dominant and curvilinear corridor, following its own independent directional agenda.
- In the general proximity of Berry, the bypass would:
  - Impact upon the short and mid-distance view-sheds from the town streetscapes.
  - Impose a contrasting and modern road form relative to those parts of the town structured on a grid pattern.
  - Impact upon some remnant pastoral open space situated along the northern margin of the town grid. This margin provides a visually appealing contrast between the urban and rural and contributes towards a general pastoral character for the town.

Visual Boundary of the BTUCA, also boundary of the *Berry District Landscape Conservation Area* and approximate boundary of SICPH CL

Buffer zone of the BTUCA

Sub-division Boundary of the BTUCA

FBB bypass

Figure I.34 Location of proposed bypass works relative to the SICPH CL. (After Figure 13 in Clarke and Duyker 2010; and The boundary of the Berry – Bolong Pastoral Landscapes (Shoalhaven Heritage Inventory) (base image: Google Earth Pro 2009)

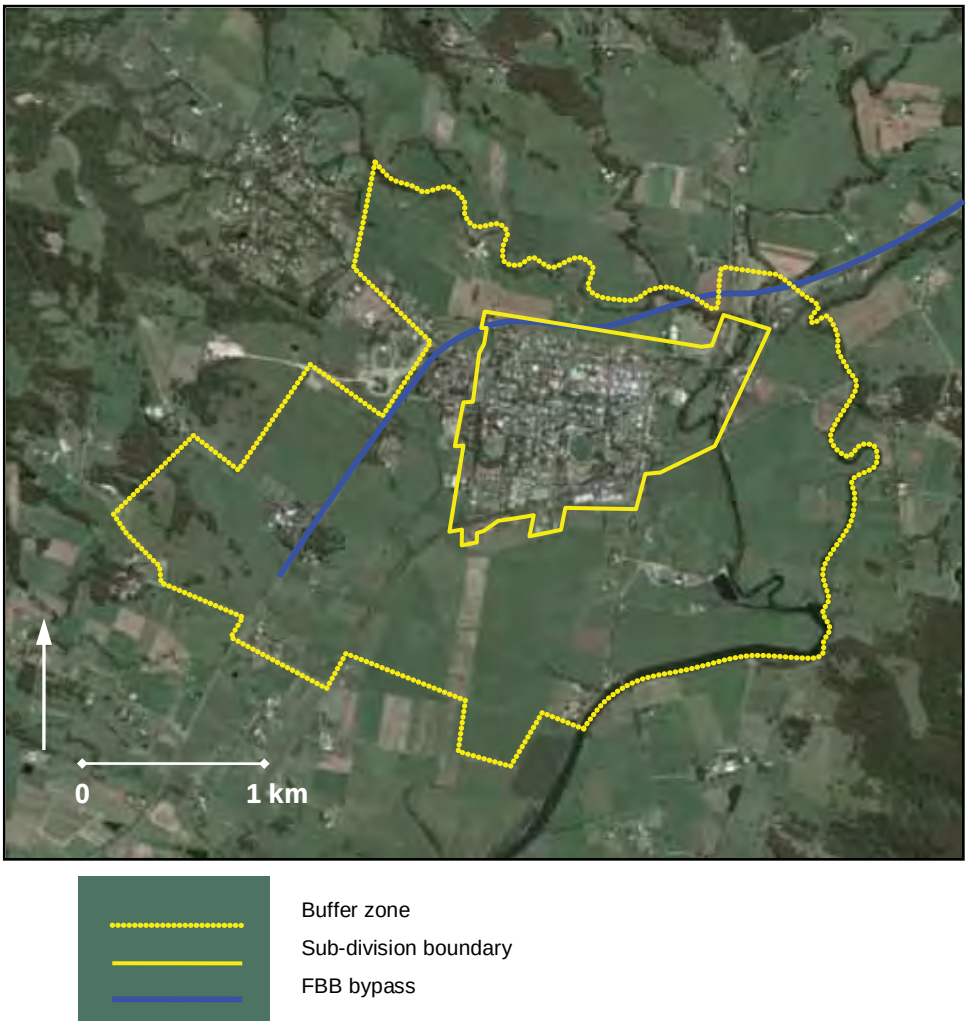


Figure I.35 Location of proposed bypass works relative to the Buffer Zone and Subdivision Boundary of the National Trust defined Berry Township Urban Conservation Area (After Figure 13 in Clarke and Duyker 2010) (Google Earth Pro 2006).

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under all criteria: a, b, c, d, e, f & g.
- Apart from substantial deviations across the Broughton Creek valley and around Berry, the bypass would generally follow the original corridor of the first European road constructed for vehicles between Berry and Gerringong – the 1856 Berry Estate Road. This provides a degree of historical and functional continuity to the bypass. It would remain a modern manifestation of an original mid nineteenth century access and transport corridor.
- The construction of the Berry bypass would avoid the need to widen and transform one of the town grid streets to accommodate the highway traffic. If the latter option was adopted it would irrevocably change the amenity and heritage character of the town, and require the full or partial demolition of many properties with heritage value.
- It is proposed to minimise and ameliorate adverse visual impacts of the bypass, through careful design of the bypass corridor and its infrastructure, minimising cuttings, embankments and carriageway elevation where feasible, and the establishment of vegetation.

- The visual impact of the bypass, from the south, would be mitigated by the construction of a landscaped barrier on the southern and eastern side of the bypass adjacent to Berry. This would provide a visual barrier that was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. The upper portion of the existing escarpment vista would be unaffected for viewers positioned further away from the barrier.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass would impose a visually obtrusive and modern contrasting structural feature across a largely nineteenth century and rectilinear landscape character.
- The soil noise barrier that would be constructed on the southern side of the bypass near Berry would foreshorten views across the valley floor to the north and west.

Impact on existing structures

- A very limited number of structures would be impacted by the bypass. Only one of these, GlenDevan (G2B H11) contributes to the overall visual and heritage character of the landscape and would be subject to full direct impact (demolition).

Impact on relics

- The identification of relics sits uncomfortably with the scale of cultural landscapes. Due to the constraints inherent in its statutory definition and interpretation the identification of relics remains most effective at the smaller scale of sites, structures, objects and deposits. Refer to the individual impact statements for each item for the assessment of relics.

Summary

- The bypass would impose a visually obtrusive and modern contrasting structural feature across a largely nineteenth century and rectilinear landscape character.
- As a consequence of the visual barrier function of the noise barrier that would be constructed adjacent to Berry, views across the valley floor towards the north and west would be foreshortened.

Why is the bypass required to traverse through the identified heritage item?

- The bypass is required to upgrade the safety, functionality and efficiency of the Princes Highway between two key population and economic nodes within the region.

Will any known or potentially significant archaeological deposits be subject to development impact?

- The following items consist of, or include, known or potential archaeological deposits which would be subject to direct impact from bypass construction: G2B H14, 28, 48, 53, and 54.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- There are no feasible alternatives to the upgrading of the Princes Highway in such a way that its form and visual impact would not pose a significant impact to the heritage values of the cultural landscape it traverses.
- Amongst a number of alternative upgrade alignments previously considered at a route selection assessment stage of the program, one included the construction of a tunnel through the Toolijooa Ridge (Maunsell Australia 2008). This alternative would have substantially reduced the visual and landscape impact of the bypass but was rejected given the poor balance between cost and other determining factors.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to minimise and ameliorate adverse visual impacts where feasible through the appropriate design, construction and finishing of the FBB easements, embankments and cutting faces, and the re-establishment of vegetation.
- The establishment of appropriate forms of vegetation along the bypass easement and adjacent areas would be an important strategy in mitigating the broad scale landscape and visual impacts of the bypass corridor. This would be conducted with an awareness of maintaining important vistas from the road corridor, and the use of vegetation boundaries and alignments which conform to the rectangular patchwork of the surrounding landscape and serve to breakup or scatter the dominant curvilinear of the bypass corridor.
- Where there is an opportunity to incorporate artistic elements in structures adjacent to the carriageway, (such as bridgework, tunnel portals, and retaining and noise abatement walls), it is proposed that designs derived from local cultural heritage themes be considered, especially at locations in close association to places of significance.
- The design, construction and finishing of the bypass in the general vicinity of the Berry Township would be realised with the aim of minimising visual obstruction to views from the streetscape across the surrounding pastoral landscape to the Illawarra Range.
- The visual impact of the bypass, from the south, would be mitigated by the construction of a landscaped barrier on the southern and eastern side of the bypass adjacent to Berry. This would provide a visual barrier that was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. The upper portion of the existing escarpment vista would be unaffected for viewers positioned further away from the barrier.

Appendix F

Artefact inventory from G2B H14 test pit excavations

Artefact inventory from G2B H14 test pit excavations

Key to abbreviations:

C	Cylindrical
D	Diameter
Deco	Decoration
EW	Earthenware
F	Flat
H	Height
L	Length
M	Melted
O	Octagonal
RD	Rim diameter
sh	Shoulder
TRF	Transfer
W	Width

F.1 G2B H14 Ceramics catalogue

Cat	Square	Context	Ware	Deco	Form	Part	No	Weight	Description
1012	A-C64	22	Stoneware	Brown Glaze	Bottle	body	1	10.3	Black TRF label: 'THIS BOTTLE IS'.
1011	B100	41	Porcelain		Insulator	rim-sh	5	23.8	RD=2.5".
1013	B-C64	22	Porcelain		Cup	body	1	2.3	
1014	B-C64	22	Stoneware	Brown Glaze	Bottle	Finish	1	5.3	Crown type finish on a Ginger beer bottle.
1015	B-C64	22	Stoneware	Brown Glaze	Bottle	body	6	17.1	Black TRF label: 'Y O' in circular field.
1002	C50	42	Ew		Plate	sh	2	12	
1007	C64	22	Stoneware	Brown Glaze	Bottle	Finish	4	15.1	Crown type finish on a Ginger beer bottle, BD=3/4".
1008	C64	22	Stoneware	Brown Glaze	Bottle	body	7	55	Black TRF label: star then 'L' and also 'LO' all in a circular field.
1010	C79	32	Ew	Black TRF	Cup	body	1	1.2	Partial pattern.
1016	D100	27	Porcelain	Grey glaze	Insulator	whole	1	275	RD=3.25", base D=1.75", H=3.25". Inner rim D=2". The inside features a threaded socket where the insulator would be attached. Around the middle of the insulator is a furrow where copper wire is attached.
1001	F20	9	Ew	Banded Blue	Plate	rim-sh	1	11.1	RD=9".
1003	F39	8	Stoneware	Brown Glaze	Pipe	body	1	470.3	D=5.5"
1004	F39	14	Stoneware	Brown Glaze	Pipe	body	5	308.7	D=5.5"
1005	F39	14	Porcelain		Unk	body	1	0.4	
1006	F39	14	Stoneware	Brown Glaze	Unk	Corner	1	13.6	Corner of an octagonal shaped item? Scuffed.
1009	F39	14	Stoneware	Brown Glaze	Pipe	body	2	767.7	D=5.5"
						Total	40	1988.9	

F.2 G2B H14 Glass catalogue

Cat	Square	Context	Form	Shape	Part	Colour	Tinge	No	Weight	Description
2061	A-C64	22	Bottle	C	body	amber		2	1.1	Embossed label: 'M'.
2062	A-C64	22	Bottle	C	base	amber		1	0.6	Mould made - Resting point seam.
2063	A-C64	22	Bottle	C	body	clear		3	4.0	Orange peel striations.
2069	A-C64	22	Lamp	C	sh	clear		1	0.5	
2070	A-C64	22	Bottle	C	body	green	olive	2	3.0	Orange peel striations.
2067	B100	40	Bottle	C	sh	clear		1	2.4	Embossed deco (sh): horizontal rib. Orange peel striations.
2009	B61	30	Bottle	C	sh	amber		1	4.8	Mould made - vertical seam.
2010	B61	30	Bottle	C	sh	amber		1	2.3	Orange peel striations
2023	B61	30	Bottle	C	sh	clear		1	9.2	Applied - vertical striations.
2024	B61	30	Bottle	C	body	clear		1	8.8	Embossed label: partial.
2025	B61	30	Bottle	C	sh	amber		2	5.2	Embossed label: 'TL'.
2041	B95	33	Bottle	C	body	clear		3	20.2	Embossed label: 'OOL'. Embossed deco: horizontal rib.
2042	B95	33	Bottle	C	body	clear		2	6.5	Machine made.
2071	B-C64	22	Bottle	C	body	green	olive	1	3.2	Orange peel striations and blisters.
2072	B-C64	22	Window	F	body	clear		1	2.9	Thickness = 2.2mm.
2002	C110	1	Bottle	C	sh	amber		1	1.1	Orange peel striations
2033	C24	43	Bottle	C	body	amber		1	5.3	Orange peel striations
2034	C24	43	Bottle	C	finish	clear		3	17.4	Machine made external screw thread, BD=2".
2046	C50	42	Bottle	C	sh	green	olive	1	3.1	Orange peel striations.
2045	C60	2	Bottle	C	body	clear		10	4.8	Orange peel striations.
2027	C60	7	Window	F	body	clear		2	0.9	Thickness = 5.7mm. Car window?
2028	C60	7	Bottle	C	sh	amber		2	24.0	Machine made.

Cat	Square	Context	Form	Shape	Part	Colour	Tinge	No	Weight	Description
2039	C60	10	Bottle	C	body	amber		1	5.6	Orange peel striations.
2040	C60	10	Bottle	C	sh	clear	green	18	80.8	Mould made - two piece. Embossed labels: (sh) '& ICE' (body) 'E PROPE'.
2047	C61	12	Bottle	C	sh	amber		10	38.1	Mould made - vertical seam. Applied.
2048	C61	12	Bottle	C	sh	amber		2	6.3	Embossed label: 'OF'. Orange peel striations.
2049	C61	12	Bottle	C	whole	clear		24	50.5	Fragmented modern machine made bottle with external screw thread finish, BD=1.5". Has printed expiry date on sh.
2050	C61	12	Window	F	body	clear		1	0.8	Thickness = 5.7mm. Car window?
2016	C70	3	Bottle	C	body	clear		1	1.6	Orange peel striations
2017	C70	3	Window	F	body	clear		1	0.6	Thickness = 5.7mm. Car window?
2043	C70	4	Bottle	C	sh	amber		1	0.7	Embossed deco: four lines of dots. Orange peel striations.
2044	C70	4	Window	F	body	clear		2	2.3	Thickness = 5.7mm. Car window?
2054	C79	32	Bottle	C	body	clear		1	8.8	Machine made. Embossed label: 'THIS BOTT'/'RAN'. Embossed deco: horizontal rib.
2068	C79	32	Bottle	C	sh	clear		1	1.0	Embossed deco: raised grid pattern. Orange peel striations.
2074	C80	2	Window	F	body	clear		1	0.5	Thickness = 5.7mm. Car window?
2005	C80	28	Bottle	C	body	green	olive	1	6.4	NW Quad. Orange peel striations.
2026	C95	32	Bottle	O	base	clear		15	120.6	Machine made, D=2.25". Embossed labels: (body) 'GE' 'GILD' and other partial segments.
2031	C95	?	Bottle	C	body	clear		2	1.2	Orange peel striations.
2032	C95	?	Bottle	C	sh	clear		1	14.1	Mould made - vertical seam.
2008	D100	27	?	M	?	green		10	47.1	Fire damaged - melted.
2029	D100	27	?	M	?	green		2	10.5	Fire damaged - melted.
2030	D100	27	Bottle	C	body	green	olive	2	10.1	Orange peel striations and blisters.

Cat	Square	Context	Form	Shape	Part	Colour	Tinge	No	Weight	Description
2073	D100	27	?	M	?	green		8	46.4	Fire damaged - melted.
2006	E100	21	?	M	?	green		1	8.4	Fire damaged - melted.
2007	E100	21	Bottle	C	sh	amber		1	0.7	Orange peel striations
2004	F20	2	Bottle	C	body	clear		1	0.9	Orange peel striations
2064	F20	2	Bottle	C	body	green	olive	1	1.1	Orange peel striations. Scuffed.
2065	F20	2	Window	F	body	clear		1	1.0	Thickness = 2.0mm
2066	F20	2	Bottle	F	sh	clear	green	1	6.0	Embossed deco (sh): two rows of dots. Orange peel striations. Scuffed.
2003	F20	9	Bottle	C	body	green	light	1	8.9	Orange peel striations
2015	F20	9	Bottle	C	body	amber		1	1.6	Orange peel striations
2018	F20	9	Bottle	C	body	clear		1	4.6	Mould made - vertical seam.
2019	F20	9	Bottle	C	sh	clear		1	1.1	Moulded deco: horizontal ribs.
2035	F20	9	Bottle	C	push up	clear	green	1	14.7	Embossed maker's mark: hexagon with starburst in centre. Scuffed.
2036	F20	9	Bottle	F	sh	green	olive	2	3.2	Applied - vertical striations. Case bottle.
2037	F20	9	Bottle	O	cr	clear	green	1	3.4	Orange peel striations.
2038	F20	9	Bottle	C	body	clear		1	0.1	Orange peel striations.
2001	F20	15	Bottle	C	sh	green	light	1	6.2	Scuffed
2011	F20	15	Bottle	C	base	clear		1	0.8	Orange peel striations
2012	F20	15	Bottle	C	sh	clear		1	0.7	Orange peel striations
2013	F20	15	Bottle	C	base	green	light	1	10.7	Rounded heel, high conical push up, D=3". Scuffed.
2014	F20	15	Bottle	C	sh	green	light	2	2.9	Orange peel striations
2075	F30	6	Bottle	C	body	amber		1	9.2	Orange peel striations.
2020	F31	13	Bottle	F	body	clear	green	1	3.0	Orange peel striations
2021	F31	13	Bottle	C	body	amber		1	0.7	Mould made - vertical seam.
2022	F31	13	Bottle	C	sh	amber		1	0.9	Moulded deco: double line of dots.

Cat	Square	Context	Form	Shape	Part	Colour	Tinge	No	Weight	Description
2051	F39	8	Window	F	body	clear		1	0.8	Thickness = 5.7mm. Car window?
2052	F39	8	Bottle	C	sh	clear		1	8.5	Applied - vertical striations.
2053	F39	8	Bottle	F	finish	amber		6	27.4	Machine made external screw thread, BD=11/16". Embossed label (body): partial.
2058	F39	14	Bottle	C	base	green	olive	1	18.5	Heel seam, medium push up, D=2.5". Scuffed.
2059	F39	14	Bottle	C	sh	green	light	2	3.4	Scuffed
2060	F39	14	Bottle	F	body	amber		1	1.5	Orange peel striations.
2055	F40	5	Bottle	C	body	amber		1	1.6	Orange peel striations.
2056	F40	5	Window	F	body	clear		7	3.4	Thickness = 5.7mm. Car window?
2057	F40	5	Bottle	C	body	clear		1	0.8	Orange peel striations.
							Total	194	742.0	

F.3 G2B H14 Miscellaneous catalogue

Cat	Square	Context	Material	Function	Part	No	Weight	Description
3001	C60	10	Coke			1	2.2	Fragment of coke or carbon?
3002	F39	8	Mortar			1	10.6	Fragment of white mortar adhered to an unknown substance.
3003	F40	5	Plastic	Band	segment	1	0.2	White/grey. W=5/16".
3004	E64	16	Plastic	Cap	rim	1	0.2	Blue screw on cap with vertical fluting on outside.
3005	F30	2	Rubber	Tire Tread	Tread	1	5.2	
3006	B100	40	Wood			2	14.2	Lengths of natural wood.
3007	F30	11	Brick	Brick	edge	1	205.8	H=2+3/4".
3008	C79	32	Rubber	Tire Tread	edge	3	8.9	Engraved lines.
3009	F20	18	Brick	Brick	corner	1	32.9	
3010	B-C64	22	Plastic	Wire	Casing	1	0.4	Red wire casing D=1/16".
3011	D100	27	Wood			1	3.1	Length of natural wood.
3012	D100	27	Charcoal			1	22.3	
3013	C50	32	Brick	Brick	end	1	712.5	Hand made. H=2.5".
3014	C50	32	Brick	Brick	body	1	70.0	
3015	F20	18	Charcoal			3	33.0	
3016	E100	21	Charcoal			1	3.0	Sample 1
3017	F30	6	Brick	Brick	corner	2	48.4	Handmade.
3018	D80	32	shell	Jewellery	whole	1	5.0	Ground pendant L=1.25", W=1/2" with one rounded end and one flat end. The flat end has a drill hole, D=1/8", L=1/4" for attachment. Could have been from an earring or a necklace.
					Total	24	1177.9	

F.4 G2B H14 Metal catalogue

Cat	Square	Context	Element	Form	Part	No	Weight	Description
4005	A-C64	22	Lead/copper	Pipe	Lengths	2	2.3	Squashed. Lead pipe casing and red plastic casing for copper wire? Lead casing D=1/8".
4006	A-C64	22	Lead/Brass	Pipe	Length	1	25.2	Lead casing for a brass wire which also has a cotton threaded cover. D=3/8".
4008	A-C64	22	Lead	Pipe	Length	1	7.5	Squashed and bent with a protective white coat. D=1/8".
4007	B100	41	Brass	wire	Lengths	4	2	D=1/32". From ceramic insulator?
4001	B95	33	Iron	Bracket	half	1	24.5	Very corroded, bracket type clasp semi circular in shape with flat end. Perhaps with a nail or bolt still attached.
4009	B-C64	22	Lead/Brass	Pipe	Lengths	2	40.7	Lead casing for a brass wire which also has a cotton threaded cover. D=3/8".
4002	C64	22	Lead	Pipe	Lengths	4	32.2	Squashed and bent. Diameter between 1/8" and 3/16". Has a white protective coat.
4003	C64	22	Lead	slag		1	3.5	Fire damaged - melted blob.
4012	C64	22	Iron	Horseshoe	half	1	90.6	Very corroded. L=5".
4010	C95	32	Iron	Hinge	half	1	664.6	Very corroded. L=7.5", W=1.25".
4015	D100	27	Iron	washer	whole	1	51.1	Very corroded. D=1.75".
4016	D100	27	Iron	Bolt	shaft-point	1	2.1	Very corroded. Threaded end.
4017	D100	27	copper	wire	lengths	7	8.3	Original attached to insulator. D=1/8".
4004	F20	2	Iron	Nail	shaft-point	4	28.8	Very corroded. These could be wire nails or simply lengths of wire.
4013	F20	2	Iron	Bolt	whole	1	36.1	Very corroded, L=2.5". Has threaded end.
4014	F20	2	Iron	washer	whole	1	8.7	Very corroded. D=1".
4011	F20	9	Iron	Nail	Head-shaft	1	6.1	Very corroded. Probably a wire nail.
4018	F30	6	Brass	?	edge	2	0.3	Very thin circular edges of some object. Edge features an embossed band of dots around it. Could be from some form of jewellery or a cog from a watch?
					Total	36	1034.6	

Appendix G

Detailed descriptions of field recordings

Detailed descriptions of field recordings

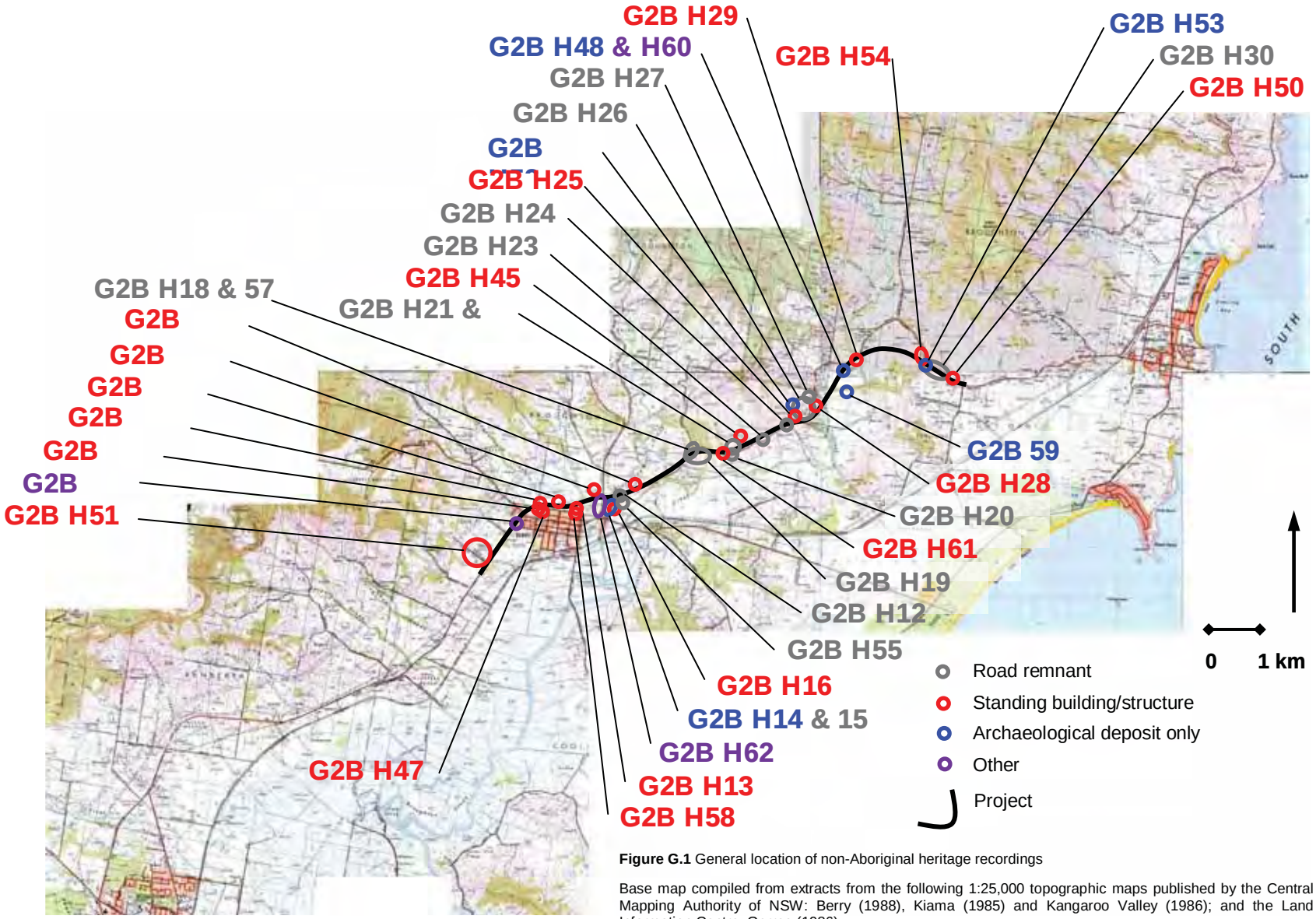


Figure G.1 General location of non-Aboriginal heritage recordings

Base map compiled from extracts from the following 1:25,000 topographic maps published by the Central Mapping Authority of NSW: Berry (1988), Kiama (1985) and Kangaroo Valley (1986); and the Land Information Centre: Gerroa (1986).

G.1 Nineteenth century road remnants

Recording ID: G2B H19		**GDA Map Reference:**	**291567.6150828 to 291987.6150902**
Name/Description:	**Remnant of Berry Estate road (c.1858 – 1870s)**	*Cadastral Location*:	Lot 13 DP1098617 Lot 4 DP801512
		Street address:	A200B Princes Highway & A350 Princes Highway Berry
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	Road remnant is situated along the crest of a low spurline, aligned northeast – southwest, which descends off the Broughton Creek Broughton Mill Creek watershed (at SW end), to the northeast. Both ends of the remnant meet the easement of the current highway, to either side of its intersection with Tindalls Lane.
Description/fabric:	This site consists of a remnant and straight section of former road platform approximately seven to eight metres wide. The platform is discernible through slight changes in ground surface relief, and in some places has a faint ditch and/or bank along its margins. The platform can be best discerned in the Lot containing forest regrowth at the eastern end of the remnant. Aerial photography is required to trace the alignment through the adjacent pasture. The nature of any subsurface evidence for the road is not known.
Dimensions:	Remnant road alignment is approximately 430 metres long and up to 10 metres wide, and aligned 82 degrees (grid north).
Physical condition:	The surface evidence for the road remnant is mostly vestigial. The surface evidence for this ground feature has been substantially impacted by ploughing, tilling and other agricultural processes.
Integrity:	This remnant has been impacted by a later nineteenth century road platform at its western end (G2B H18), and elsewhere by ploughing/tilling, fencing and tree regrowth. Although these impacts have reduced the clarity and definition of the site, its characteristics where discernible are likely to relate to the original road platform.
Associated features:	A remnant portion of a later nineteenth century road platform (G2B H18) is situated at the western end of this remnant.
Current use:	Lot 13*:* Grazing pasture grassland, being part of an active dairy farm, possible periodic cropping. Lot 4: Rough grazing, regenerating low forest.
Heritage listings:	no current listings

Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).
2. The nature and form of the remnant.
3. The association (via proximity or alignment) of the remnant to contemporary occupation or service features.
4. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).

Despite pressure from residents and Alexander Berry to extend the road formalised in 1834 between Appin and Saddleback Mountain, to the Shoalhaven, little government action was forthcoming. In 1856, Surveyor Shone was required to mark a line from Gerringong to Broughton Valley and to report on the expediency of extending the line to Bomaderry. Following further inaction, Alexander Berry took the initiative, and privately constructed a road across his estate lands from Gerringong to Broughton Creek (Berry) and later to Bomaderry by 1858 (JME 1951:81; Cousins 1948:105).

It is this private road that is presumably shown on an 1866 map of the County of Camden. The Berry Estate road was distinctive in its use of long straight sections, which often traversed steep spurs and ridges without apparent regard for the consequentially steep gradients. The straight and sometimes steep nature of the road may be explained by:

- The need to minimise length and consequential costs.
- Pressure to establish a road link in a minimal time period.
- The absence of cadastral or land ownership limitations which would otherwise require deviations and bends.
- The predominant early use of bullock teams to convey produce, and thus a greater tolerance of moderate gradients.

On the 9th August 1858, the *Illawarra Mercury* reported that a road was to be proclaimed from Gerringong to the head of Broughton Creek. It was to be maintained at the expense of the parishes which it traversed.

In the period between Berry's original construction of the estate road and the 1890s, the further development of the road by the local Councils resulted in a longer and more angular alignment, involving switch-backs and deviations around spurs. The elaboration and revision of Berry's originally straight alignments appears to have been a consequence of establishing more gradual grades, suitable for horse drawn vehicles, and complying with various farm boundaries and related cadastre. By this time, most of the latter were now freehold title following the break up and sale of the Berry Estate.

Figure G.2 General view across road remnant (approximate alignment marked in yellow), looking SW

Figure G.3 Road remnant visible on 1958 aerial photo (outlined in yellow), (NSW 699-5032, SH.I Dapto-Ulladulla Run GK11 23/07/58)

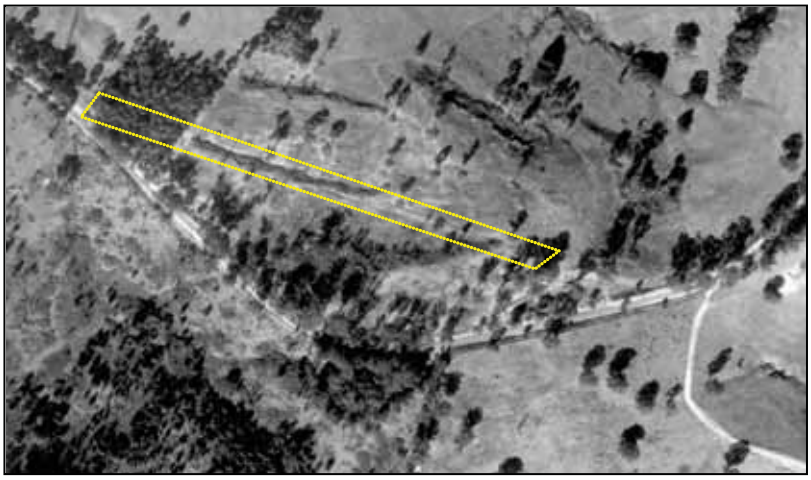


Figure G.4 Aerial image (2006) of area of road remnant (outlined in yellow), in 2006 (Google Earth Pro 2011)

Figure G.5 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

Recording ID: G2B H22		**GDA Map Reference:**	**292713.6151056 to 292596.6151024 to 292425.6150991 to 292296.6150888**
Name/Description:	**Remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*: Street address:	Lot 12 DP1098617 A371 Princes Highway Berry
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	Road remnant consist of a traverse across the crest and upper and midslopes to either side of a low spurline, aligned northwest – southeast, and forming part of the lower northern fall of the Broughton Creek valley. The remnant is truncated at either end by the current highway which diverges up to 60 metres downslope of the remnant alignment.
Description/fabric:	This site consists of a 460 metre road alignment in three angled sections. The middle section, which traverses east facing upper slopes and the crest is 172 metres long, and contains 110 metres of relatively well defined platform associated a minor cutting, approximately seven to eight metres wide. Elsewhere the road platform is discernible through slight changes in ground surface relief, and traces of the side ditches. The nature of any subsurface evidence for the road is not known.
Dimensions:	Remnant road alignment has the following approximate sections (east to west): 120 metres 225 degrees (grid north) 172 metres 261 degrees 168 metres 233 degrees
Physical condition:	The surface evidence for this road remnant ranges from vestigial to relatively distinct shallow surface relief and upslope cutting. The sections either side of the middle have become indistinct through ploughing, tilling and forest regrowth (western section).
Integrity:	The middle section of this remnant has been kept open through modern use as a farm track. Despite this, its characteristics are likely to relate to the original road platform. The remaining sections are vestigial.
Associated features:	A remnant and incised portion of a later nineteenth century road platform (G2B H22) is situated immediately downslope of the middle section of this remnant.
Current use:	A rough farm track along the middle section is still being used for access across enclosed pastures. The remaining sections support agricultural grassland and regenerating forest.
Heritage listings:	Included within property definition for Glenvale homestead on Shoalhaven LEP (as amended) Schedule 7, but not specifically identified.

Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).
2. The nature and form of the remnant.
3. The association (via proximity or alignment) of the remnant to contemporary occupation or service features.
4. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).

Refer also section in G2B H19 for general historical background

Figure G.6 General view along road remnant from near eastern end (approximate alignment marked in yellow), looking W

Figure G.6 Road remnant visible on 1958 aerial photo (outlined in yellow), (NSW 699-5031, SH.I Dapto-Ulladulla Run GK11 23/07/58)

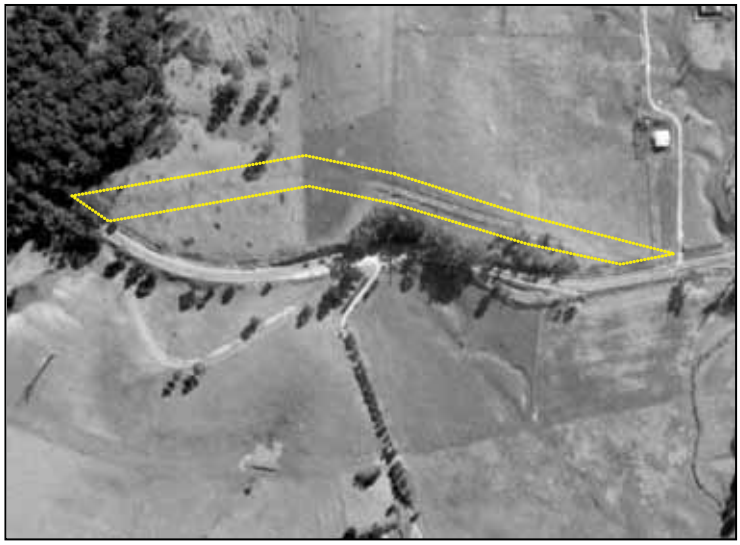


Figure G.8 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.9 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

Recording ID: G2B H23		**GDA Map Reference:**	**293162.6151296 to 292911.6151149**
Name/Description:	**Probable remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*: Street address:	Lot 12 DP1098617 A371 Princes Highway Berry
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	Road remnant is a straight traverse across both sides and crest of a low spurline, aligned north – south, and forming part of the lower northern fall of the Broughton Creek valley. The current highway alignment connects with either end of the remnant and loops around to the south, forming a more gradual and consistent vertical alignment.
Description/fabric:	This site consists of a remnant and straight section of former road platform and associated side ditches approximately 10 metres wide. The ditches to either side of the platform are discernible through slight changes in ground surface relief, and the colour and height of the grass cover, depending on light and growth conditions. This feature is best seen from aerial photography. The nature of any subsurface evidence for the road is not known.
Dimensions:	Remnant road alignment is approximately 320 metres long and up to 12 metres wide, and aligned 61 degrees (grid north). The road platform ranges in width from seven to eight metres.
Physical condition:	This is the best and longest conserved section of the road where there are no sections of cutting or benching to indicate the alignment. It is probable that tilling and cropping has reduced the original relief and definition of the feature. One fence line crosses the feature near the spur crest.
Integrity:	Apart from some impact from possible tilling or ploughing, this remnant appears to conserve characteristics which are likely to relate to the original road platform.
Associated features:	-
Current use:	Grazing pasture grassland
Heritage listings:	Included within property definition for Glenvale homestead on Shoalhaven LEP (as amended) Schedule 7, but not specifically identified.

Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The nature and form of the remnant.
2. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).
3. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).

Refer also section in G2B H19 for general historical background

Figure G.10 Road remnant visible on 1958 aerial photo (outlined in yellow), (NSW 699-5029, SH.I Dapto-Ulladulla Run GK11 23/07/58)

Figure G.11 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.12 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

Recording ID: G2B H27		**GDA Map Reference:**	**293988.6152199 to 293974.6152006 to 293742.6151753**
Name/Description:	**Remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*:	Lot 2 DP593476 Lot 1 DP919179
		Street address:	A441 Princes Highway & A540 Princes Highway Broughton Village
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	Road remnant is situated at the southern margin of Broughton Village and traverses two minor spurs, separated by a minor gully, and a minor tributary stream and its associated flats. The spurs are aligned northwest – southeast and form part of the lower northern fall of the Broughton Creek valley. The remnant is situated to the west of the current highway, adjacent to a section known locally as "the big dipper".
Description/fabric:	This site consists of three straight sections of road platform separated by two sharp corners. The net length of remnant is approximately 550 metres. The northern section is poorly defined and a modern farm track currently follows this alignment. The middle section is clearly discernible due to cutting and benching, and descends (SW) to a creek crossing which has been modified by a subsequent (and now disused) highway alignment (G2B H26) and later realignments of the creek bed. The southernmost section of the remnant is vestigial only, with slight ground relief indicating side ditches. The nature of any subsurface evidence for the road is not known.
Dimensions:	The lengths and alignments are, from north to south: 190 metres, 185 degrees (grid north); 260 metres, 232 degrees; and 100 metres, 203 degrees. The total length of the remnant road alignment is approximately 550 metres long. The width of the platform and associated earth works varies from eight to 15 metres.
Physical condition:	The surface evidence for this road remnant is variable and ranges from shallow surface relief to a defined earthen platform bordered by defined slope cuttings or benching. The middle portion is well preserved and clearly discernible, the northern and southern sections are vestigial.
Integrity:	The alignment has been impacted by on-going farm use as a vehicle track (this has also kept the track clear of vegetation), creek bank erosion, probable ploughing and tilling (especially on the creek flats), subsequent construction of a later nineteenth century highway platform (which re-uses part of the alignment and associated creek crossing). Two fence lines cross the alignment. The northern section may have little remaining original evidence, given its vestigial condition prior to its current use as a farm track. Despite these impacts, this remnant includes the best and most representative surviving cut and benched section, and the best interpretative context.

Associated features: Integral to this interpretation and historical context of this feature is a subsequent highway alignment (G2B H26), which superseded the original road, and which probably dates from the 1870s or 1880s. It was superseded in the 1930s by the current highway. The 1870s-80s alignment is situated downslope of the middle section of the original Berry Estate road, and then joins and overlays the platform near the southern end of the middle portion, including the creek crossing. It forms a tight bend just south of the creek crossing and this was known as "Binks Corner" after the owners of the property (then and now).

Immediately to the west of this tight corner there was formerly situated a Berry estate tenant farm, occupied in the 1890s by a "Mrs Wiley" (G2B H52).

The Sedgeford homestead (G2B H25) is a post Berry Estate homestead, in a similarly original association with the later highway alignment (G2B H26). All of these recordings form a complex, which, as a group have value in understanding and interpreting the evolution of the highway, its various alignments, and its interrelation with adjoining land holdings and homesteads.

Current use: The northern and middle sections are being used as farm tracks, for access to and enclosed pastures.

Heritage listings: no current listings

Historical Background/Interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).
2. The nature and form of the remnant.
3. The association (via proximity or alignment) of the remnant to contemporary occupation or service features.
4. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).

Refer also section in G2B H19 for general historical background

Figure G.13 General view, looking NW towards road remnant (approximate alignment marked in yellow, later highway alignment (G2B H26 shown in blue)

Figure G.14 Closer view of best preserved, cut and benched, middle section of the remnant road (alignment indicated by yellow dotted line), looking W.

Figure G.15 Road remnant visible on 1958 aerial photo (outlined in yellow), A later nineteenth century highway alignment, including "Binks Corner" is shown in blue (NSW 699-5028, SH.I Dapto-Ulladulla Run GK11 23/07/58)

Figure G.16 Aerial image showing road remnant (outlined in yellow) in 2006. A later nineteenth century highway alignment, including "Binks Corner" is shown in blue (Google Earth Pro 2011)

Figure G.17 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

Recording ID: G2B H30		**GDA Map Reference:**	**296738.6152431 to 296277.6152706**
Name/Description:	**Remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*:	Lot 10 DP857480 Lot 1 DP1014800
		Street address:	- Toolijooa
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting: Road remnant is situated along the crest of a prominent spurline which forms part of the eastern fall of Toolijooa Ridge. The spurline is aligned northwest – southeast. The eastern end of the remnant joins the current highway easement approximately 270 metres west of its intersection with Toolijooa Rd. The road remnant is located to the south of the current highway, and always situated on the crest of the spur, which forms an extended shoulder formation, after a relatively steep ascent at the eastern end.

Description/fabric: This site consists of two sections of road platform, joined by a gentle curve. The net length is approximately 530 metres. The best defined section is on the higher gradient slope at the eastern end, where side ditches and a distinct (earthen) road platform is evident. A rough avenue of Eucalyptus trees survives on either side of this section, for a distance of approximately 50 metres. The trees appear to be too young and low in height to be original road verge vegetation. A low cut along the upslope side of the road, (of up to 0.4 metres) is evident at the eastern end of the shoulder, and along the upper portion of the slope to the east. The middle and western portions of the remnant alignment are less distinct but include discontinuous, low relief, sections of side ditching and earth platform.

To the west of the fence line, which marks the current western end of this recording, there is a distinct road alignment within a narrow cutting (approximately 0.5 metres deep) which has been excavated into a stone rubble rich substrate. The alignment of this platform probably follows the original road alignment, and joins a modern sealed driveway 10 metres west of the fence line. It is thought likely that the excavation in this section is a more recent feature, but an original age cannot be fully discounted.

The nature of any subsurface evidence for the road is not known.

Dimensions: The curved alignment can be approximated by two lengths: (eastern end) 160 metres 96 degrees (grid north); (middle and eastern portions) 370 metres, 313 degrees. The width of the platform and associated earth works varies from 8 to 16 metres. The platform width ranges from 7 to 8 metres.

Physical condition: The surface evidence for this road remnant is variable and ranges from shallow surface relief to a defined earthen platform bordered by defined slope cuttings and side ditches. The eastern portion is well preserved and clearly discernible, the middle and western sections are less distinct and has been impacted in places by tracks created by farm vehicles. One fence line crosses this alignment.

Integrity: The alignment has been impacted by erosion, and by on-going farm use of informal tracks that cross or follow the original platform. The impact of ploughing and tilling appears to be limited. Overall this site displays minimal disturbance from subsequent use as a farm track or subsequent road development. The features of this site are likely to relate to the original road platform.

Associated features:	Thirty metres to the west of this site is a low linear mound of rock rubble (basaltic bedrock) which runs adjacent and parallel to the northern side of a modern sealed driveway which follows the alignment of the original Berry estate road. This feature forms part of recording G2B H53, the site of a former Berry Estate tenant farm) however its origin and relationship to the roadway is not clear. It may be the remains of an agricultural dry stone wall, the residue from the demolition of a former Berry Estate tenant farm, or alternatively, it may be a waste pile of excavated rock created during the late nineteenth century construction of the current highway alignment 30 metres downslope.
Current use:	Grazing pasture grassland.
Heritage listings:	no current listings

Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate Road is based on the following reasons (in order of importance):

1. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).
2. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).
3. The nature and form of the remnant.

Refer also section in G2B H19 for general historical background

Figure G.18 General view of eastern end of remnant, looking NW (approximate alignment marked in yellow), Toolijooa Rd in foreground

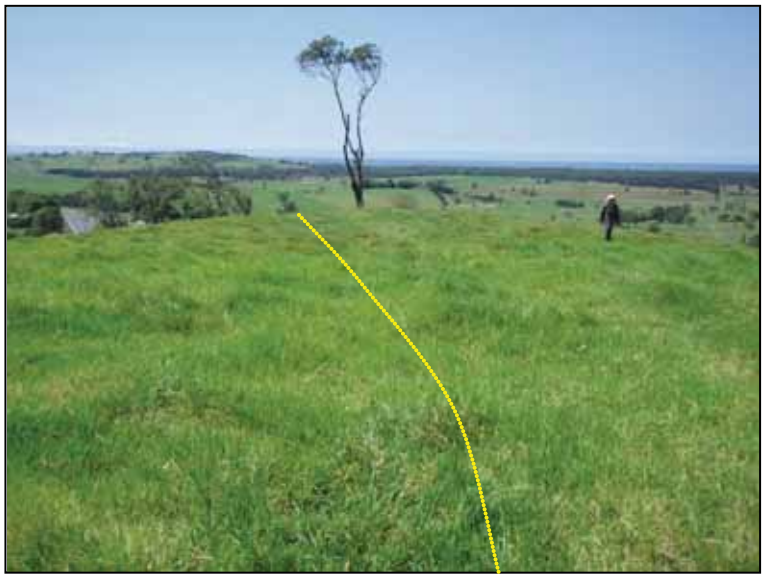


Figure G.19 View looking SE across crest of spur with remnant road platform in foreground (approximate alignment marked in yellow)

Figure G.20 View, looking E towards Toolijooa Rd intersection, along remnant road platform at eastern end of site, Note tree avenues and ditches on either side (approximate alignment marked in yellow)

Figure G.21 View of remnant road section where side ditches are evident , looking NW

Figure G.22 Road remnant visible on 1958 aerial photo (outlined in yellow), A later nineteenth century highway alignment, including "Binks Corner" is shown in blue (NSW 699-5028, SH.I Dapto-Ulladulla Run GK11 23/07/58)

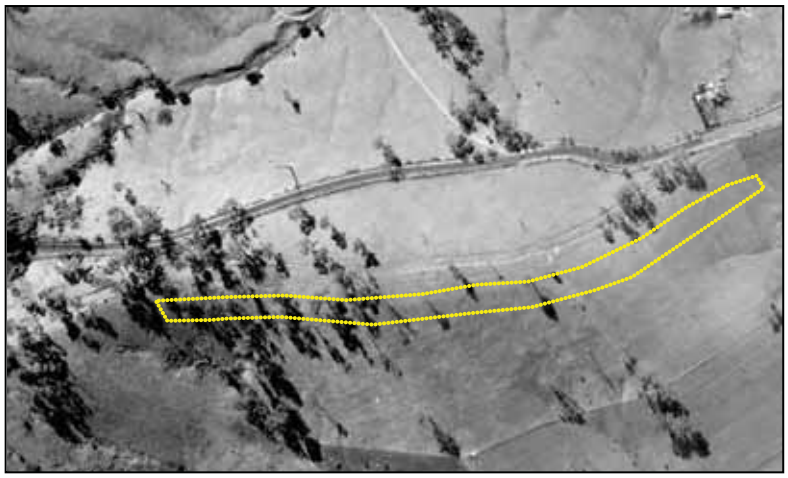


Figure G.23 Aerial image of area of road remnant (outlined in yellow), in 2006. A later nineteenth century highway alignment, including "Binks Corner" is shown in blue (Google Earth Pro 2011)

Figure G.24 Extract from 1839 (and later amendments), Crown Plan 56-672, showing alignment of Berry Estate road and later 1870s – alignment (G2B H30 section shown by dotted blue line overlay)

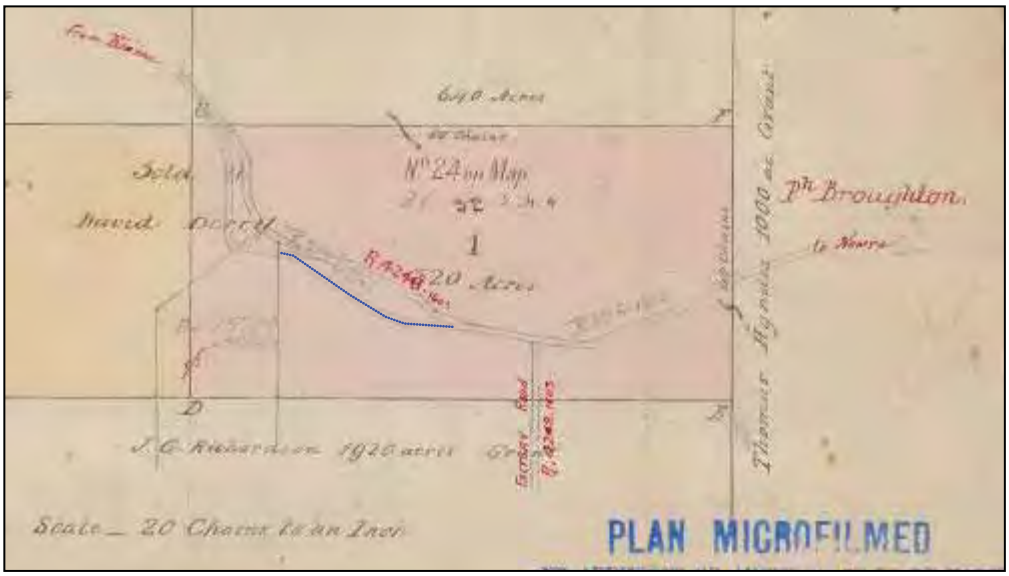
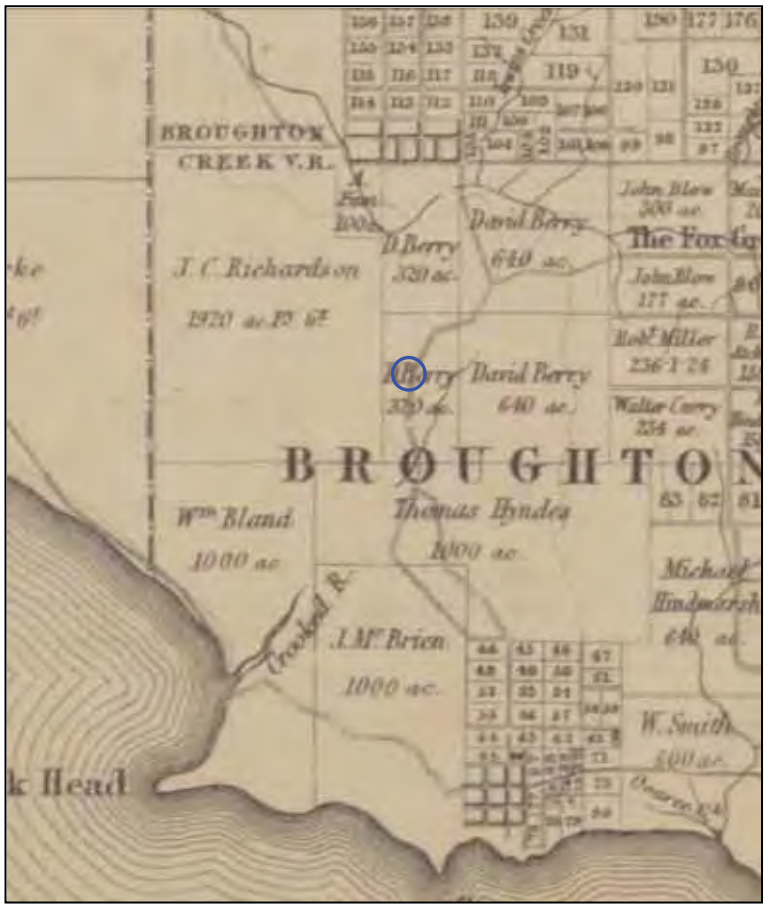


Figure G.25 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))



Recording ID: G2B H55		**GDA Map Reference:**	**290246.6149973 to 290172.6149916**
Name/Description:	**Remnant of Berry Estate road (c.1856 – 1870s)**	*Cadastral Location*: Street address:	Lot 3 DP 1081231 A40A Princes Highway Berry
Item/Site Type:	Nineteenth Century Berry Estate Road		

Context/setting:	The road remnant is situated 500 metres east of the Broughton Mill Creek bridge along the current highway, and between 10 and 20 metres to the south of the edge of the cutting batter opposite the wayside stop. The remnant is located along the crest and upper slopes of a descending spurline which forms the watershed between Broughton and Broughton Mill Creeks. This watershed is aligned northeast - southwest.
Description/fabric:	This site consists of a remnant and straight section of former road platform approximately 7 to 8 metres wide. The upslope (northern) side of the remnant is defined by varying degrees of shallow cutting into the hill slope, with corresponding benching evident on the downslope side. . The nature of any subsurface evidence for the road is not known.
Dimensions:	Remnant road alignment is approximately 100 metres long and up to 10 metres wide, and aligned 233 degrees (grid north).
Physical condition:	The surface evidence for this road remnant consists of relatively distinct ground surface relief, However there has been a degree of erosion in the past across the inclined platform and along the ditch on the upslope side of the platform. The erosion hazard of run-off has been managed by the excavation of a number of channels from the ditch across the platform and downslope. This has significantly impacted the road remnant
Integrity:	Although this remnant is easily discerned due to the significant relief of its features, the integrity of the site has been substantially reduced due to the construction of side drains to control run-off.
Associated features:	Archaeological deposits (G2B H14) associated with the original and pre 1950s highway alignment, situated 100 metres further to the west.
Current use:	Grazing pasture grassland
Heritage listings:	no current listings

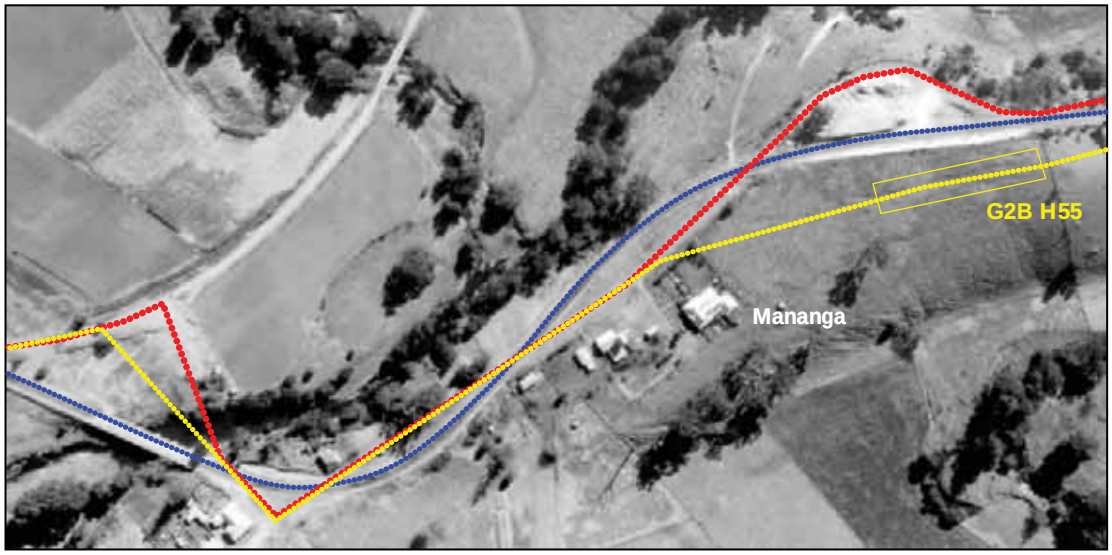
Historical background/interpretation:

The identification of this site as a remnant portion of the 1856 – 1870s Berry Estate road is based on the following reasons (in order of importance):

1. The likelihood that the landform context provided the most expedient alignment option for the road (given the resource, strategic and technological constraints of the road).
2. The nature and form of the remnant.
3. The association (via proximity or alignment) of the remnant to contemporary occupation or service features.
4. The proximity of the remnant to the mapped location of the original road as shown on the 1866 County map (Figures 5.15, 5.16 and 5.20).

It remains possible that this road remnant relates to a later period, conceivably for farm access after the 1950s re-alignment of the northern highway approach into Berry. The main reasons for discounting a later origin are:

- The form of the road (a platform with prominent side ditches), which matches the other estate road remnants.
- And the fact that the north eastern portion of the fenced front yard of the current *Mananga* homestead (built 1894) superimposes the original road platform. This strongly suggests that the remnant not only predates the current *Mananga*, but also the 1880s-1950s highway alignment to which the front yard enclosure relates (Figure G.26).



Original alignment - 1870s (refer Figure 4.10)

Alignment 1880s – 1950s (refer Figure 4.11 & 4.19)

Alignment mid 1950s - present

Figure G.26 Extract from 1958 aerial photograph showing northern highway entrance to Berry, with coloured overlays of current and previous highway alignments. Note the alignment of the Mananga homestead with the 1880s – 1950s alignment and the superimposition of the Mananga front yard over the original 1870s alignment. This strongly suggests that the G2B H55 road remnant relates to the original Berry Estate road which was constructed in 1856.

Refer also section in G2B H19 for general historical background

Figure G.27 Road remnant visible on 1958 aerial photo (outlined in yellow), (NSW 699-5036, SH.I Dapto-Ulladulla Run GK11 23/07/58)

Figure G.28 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.29 Approximate location of road remnant relative to road alignment as shown on 1866 County map (County of Camden, National Library of Australia (Braddock and Baly 1866))

G.2 Twentieth century highway remnants

Recording ID: G2B H12		**GDA Map Reference:**	**290206.6149987 to 290097.6149908**
Name/Description:	**Remnant section of Princes Highway (Stewarts Hill, way-side stop)**	*Cadastral Location*:	Highway easement
		Street address:	- Berry
Item/Site Type:	Twentieth Century Highway Remnant		

Context/setting:	This remnant is located 460 metres east of the Broughton Mill Creek bridge, on the north side of the current highway, and located on the north side of the prominent spurline which forms the watershed between Broughton Mill and Broughton Creeks.
Description/fabric:	Bitumised highway platform in the form or a large curved loop. The downslope side of the platform is very steep and may have been built up with fill. Wooden post and wire mesh fencing along the downslope side of the platform may date from the 1950s. The inside of the loop formerly consisted of the natural northern upper slopes of the spurline. This has been quarried away during the construction of the current highway alignment. Until recently this area was used both as a materials and gravel dump for the highway, and an informal rest area. The whole area has recently been landscaped and developed as a way-side stop. Two memorial sculptures representing David and Alexander Berry have been installed as part of this re-development.
Dimensions:	170 x 40 metres
Physical condition:	The basic supporting earthworks and associated platform are in good condition. Apart from some remnant road side fencing, there is no original road furniture or other surviving features.
Integrity:	This remnant has little integrity as a 1950s highway corridor, due to quarrying impact from the adjacent 1950s highway upgrade, and the subsequent use of the area as a works area and materials dump.
Associated features:	A well preserved section of 1950s highway carriageway, also isolated by the 1950s upgrade, is located 40 metres to southwest, on the opposite side of the current highway (G2B H15).
Current use:	Landscaped way-side stop and commemorative sculpture area.
Heritage listings:	no current listings

Historical background/interpretation:

This remnant follows the 1870s to 1950s alignment of the Princes Highway. It ceased to form part of the active carriageway in the mid 1950s when the current highway alignment into Berry was constructed.

The first Edition Berry 1:25,000 topographic map shows the area as a picnic area.

Figure G.30 View showing the road corridor in the area of G2B H12 in the late 1890s, looking SW "Town of Berry from Stewarts Hill" Government Printing Office , 1898 (State Library of NSW d1_12472r.jpg; also Wollongong Library)

Figure G.31 View showing the road corridor in the area of G2B H12 in the late 1930s, looking SW "View of the town of Berry" (State Records of NSW 1937. 12932-a012-a012X2448000124.jpg)

Figure G.32 1949 aerial view of road remnants G2B H12 and G2B H15 (SVY552/NOWRA Run2(155-166) 4/4/1949)

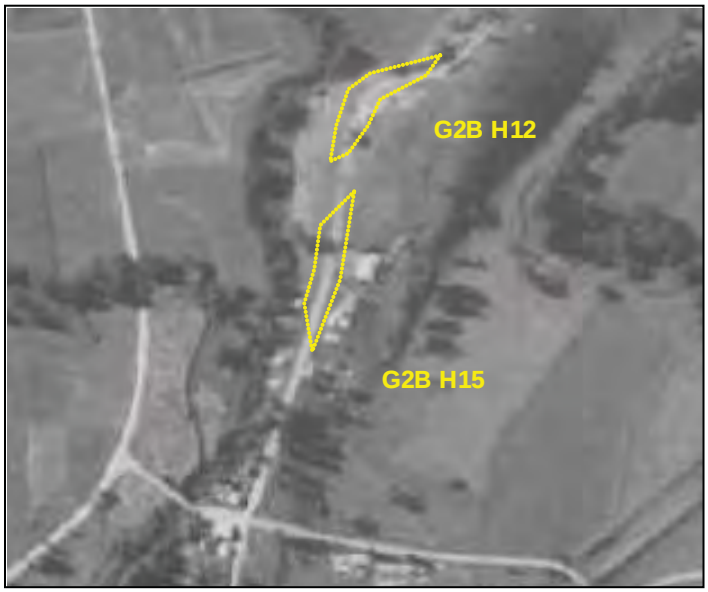


Figure G.33 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

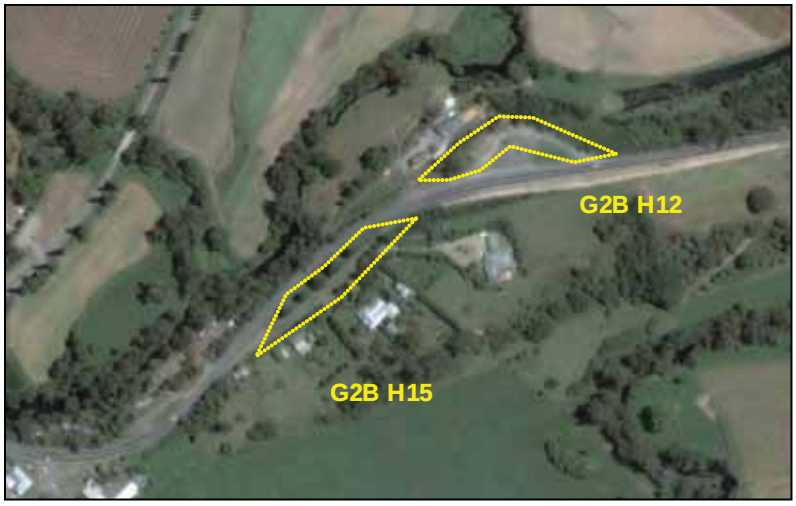


Figure G.34 Extract from 4th edition parish map of Coolangatta (cancelled 1928), showing location of G2B H12 and G2B H15

Recording ID: G2B H15		**GDA Map Reference:**	**290085.6149872 to 290020.6149720**
Name/Description:	**Remnant section of (mid 1950s) Princes Highway (Adjacent to *Mananga* homestead)**	*Cadastral Location*: *Street address:*	Highway easement - Berry
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located 460 metres east of the Broughton Mill Creek bridge, on the north side of the current highway, and located on the north side of the prominent spurline which forms the watershed between Broughton Mill and Broughton Creeks.
Description/fabric:	Bitumised highway platform, around 4.5 metres wide, with a net width, including gravelled shoulders of around 7.5 to 8.0 metres. The remnant is 195 metres long and is truncated by the current highway at either end. The remnant is slightly curved to the east, but in general is aligned at 26 degrees (to true north).
Dimensions:	195 x 15 metres
Physical condition:	The remnant is in good condition. For the majority of its length, the sealed road surface appears complete and in good repair and has probably been maintained and renewed post 1950s. At its northern and southern ends the roadway has been impacted by has construction of the current highway alignment. A spoil pile blocks use of the northern extent of the remnant, just after the northernmost driveway. At the southern end, access onto the current highway is maintained and possibly the original bitumen surface remain visible and has been eroded and patched due to side drainage and potholing. An avenue of five deciduous trees have been planted along the western side of the remnant (sometime between 1972 and 1986), between the remnant and the current highway.
Integrity:	This remnant retains many features of the 1950s highway easement, including an original configuration of road platform, shoulders and verge. Also original is the relationship between the roadway and adjacent Lot access and boundaries.
Associated features:	A highly modified section of 1950s highway carriageway, also isolated by the 1950s upgrade, is located 40 metres to northeast, on the opposite side of the current highway (G2B H12) and is now used as a wayside stop.
Current use:	Vehicle access to adjacent Lots.
Heritage listings:	no current listings

Historical background/interpretation:

This section of the highway was bypassed by the current highway alignment which was constructed in 1955 and apart from resurfacing appears not to have been modified since that time. It is currently used to access adjacent residential and agricultural lots on its eastern side. The alignment of this road remnant was formalised in the 1880s.

Recording ID: G2B H15

Remnant section of Princes Highway (Adjacent to Mananga HS)

Figure G.35 General view of remnant (to right of current highway) looking N

Figure G.36 General view of remnant (on left) looking S

Figure G.37 1949 aerial view of road remnants G2B H12 and G2B H15 (SVY552/NOWRA Run2(155-166) 4/4/1949)

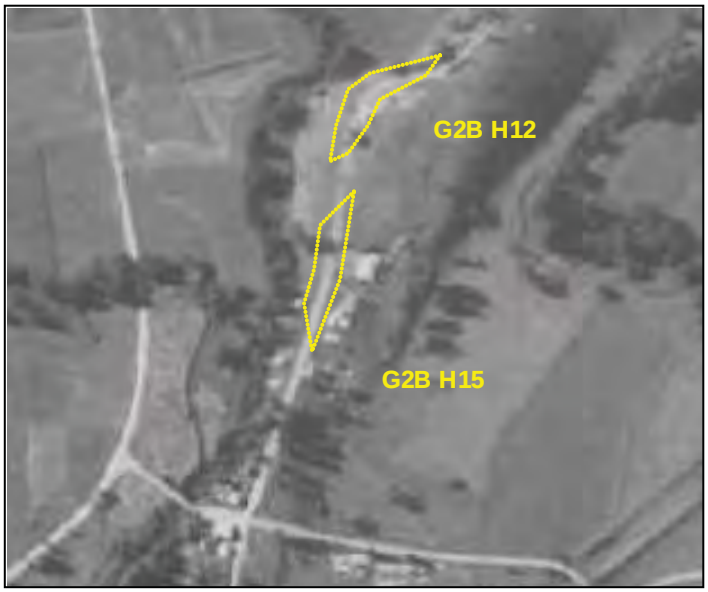


Figure G.38 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

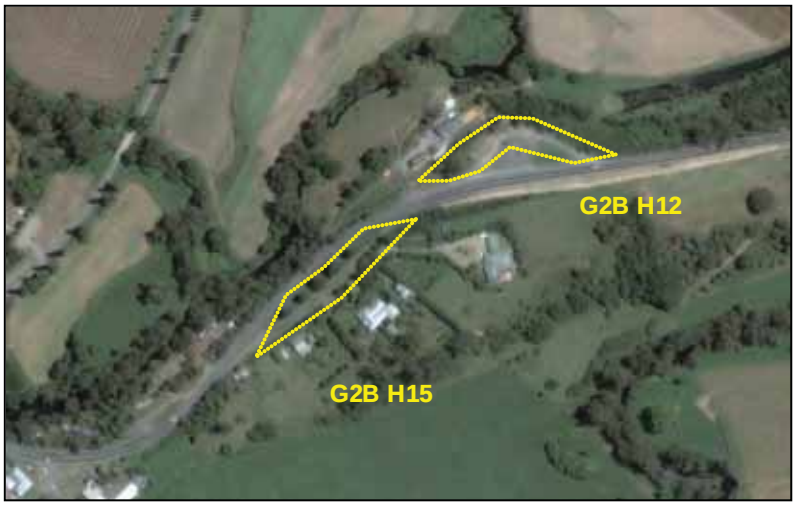


Figure G.39 Extract from 4th edition parish map of Coolangatta (cancelled 1928), showing location of G2B H12 and G2B H15

Recording ID: G2B H18		**GDA Map Reference:**	**291610.6150911 to 291500.6150827**
Name/Description:	**Remnant section of mid 1930s Princes Highway(Close to Tindalls Lane Int.)**	*Cadastral Location*: *Street address:*	Lot 14 DP1098617 A200B Princes Highway Broughton
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located on the east side of the current Princes Highway, 25 metres west of the intersection with Tindalls Lane. It is situated on the crest of a low but prominent spurline which forms the watershed between Broughton Mill and Broughton Creeks.
Description/fabric:	An indistinct earthen road platform, around eight metres wide, consisting of an angled alignment or corner (150°), with a net length of approximately 150 m. The remnant has been truncated by the current highway easement at both ends. The platform is discontinuously defined by low relief traces of shallow ditches and embankments. Dense grass cover prevented an assessment of any surviving road surface or treatment.
Dimensions:	150 x 25 metres, southern section: 70 metres, 66 degrees (true north), 80 metres, 39 degrees
Physical condition:	The remnant is in poor condition. The remnant is indicated only by low relief and indistinct ground relief. The establishment of pasture grasses and probable ploughing/tilling, has apparently reduced surface relief and removed other potential surface features.
Integrity:	This remnant is indistinct and eroded and has been impacted by subsequent agricultural use. Its remaining features are likely to relate to a mid 1930s highway platform.
Associated features:	Another 1930s remnant of a sharp corner is situated 25 metres to the northeast on the opposite side of the current highway (extending northeast from the Tindalls Lane intersection with the highway (G2BH57).
Current use:	Agricultural pasture grassland.
Heritage listings:	no current listings

Historical background/interpretation:

This highway section was bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s. The sixth edition of the parish map for Broughton (1916, cancelled 1938) notes that this road remnant was resumed as severed land in August 1936 (Figure G.41).

Figure G.40 General view, looking E, across the southern portion of the road remnant (foreground), (approximate alignment marked in yellow), .

Figure G.41 Extract from Sixth edition of parish map of Broughton (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901), showing resumption of severed land at G2B H18 (blue circle) in Aug 1936 (map reference note 23)

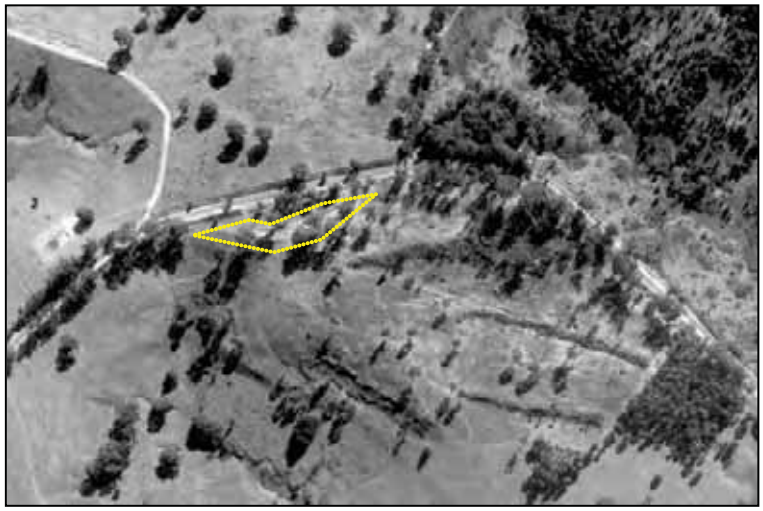


Figure G.42 1958 aerial image of area of road remnant G2B H18 (outlined in yellow) (SHI Dapto-Ulladulla Run GK11 699-5032, 23/07/1958),

Recording ID: G2B H20		**GDA Map Reference:**	**292460.6150870 to 292324.6150850**
Name/Description:	**Remnant section of late 1930s Princes Highway**	*Cadastral Location*: *Street address:*	Lot 4 DP801512 A350 Princes Highway Broughton
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located on the south side of the current Princes Highway, 715 metres east of the intersection with Tindalls Lane. It is situated on the upper slopes and crest of a low spur which is aligned northeast-southwest. The spur forms part of the lower slopes of the southern fall of the Broughton Creek valley.
Description/fabric:	A distinct earthen road platform, around eight metres wide, consisting of an angled alignment or corner (150°), with a net length of approximately 195 m. The remnant has been truncated by the current highway easement at both ends. The platform is discontinuously defined by low relief traces of shallow ditches and embankments. The platform has been used as a farm track since it was bypassed by the current highway alignment. This has involved maintenance and the application of gravels. Dense grass cover prevented an assessment of any surviving road surface or treatment.
Dimensions:	150 x 25 metres, southern section: 70 metres, 66 degrees (true north), 80 metres, 39 degrees
Physical condition:	The remnant is in reasonable condition. The remnant is indicated by more recently applied surface gravels and by low and often indistinct ground relief. The establishment of pasture grasses and probable ploughing/tilling, has apparently reduced surface relief and removed other potential surface features.
Integrity:	This remnant remains distinct but eroded and has been impacted by subsequent agricultural use. The recent construction of a bitumen driveway for an adjacent new homestead development has reused a portion of the platform. The remaining features are likely to relate to a mid 1930s highway platform.
Associated features:	Another 1930s remnant of a sharp corner is situated 50 metres to the northeast on the opposite side of the current highway (G2BH21).
Current use:	Agricultural pasture grassland, and modern driveway.
Heritage listings:	no current listings

Historical background/interpretation:

This highway section was bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s. The seventh edition of the parish map for Broughton (1938 cancelled 1959) notes that this road remnant was resumed as severed land in August 1938 (Figure G.45).

Figure G.43 1958 aerial image of area of road remnant G2B H20 (outlined in yellow) (SHI Dapto-Ulladulla Run GK11 699-5031, 23/07/1958)

Figure G.44 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.45 Extract from Seventh edition of parish map of Broughton (1938, cancelled 1959, Parish Map Preservation Project ID no. 10354001), showing resumption of severed land at G2B H20 (blue circle) in Aug 1938 (map reference note 36)

Recording ID: G2B H21		**GDA Map Reference:**	**292567.6150985 to 292492.6150957**
Name/Description:	**Remnant section of late 1930s Princes Highway**	*Cadastral Location*: *Street address:*	Lot 12 DP1098617 A371 Princes Highway Broughton
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located on the north side of the current Princes Highway, 920 metres east of the intersection with Tindalls Lane. It is situated on the upper slopes and crest of a low spur which is aligned northeast-southwest. The spur forms part of the lower slopes of the northern fall of the Broughton Creek valley.
Description/fabric:	A distinct earthen road platform, aligned in a sharp roughly 90 degree bend, around eight metres wide, and bordered on its upslope side by an excavated, steeply inclined embankment up to three metres high. The net length of the road alignment is 120 metres. The nature of the road surface or pavement is not known due to the degree of leaf litter and spoil that was present at the time of survey. The remnant has been truncated by the current highway easement at both ends. Sapling regrowth and extensive establishment of woody weeds has occurred across the remnant and its immediate area.
Dimensions:	130 x 40 metres: the alignment consists of two continuous lengths: the western section is around 43 metres and aligned 12 degrees (true north), the eastern section is around 78 metres and aligned 94 degrees.
Physical condition:	The ground relief of the remnant remains distinct, though the embankment has been impacted by collapse and erosion in some places. The platform is obscured by sapling regrowth and woody weeds.
Integrity:	This remnant demonstrates to some degree the construction standards and tolerances of a main road corridor from the first half of the twentieth century. The eroded and revegetated condition of this remnant substantially obscures access and interpretation of these traits. Dumping of spoil and excavation associated with the modern adjacent highway, has impacted the southern margin of the site.
Associated features:	A 1930s remnant of a less sharp corner (previously continuous with G2B H21) is situated 50 metres to the southwest on the opposite side of the current highway.
Current use:	Rough bush grazing.
Heritage listings:	Included within property definition for Glenvale homestead on Shoalhaven LEP (as amended) Schedule 7, but not specifically identified.

Historical background/interpretation:

This highway section was presumably bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s, at the same time as the bypass of G2B H20 (c1936). The seventh edition of the parish map for Broughton (1938, cancelled 1959) does not show this remnant or indicate its severance (Figure G.45). The earlier carriageway is however shown on the previous edition along with an indicative upgraded alignment (Figure G.48).

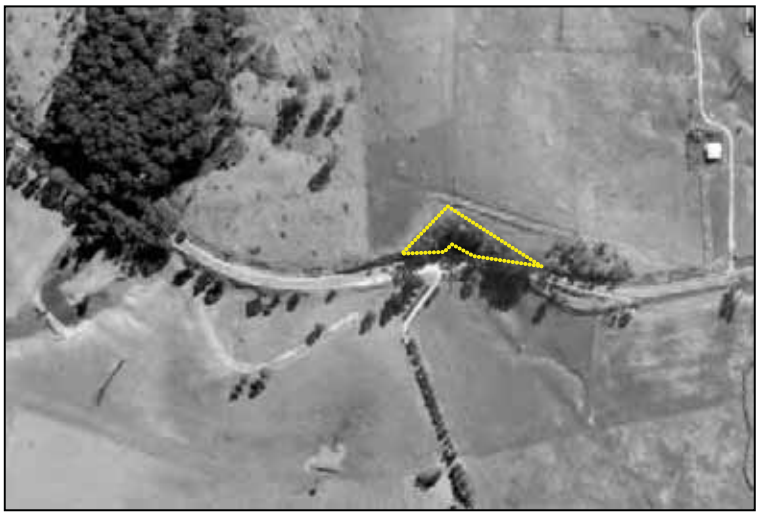


Figure G.46 1958 aerial image of area of road remnant G2B H21 (outlined in yellow) (SHI Dapto-Ulladulla Run GK11 699-5031, 23/07/1958)

Figure G.47 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.48 Extract from Sixth edition of parish map of Broughton showing the G2B H21 portion of highway (blue circle) and an adjacent upgraded alignment (reference note 24, resumed and gazetted public road Dec 1936 (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901)

Figure G.49 View of the G2B H21 platform and cutting looking N from the western end of the remnant. Note thick understory growth and sapling regrowth.

Recording ID: G2B H24		**GDA Map Reference:**	**to 293535.6151482 293405.6151406**
Name/Description:	**Remnant section of 1930s Princes Highway**	*Cadastral Location*: *Street address:*	Princes Highway easement - Broughton
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting:	This remnant is located on the south side of the current Princes Highway, 1.9km east of the intersection with Tindalls Lane. It is situated on the upper slopes and crest of a low spur which is aligned northwest-southeast. The spur forms part of the lower slopes of the northern fall of the Broughton Creek valley.
Description/fabric:	This site consists of the alignment of the former highway which forms a long loop, following the contour around the crest of the spur. The net length of the remnant was 210 metres. The original level and road platform and is now obscured by fill which has been levelled across the area circumscribed by the former road loop. The nature of the road surface or pavement is not known. The remnant has been truncated by the current highway easement at both ends. The area is currently used for the storage and sorting of road works spoil.
Dimensions:	180 x 30 metres
Physical condition:	There is little evidence of the original road platform or associated earth works. The majority of the alignment and the adjacent upslope area has been filled and levelled for use a materials storage area.
Integrity:	This site has little integrity.
Associated features:	-
Current use:	Road side maintenance materials storage and sorting area.
Heritage listings:	No current listings

Historical background/interpretation:

This highway section was bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s (Figure G.52).

Figure G.50 1958 aerial image of area of road remnant G2B H24 (outlined in yellow) (SHI Dapto-Ulladulla Run GK10 697-5105, 10/07/1958)

Figure G.51 Aerial image (2006) of area of road remnant (outlined in yellow), (Google Earth Pro 2011)

Figure G.52 Extract from Sixth edition of parish map of Broughton showing the G2B H24 portion of highway (blue circle) and an adjacent upgraded alignment (reference note 24, resumed and gazetted public road Dec 1936 (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901)

Figure G.53 View of the G2B H24 area, looking SW, note filling and levelling across site

Recording ID: G2B H26		**GDA Map Reference:**	**293839.6151602 to 293836.6151654 to 293701.6151821 to 293775.6151840 to 293835.6151882 to 293982.61521937 to 294008.6151962**
Name/Description:	**Remnant section of 1930s Princes Highway ("Bink's Corner")**	*Cadastral Location*:	Lot 1 DP450081
		Street address:	A540 Princes Highway Broughton Village
Item/Site Type:	Twentieth Century Highway remnant		

Context/setting: Road remnant is situated at the southern margin of Broughton Village and traverses the northeast facing slopes of a prominent spurline and the southwest and southeast facing basal slopes of a minor spur. The road platform crosses a minor creekline at its northern end, and a larger creek between the two spurs. The spurs are aligned northwest – southeast and form part of the lower northern fall of the Broughton Creek valley. The remnant is situated to the west of the current highway, adjacent to a section known locally as "the big dipper"

Description/fabric: This site consists of a remnant road platform which descends into and climbs out of a small valley via slope traverses angled obliquely across the contours. The net length of remaining alignment is around 612 metres. The overall alignment forms a sharp 'V' pointing up valley (west), with a tightly rounded corner turning 60 degrees. During the active use of this alignment as the Princes Highway, this corner was known as "Bink's Corner", after the family which owned (and still own) the property. The platform is easily discerned and variously recessed, cut and benched across the slopes. Side ditching is present in places. It is not known if culverts are associated with the creek crossings. The nature and condition of any surviving road surface is not known. The remnant is truncated at both ends by the current highway.

The platform continued to be used as a farm track following its resumption in 1936. The northern road portion, north of the larger creek crossing, is now overgrown and the southern portion, although clear, is no longer favoured as a through-track.

Dimensions: The area within which the remnant occurs covers approximately 430 x 195 metres. The width of the platform ranges from between 6 and 8 metres. The maximum width of platform and side earthworks (ditches, embankments etc) is around 16 metres. The alignment of the remnant platform can be simplified into the following intervals (south to north):

52 metres, 25° (grid north)
216 metres, 358°
83 metres, 79°
75 metres, 55°
55 metres, 71°
41 metre, 41°

Physical condition: This remnant is in relatively good condition, with the ground relief of the platform, and associated cuttings, ditches and embankments still clearly evident. There is some sapling regrowth across the platform in the northern section, and there may have been erosion of the platform in the area of the creek crossings. A number of current or former fence lines cross the platform.

Integrity:	This remnant does not appear to have been significantly modified since its resumption, or as a result of low key use as a farm track. Its form and character relate to the tolerances and maintenance of a 1930s active highway. The remnant follows that of a surveyed line which dates from the 1870s to 1880s.
Associated features:	A remnant of the earlier Berry Estate road (G2B H27), constructed in 1856 and which was replaced by this road, crosses this alignment twice and occurs in close association with it. The G2B H26 highway remnant forms part of a complex of recordings which, as a group, have value in understanding and interpreting the evolution of the highway, its various alignments, and its interrelation with adjoining land holdings and homesteads. These recordings are: • G2B H27 remnant section of 1856 Berry Estate Road • G2B H26 remnant section of 1870s – 1930s Highway ("Binks Corner") • G2B H25 *Sedgeford* homestead
Current use:	Agricultural pasture grassland
Heritage listings:	no current listings

Historical background/interpretation:

Based on County and parish mapping, this remnant follows a highway alignment which became established in the 1870s or 1880s and replaced the 1856 Berry Estate road. It was bypassed in 1936.

Bink's Corner was the location of a fatal car accident in 1935, one year prior to its upgrade. David Mahlon Cowlishaw, 20, son of Dr. and Mrs Leslie Cowlishaw of Lindfield, was killed on the 28 January 1935, when his car overturned at Bink's corner. "The car had just passed the property of Mr A.N. Binks, MLC, when it swerved and overturned. It rolled over and finally came to a standstill with its four wheels in the air". The press report of the incident paper noted that "The scene of the accident is a recognised danger spot" (Sydney Morning Herald 30 January 1935, p14).

At the subsequent inquest the Coroner, Mr Reuben King, found that

> "the accident was due to the rough and dangerous turn there, and that the danger attached to the turn as not and is not sufficiently indicated by the authorities in charge of the section of the Princes Highway".

Dr Cowlishaw stated at the inquest that

> "There is no warning to an approaching driver that it is a danger spot… The white stones are neglected and covered with dust… I would like the attention of those in charge of the road to be directed to its state. It cannot do my boy any good now, but may prevent loss of life to others if it is remedied".

Constable A.W. Wright stated that

> "the only warning to motorists was big stones at the edge of the curve, but they were dust covered and overgrown with weeds and grass and could not be seen on a dark night. His predecessor, Constable Brogan, had crashed at the spot, and was off duty two months" (Sydney Moring Herald 4 February 1935, p9).

It seems likely that the upgrade of the highway the following year may well have been prompted, or was at least strongly supported by the Coroners findings. This event and its location, are representative of several dominant themes in the development of the highway – the interplay between resourcing road maintenance and the safety of its users, the interrelation between highway design and need to increase user safety, and the pressure created by fatal accidents to upgrade the highway.

Figure G.54 View, looking NW from the upgrade alignment towards G2B H26 road remnant (yellow dotted line), Berry Estate road (G2B H27) in blue)

Figure G.55 View of northern portion of road remnant (approx. alignment marked in yellow), looking N

Figure G.56 View looking SW, showing well benched platform in right foreground and more distant alignment on southern side of valley (mid distance) (approx. alignment marked in yellow)

Figure G.57 Road remnant visible on 1958 aerial photo (outlined in yellow), The alignment of the earlier Berry Estate road is shown in blue (NSW 699-5028, SH.I Dapto-Ulladulla Run GK11 23/07/58)

Figure G.58 Aerial image showing road remnant (outlined in yellow) in 2006. The alignment of the earlier Berry Estate road is shown in blue (Google Earth Pro 2011)

Figure G.59 Extract from 1890s map of the northern Berry Estate, showing the remnant alignment (blue line) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

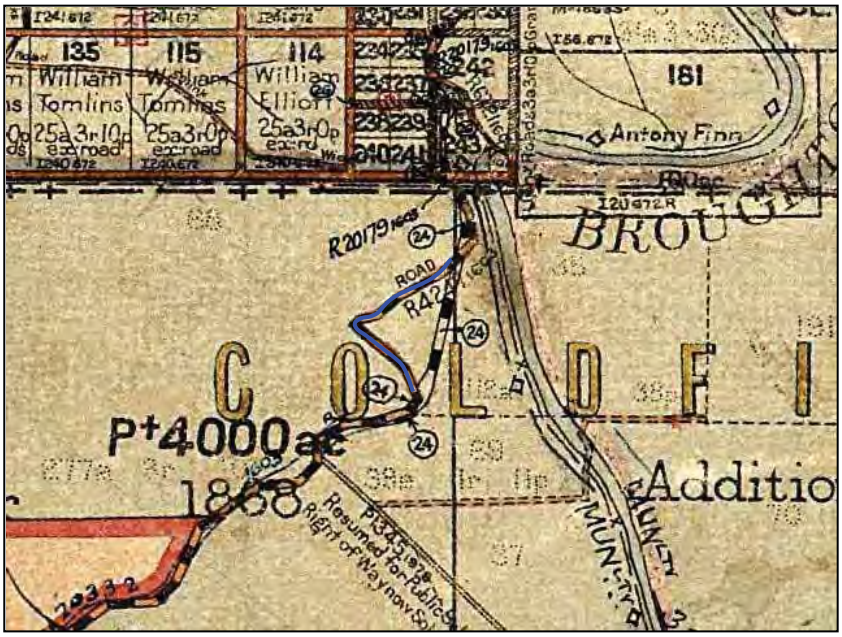


Figure G.60 Extract from Sixth edition of parish map of Broughton showing the G2B H26 portion of highway (blue line), (reference note 24, resumed and gazetted public road Dec 1936 (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901)

Figure G.61 "Binks Corner - old abandoned roadway 1937". This photo was taken looking SW and downslope towards the main creek crossing. (State Library of NSW d1_27130r)

Recording ID: G2B H57		**GDA Map Reference:**	**291610.6150911 to 291500.6150827**
Name/Description:	**Remnant section of mid 1930s Princes Highway** (**Tindalls Lane Int.)**	*Cadastral Location*: *Street address:*	Lot 14 DP1098617 A200B Princes Highway Broughton
Item/Site Type:	Twentieth Century Highway Remnant		

Context/setting:	This remnant is located on the north side of the current Princes Highway, immediately east of the intersection with Tindalls Lane. It is situated on the north facing, upper slopes of a low but prominent spurline which forms the watershed between Broughton Mill and Broughton Creeks.
Description/fabric:	An overgrown and indistinct earthen road platform, around 6-7 metres wide, consisting of a 'dog leg' angled corner, with a net length of approximately 125 metres. The remnant has been truncated by the current highway easement at both ends, and encroached upon by a turning circle platform on Tindalls Lane (NOHC 2005). The platform is recessed up to 30 centimetres into the ground discontinuously across its length. A low density scatter of mid twentieth century glass and ceramic fragments are associated with the platform. Dense forest litter and grass prevented an assessment of any surviving road surface or treatment.
Dimensions:	90 x 50 metres
Physical condition:	The remnant is in poor condition. The section closest to Tindalls Lane has been encroached upon by the recent construction of a turning bay. Clearance of the eastern gas pipeline easement has also impacted upon another section. Forest regrowth is now obscuring the platform and its edges.
Integrity:	This remnant is indistinct and overgrown and has been impacted by subsequent easement construction and road works. Its remaining features are likely to relate to a mid 1930s highway platform.
Associated features:	Another 1930s remnant of a sharp corner is situated 25 metres to the southwest on the opposite side of the current highway (G2BH18).
Current use:	Rough forest grazing.
Heritage listings:	no current listings

Historical background/interpretation:

This highway section was bypassed by the current highway alignment when it was upgraded and straightened in the mid 1930s. The sixth edition of the parish map for Broughton (1916, cancelled 1938) notes that this road remnant was resumed as severed land in August 1936 (Figure G.63).

Figure G.62 General view, looking SW, showing edge of recessed remnant road platform (foreground), (approximate alignment marked in yellow) (photo: Dec 2005)

Figure G.63 Extract from Sixth edition of parish map of Broughton (1916, cancelled 1938, Parish Map Preservation Project ID no. 10353901), showing resumption of severed land at G2B H57 (blue circle) in Aug 1936 (map reference note 23)

Figure G.64 1958 aerial image of area of road remnant G2B H57 (outlined in yellow – note that outline shows full extent of remnant as of 1958, current remnant has been reduced in size by eastern gas pipeline and turning bay on Tindalls lane) (SHI Dapto-Ulladulla Run GK11 699-5032, 23/07/1958)

G.3 Standing buildings and structures

Recording ID: G2B H10 **GDA Map Reference: 288592.6149727**

Name/Description:	**Cottage**	*Cadastral Location*:	Lot 1 DP22828
		Street address:	72 North St Berry
Item/Site Type:	Early twentieth century cottage		

Context/setting:	This building is situated on an urban lot on the south side of North Street, Berry. The lot is situated immediately southeast of, and opposite, the T-intersection of Rawlings Lane and North Street. The lot is situated on relatively level ground, around 80 metres northeast of Town creek, a small tributary which traverses diagonally across the Berry township area.
Description/fabric:	This is a modified example of a small workers cottage with a central gabled roof, aligned east-west, (parallel to the road), and with adjoining rooms covered by lower pitched roofs on the northern and southern sides. The front room was formerly an open veranda now enclosed. Similarly a skillion roof abutting the eastern side wall may originally have been an open verandah. The rear roof fall may cover both original back rooms and later additions. The house, was probably originally clad with horizontal wooden weatherboards, and has now been re-clad with wide synthetic cladding. The roof is corrugated iron. All visible windows are of modern design and framing.
Dimensions:	The building has approximate dimensions of 10 x 12 metre
Physical condition:	The building is well maintained, but retains few original exterior materials or features. Interior not inspected.
Integrity:	Based on the exterior, this building has undergone considerable renovation and does not display appreciable integrity. Historical aerial photography indicates that this building was moved from an original location and moved to its current position in the 1950s (refer Figure G.69 below).
Associated features:	-
Current use:	Town residence
Heritage listings:	no current listings

Historical background/interpretation:

Inspection of early aerial photography reveals that this building was present at its current location in 1958, but absent nine years previously (Figure G.69). Given that the design of the building is typical of the early twentieth century, and not characteristic of the 1950s it is probable that it pre-dates this time and was moved to this location.

The 1958 aerial image suggests that at this time, there was a garage abutting its western side, and verandas were present along its southern and eastern sides, but absent along the front (Figure G.68).

Recording ID: G2B H10 **Victorian Cottage**

Figure G.65 General view of house, looking SE

Figure G.66 Detail of front of house, looking SE

Figure G.67 Detail of front of house, looking S

Figure G.68 1958 aerial image showing context of G2B H10 (SH.I Dapto-Ulladulla Run GK11 699-503 23/07/1958)

Figure G.69 (above) enlargement of 1949 aerial image showing absence of G2B H10 building at this time (red area) (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949)

Figure G.70 Enlargement of 1958 aerial image shown at top, (area indicated in blue) showing detail of building configuration

Recording ID: G2B H11 **GDA Map Reference: 288638.6149772**

Name/Description:	***GlenDevan***	*Cadastral Location*:	Lot 3 DP206971
		Street address:	77 North St Berry
Item/Site Type:	Federation House		

Context/setting:	This building is situated on a large allotment on the north side of North Street, Berry, 35 metres east of its intersection with Rawlings Rd. The lot is situated on relatively level ground, around 120 metres northeast of Town creek, a small tributary which traverses diagonally across the Berry township area.
Description/fabric:	An asymmetrical Federation style weatherboard house with a mature garden. The house a pyramidal roof, partial verandas around all four sides, two tall chimneys, and perhaps four original rooms (now five excluding former verandas). One front room (to the left of the entrance) projects forward with no veranda and front facing projecting gable. Verandas remain partially open on southern, eastern and northern sides, but are enclosed on N and w sides. Some changes to internal walls and room enlargements appear to have occurred towards the back of the house. A kitchen block (with external chimney) originally separate from house, is now attached at NW end. Some renovations are thought to have been conducted around 1910, based on fittings/windows associated with enclosed verandas. All doors in original building and associated frames are thought to be made of red cedar. A separate shed, (NW of house) was a tractor shed, when Gardner bought the property. It, included a laundry with an old copper.
Dimensions:	The house is approximately 19 x 19 metres in area. The grounds and garden occur within an approximate enclosed area of 55 x 40 metres.
Physical condition:	The house and grounds are in good condition and well maintained. The iron on the roof was replaced around 2004.
Integrity:	The building retains many original features, and an overall Federation character and structure. The additions do not significantly detract from the heritage value of the building, and are evidence of the changing circumstances and needs of the owners.
Associated features:	Grounds and garden
Current use:	Town residence
Heritage listings:	Shoalhaven Heritage Inventory No current statutory listings

Historical background/interpretation:

The following information is provided on the Shoalhaven Heritage Inventory (Shoalhaven City Council).

This house was built prior to 1894 when it is known that Dr Dawson and his family were in residence. Dr Cecil Lacy Dawson arrived in Berry from Pambula in 1894 and set up a surgery in the vacated office of surveyor John Ewing. He had married Mabel Wylde two years previously and they both raised a family of five children at this residence (Mabel b.1893, Mavis b.1896, Cecil b.1904, and twins Gilbert and Joyce b.1905). Dr Dawson died suddenly

on 21 September 1907 aged 44.

Mabel Dawson purchased the property from the Berry Estate on 4 February 1908 (formerly Lot 42 DP4497).

The property was sold to William Henry Shute and his wife Elizabeth and they farmed the land for many years prior to George Miller owning it. There were several tenants of the farm until it was then purchased by Mr and Mrs Arther Belling, themselves former tenants. At that time there was no garden only two flame trees. Mrs Belling sold the property to Mrs Judith Gardner.

The following information was kindly provided by Mrs Judith Gardner (pers. comm.. 18 March 2009).

Judith moved-in in 1989. She purchased the property from Mrs Kath Billings (brought up at Woodhill, now of Nowra).
Mrs Billings planted most of the garden.

Mrs Billings bought the property from George Miller in 1969.

The property was rented (from Miller) by the Gray family for an extended period of time, Sid Ray and his wife raised three children in the house.

Mr Miller bought the property from Mrs Dawson, (possibly a doctor). She is remembered as a cattle breeder and for importing breeds from England. When her husband died she returned to England. A number of articles, between 1907 and 1914, reporting the results of the Berry Agricultural show, mention a Mrs Dawson and a Dr Dawson in relation to prizes for cattle and horse events (c.f. Sydney Moring Herald 5 February 1914, p.5; 14 February 1911, p.6; 2 February 1907).

It is possible that Dawson built the house (others believe that it was built by Janet Bowden's uncle George).

A previous heritage assessment of this site has stated the age of its construction to be around 1894 when it formed part of the Berry Estate. It was considered to have historical significance at a local level as a representative example of accommodation constructed late in the history of the Estate (Conybeare Morrison & Partners 1999:27, refer also Peter Freeman Pty Ltd 1998).

Figure G.71 General view of front of *GlenDevan* Cottage, looking N

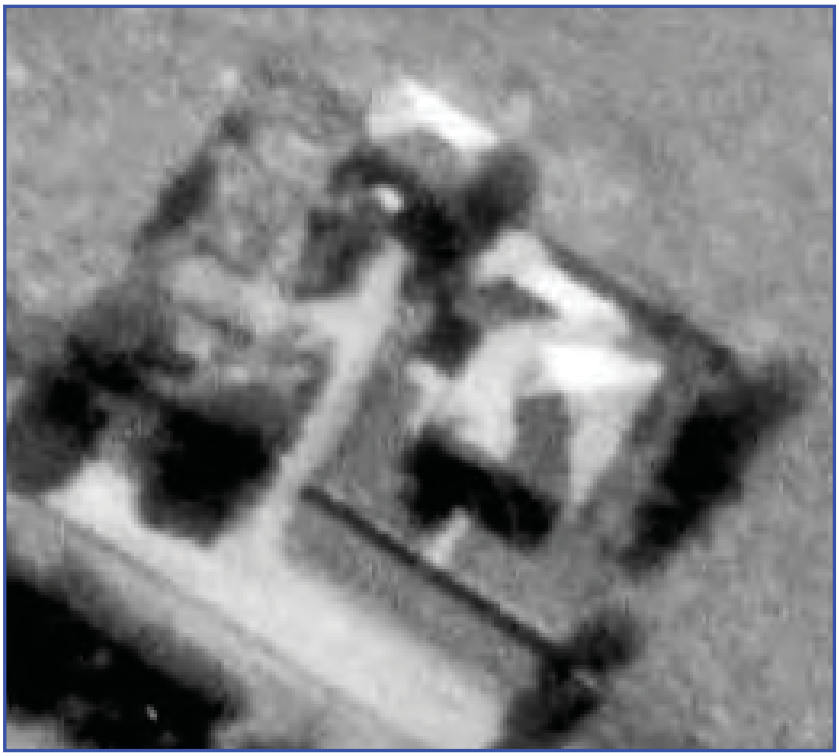
Figure G.72 Front view of *GlenDevan* Cottage, looking NE

Figure G.73 Detail of front of building, looking N

Figure G.74 1958 aerial image showing context of G2B H11 (SH.I Dapto-Ulladulla Run GK11 699-5038 23/07/1958)

Figure G.75 (above) enlargement of 1949 aerial image showing G2B H11 (red area) (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949)

Figure G.76 Enlargement of 1958 aerial image shown at top, (area indicated in blue) showing detail of building configuration



Recording ID: G2B H13 **GDA Map Reference: 289329.6149710**

Name/Description:	**Burnett Estate Overseer's Cottage**	*Cadastral Location*: *Street address:*	Lot 1 DP 973922 143 North St Berry
Item/Site Type:	Early twentieth century cottage		

Context/setting:	The cottage is situated on a large allotment on the north side of North Street, Berry, 410 metres east of its intersection with Woodhill Mountain Road. The cottage has been built on level ground around 140 metres south of Bundewallah Creek.
Description/fabric:	A basic and small, timber frame and horizontal weatherboard cottage, with a central gabled roof, aligned east-west, (parallel to the road). Adjoining rear rooms are covered by a lower pitched roof. A front veranda on the south side of the building, has been enclosed with weatherboarding and a continuous upper wall of eight window panels. Corrugated iron roof. Two slanting wooden frame and corrugated iron awnings are evident over windows on the west side of the building. (Interior not inspected).
Dimensions:	Cottage is approximately 12 x 6 metres.
Physical condition:	Good
Integrity:	Generally (apparently) in original condition except for the enclosure of the verandah.
Associated features:	-
Current use:	Private residence
Heritage listings:	Shoalhaven Heritage Inventory
	No current statutory listings

Historical background/interpretation:

The Shoalhaven Heritage Inventory includes the following information on this building (Shoalhaven Heritage Inventory – Shoalhaven City Council):

This land, formerly Lot 44, (together with Lots 41, 43 and 46, DP4497) was purchased from the Berry Estate in 1912 by Lady Alice Carruthers, wife of Sir Joseph Carruthers, KCMG, a solicitor of Sydney, and her sister Rhoda Burnett. Combined with other purchases by Alexander and Jane Maria Burnett (Lots 38, 39, 40, 45, 47 & 50, DP4497), these lands formed the Burnett family estate (Figure G.80). It appears probable that the G2B H13 cottage was constructed as an overseer's residence for the estate, around 1917. It was located 220 metres west of the main homestead, which was located where the tennis courts are now (Figure G.79).

From 1914 to 1921 the McGee family managed the Burnett property. They milked 80 cows of mixed varieties. There was an orchard with loquats and apples. Burnett visited regularly to pay the family and check the property. He paid Mr McGee six pounds per week out of which the two sons received 10/- each.

In 1946 a Mr Conway and his daughter Marcia were occupying the cottage. In June 1961, Eric Standen, a general carrier of Gerringong owned the property. In March of 1967 Henry (Harry) William Auld and his wife Phyllis (Mavis) purchased the property.

Figure G.77 General view of cottage looking NE

Figure G.78 Cottage looking N

Figure G.79 Comparison of 1958 and 2006 aerial images (SH.I Dapto-Ulladulla Run GK11 699-5038 23/07/1958; and Google Earth Pro 2011)

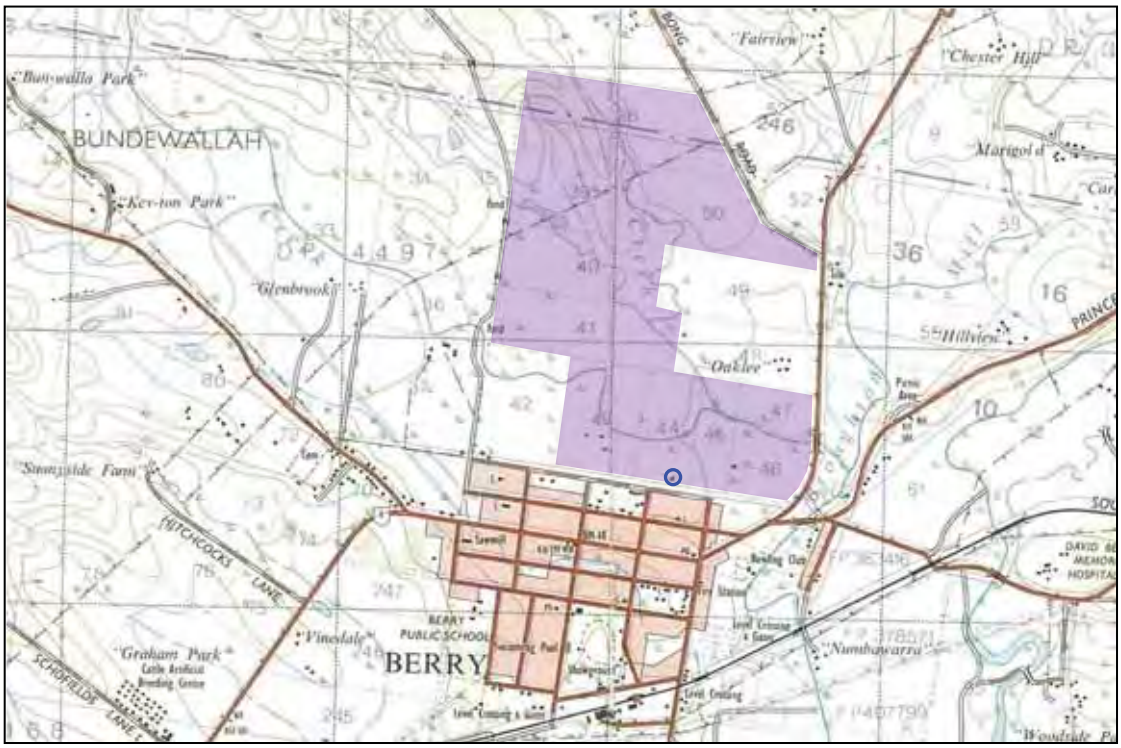


Figure G.80 Property holdings (purple) of the Burnett family (including Carruthers, nee Burnett). G2B H13 Cottage indicated by blue circle (information from Shoalhaven Heritage Inventory, base map: Berry 1:25,000 1st Ed, CMA 1970)

Recording ID: G2B H16 **GDA Map Reference: 290103.6149797**

Name/Description:	***Mananga* homestead complex Former Berry Estate Manager's Residence**	*Cadastral Location*:	Lot 101 DP1057897
		Street address:	A40 Princes Highway Berry
Item/Site Type:	Federation Queen Anne style homestead, associated outbuildings and grounds		

Context/setting: The homestead and attached land is situated on the crest and eastern fall of a low but locally prominent spurline shoulder which forms the watershed between the Broughton Creek to the east, and Broughton Mill Creek to the west. The homestead is situated 80 metres to the east of Broughton Mill Creek and is elevated approximately eight metres above the surrounding valley floor.

Description/fabric: Federation Queen Anne style weatherboard homestead – complex corrugated iron roof with decorative timberwork to gables (with Art Nouveau character), hipped skillion verandah returning to sides, timber posts and brackets. Verandas appear to have originally surrounded an original core building. An addition wing has been added to the north eastern corner of the building, sometime prior to 1949. A conservatory has been relatively recently added to the eastern side of the building.

The building is surrounded by a mature garden.

The homestead building is thought to be designed by noted Sydney architect Howard Joseland (1860-1930) (Peter Freeman Pty Ltd 1998).

The current property holding includes five outbuildings to the south of the current homestead, including a concrete silo, associated large iron sheds and disused milking bails. Eight outbuilding structures are visible on the 1958 aerial photo (Figures 6.91). Non-captioned photos in the Shoalhaven Heritage Inventory appear to show interior rendered walls (and/or ceilings) within an outbuilding, constructed using sawn timber studs filled in using multiple timber slats with applied plaster or render.

At the southern end of the property there are landform traces of the excavated trench through the spurline (now filled in for the Princes highway platform) which formed part of the infrastructure for the water race for the Berry Estate saw mill which dates from the 1830s. Immediately north of the race alignment is the location of the original Mananga homestead or cottage. This site is associated with some exotic plantings and mature trees. This site, together with the infilled mill race should be considered and managed as archaeological deposits.

Dimensions: Original building had approximate dimensions 24 x 18 metres. The additional wing on NE corner has approximate dimensions: 15 x 11 metre.

The current property attached with the homestead is approximately 250 x 118 metres in cross dimensions.

Physical condition: The homestead is in excellent and well maintained condition

The outbuildings appear to be in varying modes of low intensity use, storage or abandonment. There are corresponding states of condition ranging from good to poor.

Integrity:	Despite a latter additional wing to the north eastern corner, and recent addition of a conservatory adjacent to the eastern veranda, this homestead retains a high degree of integrity to its original period of construction. The interiors have been sensitively restored for use as holiday accommodation.
Associated features:	The Mananga homestead complex and attached property, forms an integral part of a suite of structures, features and archaeological deposits which constitute the remains of the focus of the Broughton Creek village (late renamed Berry) from the 1860s to the 1890s. Included in this suite are: • the Pulman Street Conservation area (situated mostly south of the intersection of Pulman St and the Princes Highway). • Constables Cottage. • Princes highway remnant (G2B H15) immediately adjacent to *Mananga*. • Remains of the Berry Estate saw mill water race (and associated mill and tannery sites). • Archaeological deposit (G2B H14) (adjacent to *Mananga*) comprising traces of former town structures on the west of the original highway alignment. • Remnant of Berry Estate Road (G2B H55), 120 metres north of the homestead.
Current use:	Private residence leased for holiday accommodation
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7 Royal Australian Institute of Architects 20th Century Register of Significant Buildings (no. 47022656) Shoalhaven Heritage Inventory

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Historical background/interpretation:

Mananga is reported to be an Aboriginal word meaning “by the water” (Shoalhaven Heritage Inventory).

The original 'Mananga Cottage' an Estate building, was built for William Stewart. William was an acquaintance of David Berry in Scotland and although, at first, settling further south of Berry, was enticed to come to Berry and help control the large David Berry Estate. Alexander Berry appointed William Stewart the first Commissioner of Peace for the district of Broughton on 8th April 1867.

William's brother, Donald Stewart, had arrived in Australia and went prospecting at the gold fields. Later he returned to Berry and became the first Post Master of Berry in 1861, the Post Office being at the Old Mananga Cottage. Upon the death of Donald in 1876, the post office moved to James Wilson’s store nearby on the intersection of the main road with Pulman Street (Lidbetter 1993).

John Stewart, son of William, came to Australia at the age of 19 years after finishing his studies in Scotland. He purchased the Mananga land following the break-up of the Berry Estate following the death of David Berry. It was John Stewart who built the existing "Mananga Homestead" in 1894. John was the first registered auctioneer in NSW and his office remains evident within the Homestead building. The firm of Stewart and Morton was formed in 1880 and operated till 1960 (http://www.stayz.com.au/31300)

Together with his father, William, John was involved in the formation of the Municipality of Broughton Creek and Bomaderry, the establishment of the local Agricultural Society, and the School of Arts.

John married Isabella Bryen and raised a family of six children, living first at the original homestead, and subsequently in the current homestead following 1894.

The Mananga homestead remained in the ownership of the Stewart family until 1992 (Lidbetter 1993).

The current *Mananga* homestead is thought to have been designed by Howard Joseland who designed many Federation buildings on the Berry Estate between 1883 and the early 1900s. This is supported by the resemblance of the timber featuring to similar elements on Bomaderry residences Greenleaves (1895) and Lynburn (1896), both designed by Joseland for the Berry Estate (Shoalhaven Heritage Inventory).

Joseland first worked for the Berry Estates in 1892, and married Blanche Augusta Hay at Coolangatta in 1897 (Chisholm 2011). Blanche was a half sister to John Hay (Sydney Morning Herald 12 Aug 1909 p8). John Hay (later Sir John Hay) was David Berry's first cousin once removed, and moved to Coolangatta in David Berry's declining years (he was born at Coolangatta) (Antill 1982). Upon David's death in 1889 John and his half brother took over the management of the estate. One third of the estate including Coolangatta was left to John, however as an executor (along with James Norton) he would eventually sell the land to meet the bequests of the will (Lidbetter 1993, Stephen 1969).

Figure G.81 *Mananga* and ground, looking NE (Photo: http://www.stayz.com.au/31300)

Figure G.82 *Mananga* looking NE (Photo: http://www.stayz.com.au/31300)

Figure G.83 Early photo of *Mananga* looking SE, possibly 1930s or 40s (Photo: courtesy of Royal Australian Institute of Architects Listing 4702265 Neg. no. SC336/1))

Figure G.84 View looking SE showing extension to NE corner of original building (Photo: http://www.stayz.com.au/31300)

Figure G.85 Internal view of a restored room in *Mananga* (Photo: http://www.stayz.com.au/31300)

Figure G.86 Detail of roadside boundary fence and entrance, looking E

Figure G.87 General view of the elevated spurline context of the *Mananga* homestead, looking NW from the creek flats of Broughton Creek and the railway (foreground)

Figure G.88 1999 image of the *Mananga* outbuildings and silo, looking S, (from Shoalhaven Heritage Inventory = Shoalhaven City Council)

Figure G.89 View of the 'old bails', the southernmost remaining outbuilding in the Mananga homestead complex, looking SE

Figure G.90 1949 aerial image, showing *Mananga* (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949)

Figure G.91 1958 aerial image showing *Mananga* (SH.I Dapto-Ulladulla Run GK11 699-5036 23/07/1958)

Figure G.92 Aerial image (2006) showing *Mananga* (Google Earth Pro 2011)

Figure G.93 View of spurline on which the current Mananga property is located, looking northwest.

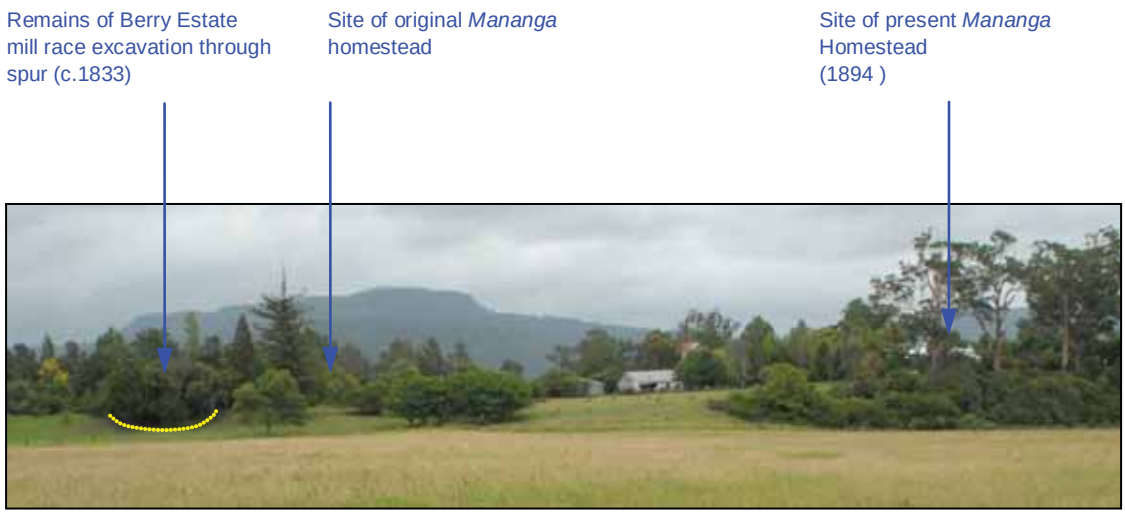

Figure G.94 Extract from 1890 survey map for the Kiama to Nowra railway, showing original *Mananga* homestead buildings (blue circle), also note Tannery buildings (Votes and Proceedings of the Legislative Assembly of NSW, 1890 session, Vol 6. Report of the Standing Committee on Public Works on the Kiama to Nowra Railway)

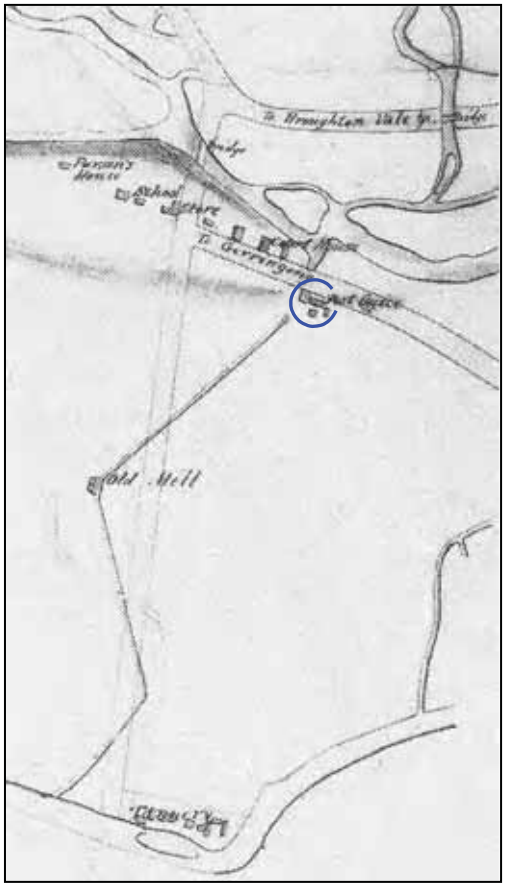

Figure G.95 Extract from early map of Broughton Creek Village area, probably 1870s, showing the original *Mananga* homestead (blue circle) as the Broughton Creek Post Office, and the alignment of the mill race and highway crossing adjacent to the homestead (Berry Museum n.d.: 15)

Recording ID: G2B H17		**GDA Map Reference:**	**290542.6150237**
Name/Description:	***Hillview* homestead** **Former Berry Estate Tenant Farm**	*Cadastral Location*: *Street address:*	Lot 31 DP840646 A111 Princes Highway Berry
Item/Site Type:	Nineteenth Century Homestead		

Context/setting: This homestead is situated on the north facing mid slopes of a prominent spurline which forms the watershed between the Broughton and Broughton Mill Creeks. The homestead is located 210 metres south of Broughton Mill Creek, and 52 metre north of the current Princes Highway.

Description/fabric: Vertical (sawn) slab homestead with hipped roof (corrugated iron) and five original rooms on an 'L' shaped plan with kitchen forming back wing. A lounge room (horizontal weatherboard) has been added to the NW corner of the kitchen, sometime prior to 1958. Other features include:

- Original verandas on SE and SW side of house, and eastern side of kitchen wing. West and east facing verandas have been infilled using (synthetic?) wide horizontal cladding, with aluminium framed windows. This treatment replaced an earlier partial infilling on the western veranda (refer Figure G.98).
- Vertical wall slabs have been sawn using a circular saw (Figure G.102).
- Exposed timber framing around external and internal doors, and some windows, with verticals extending to ceiling. The residents note that these timbers are made of hard wood and very hard.
- One original brick chimney on a formerly external wall of the kitchen, now enclosed by lounge addition (Figure G.105). An additional hearth and chimney is located on the west wall of the lounge addition.
- Central NW=SE aligned hall, extends at N end onto verandah along E wall of kitchen (Figure G.104).
- Small skillion roofed addition (horizontal weatherboards) to N end of lounge, on separate and lower level (Figure G.101).
- Rough sandstone wall foundations under original building, and stone pillars used under the lounge room addition (Figures 6.106 and 6.107).
- Two fig trees have been planted on the western side of the homestead and are now large and mature. They may date to the nineteenth century (Figures G.108 & G.116).
- A number of post 1960 plantings, including an Oak tree, are present between the homestead and the current highway. Although not part of the significant fabric of this site, these plants were planted by the late wife of the current owner and have great sentimental value.

- Many of the external windows appear to be too young for the building, and may have been replaced with their present wooden frame, single pane sash windows (some have two panes in the upper sash). This renovation may date to the 1920s or 30s, possibly at the same time as the addition of the lounge room. Two 2x6pane sash windows survive, one on the kitchen exterior wall, and one on a former western exterior wall now behind an enclosed verandah.

Outbuildings include a number of timber frame and corrugated iron sheds and a concrete silo. The largest and downslope shed is reported to have been disassembled and moved from Port Kembla where it had been used for processing immigrant workers after the war (pers. comm.. Keith Bowden 24/08/2011).

Dimensions: Original homestead 'L' configuration approximately 12.5 x 16.5 metres; with later additions, approximate maximum dimensions: 21 x 16 metres.

Physical condition: Very good and well maintained condition

Integrity: Despite replacement of many windows, the addition of a lounge room, and infilling of verandas the homestead retains its original configuration, basic structure, framing, and exterior slabs and weather bands. Many original details remain.

Associated features: -

*Current use:*Private residence and farmhouse

*Heritage listings:*no current listings

Historical background/interpretation:

An 1890s map of the northern portion of the Berry Estate (probably 1892, refer Graham 1998) shows a T. Courtney as the tenant farmer in residence. Four buildings in a diamond configuration are shown on the map, in the location of the current homestead complex (Figure G.114).

Based on similarities with the *Glenvale* homestead (G2B H45), notably the 'L' configuration of the homestead (a consequence of an adjoining rear kitchen wing), and similar (sawn) vertical slab walls it can be speculated that *Hillview* homestead is of a similar age, or possibly a little later - ie the 1860s or a little later.

The following information on some of the previous owners was kindly provided by the current owner Mr Keith Bowden (pers. comm. 17/02/2009 & 24/08/2011):

- The earliest owner known to him was Mick Keller, he was a "hoppy leg" fella, with a limp in one leg.
- Noel and Colin Cook, owned the first black and white heard of cows. Colin moved to Shellharbour around 60 years ago.
- Allan Blinkensopp.
- Mrs Birdsall bought the property off the Cooks (she was a McIntosh).
- Richardson from Albion Park (owned the property for only a short period of time, 3 to 4 months)
- Barma and Jessup.
- Keith Bowden bought the property off McIntosh 36 years ago (c.1975).
- The largest and downslope shed is reported to have been disassembled and moved from Port Kembla where it had been used for processing immigrant workers after the war.

Figure G.96 General context view of *Hillview* homestead group, looking SW

Figure G.97 View of *Hillview* homestead group, looking NE

Figure G.98 1959 photo of *Hillview* homestead group, looking NE , enlarged area shown in blue) (National Library of Australia photographer R.Reeves pic-vn4590232)

Figure G.99 View of western side of the *Hillview* homestead, looking NE

Figure G.100 View of eastern front corner and verandah of original homestead building

Figure G.101 View of back (northwest facing) portion of homestead, showing veranda infill and skillion additions, looking S

Figure G.102 Ceiling boards and exposed timber frame joinery and vertical slabs on wall and around four pane window (room over back stairway)

Enhanced detail showing circular saw marks on wall slabs

Figure G.103 Typical internal detail of exposed wall framing above door in central hall

Figure G.104 View along central hall toward front door, showing exposed framing around doors

Figure G.105 Internal view of kitchen wing, looking NW, note large kitchen hearth and chimney, Keith Bowden at table

Figure G.106 Rough sandstone wall foundations under original portion of homestead

Figure G.107 Sandstone pillars supporting later northwestern addition to homestead

Figure G.108 Detail of large fig trees planted along western side of homestead

Figure G.109 Context view of rear outbuildings, looking SE near Broughton Mill Creek bank

Figure G.110 Front of downslope shed, built using components from a Port Kembla shed used for processing immigrant workers

Figure G.111 Detail of internal wooden frame in downslope shed

Figure G.112 View of king truss used to support roof in downslope shed

Figure G.113 View of reused vertical wooden slabs and sawn horizontal boards within a smaller shed adjacent to the large downslope shed

Figure G.114 Extract from 1890s map of the northern Berry Estate, showing four buildings at the location of *Hillview* (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.115 Detail of 1958 aerial photo showing original 'L' configuration of homestead with addition of lounge room on northwestern corner

Figure 6.116 Extracts from 1958 and 2006 aerial photography showing little change in the number and configuration of buildings. Apart from the two fig trees, the garden development largely post dates 1960 (SH.I Dapto-Ulladulla Run GK11 699-5035 23/07/1958; Google Earth Pro 2006)

Recording ID: G2B H25 **GDA Map Reference: 293762.6151623**

Name/Description:	***Sedgeford* homestead and grounds**	*Cadastral Location*:	Lot 1 DP 593476
		Street address:	A495 Princes Highway, Broughton Village
Item/Site Type:	Early twentieth century homestead and garden		

Context/setting: Homestead and garden are located on the crest of a prominent spurline situated at the southern end of Broughton Village. The current Princes Highway forms the southern boundary of the item. A disused, pre 1936 highway alignment (G2B H26) forms the eastern boundary, and former 'front' of the property and garden.

Description/fabric: Federation weatherboard homestead, built 1902, sandstone footings, original home had veranda on three sides of house, verandas subsequently filled in on northern (side) and western (rear) sides.

One double fire place located on internal wall between north facing rooms.

Room walls originally had hessian lining with wall paper over the hessian.

Originally five bedrooms.

Hall includes original ceiling and wall.

Internal walls either use sawn vertical boards (approx. one foot wide), or horizontal boards (approx. seven inches wide).

All hardwood pit sawn off property.

Cypress or pine floor boards.

Verandas subsequently filled in on northern and western side.

New veranda added to southern side of house.

New Kitchen: sawn wooden frame with fibro cladding.

New back (western) entrance added in last 60 years.

One internal wall (NE front room) and two formerly external walls (northern veranda) removed, additional exterior doors added, esp. on S side of house, new kitchen building added to SW corner.

A separate cottage built in the 1980s uses recycled former building elements from the property, including vertical slabs, originally cut on property, but recycled from a number of previous structures.

Cement dairy building built in 1936.

Homestead is supplied with water from a natural spring located to N of homestead on opposite side of valley.

Garden and grounds include the following mature tree plantings:

- Podocarpus (‘Brown Pine”).
- Jacaranda.
- Araucaria “Norfolk Island Pine”.
- Araucaria “Bunya Pine” (2).
- Casuarina “River Oaks”.
- Grevillia “Silky Oak”.
- Cedrus “Indian Cedar”.
- Oak.
- Maple.
- Brachychiton “Illawarra Flame Tree’.
- Tristania.
- Ficus (five mature trees, at least two types, including “Moreton Bay Fig”).

Dimensions: The original 1902 homestead, associated plantings, grounds and location of former outbuildings occur within an approximate area of 200 x 100 metres

Homestead: approximately 22 x 14 metres

Physical condition: Original homestead is an active home, and in good condition and well maintained.

Garden and grounds in good condition with many original tree plantings providing a high canopy

Integrity: Homestead includes many original features and fabric but has been modified with small additions, infilled verandas, and removal of some internal walls.

Front garden includes original highway frontage and remnant highway alignment (disused from the 1930s)

Associated features: The *Sedgeford* homestead forms part of a complex of recordings which, as a group, have value in understanding and interpreting the evolution of the Princes highway, its various alignments, and its interrelation with adjoining land holdings and homesteads. These recordings are:

- G2B H27 remnant section of 1856 Berry Estate Road.
- G2B H26 remnant section of 1870s – 1930s Highway (“Binks Corner”).
- G2B H52 potential archaeological deposit of former Berry Estate tenant farm.

Current use: residential home

Heritage listings: No current listings

Reportedly previously listed on Shoalhaven LEP Heritage schedule in the 1990s and subsequently unlisted by the Shoalhaven Council in late 2006 (NOHC 2009b & c, AECOM 2009, *South Coast Register* 11 July 2007).

Historical background/interpretation:

Unless referenced otherwise, the following information was provided by Mrs Margaret Binks (born 1928), during interviews on the 18 Aug 2008 (NOHC 2009b & c) and 18 March 2009).

Thomas Binks (1841 – 1926), was born in Sedgeford, Norfolk, England and arrived at Port Kembla in 1860 aged 19. He married Mary Hetherington (1836-1921), born Irvinestown, Fermanagh, Ireland (Cowling no date).

The name, T. Binks, presumably Thomas Binks, is listed on an 1890s map as the tenant farmer of 128 acres of upper catchment slopes, situated 500 metres to the northwest of the Sedgeford homestead (Figure G.120). Following the break-up of the Berry Estate around the turn of the twentieth century, the *Sedgeford* property was taken up by Thomas and Mary who established a dairy farm on approximately 200 acres. Cowling (no date) states that the sale occurred in 1899 and involved 700 [200?] acres and cost 3324 pounds.

The *Sedgeford* home, named after Thomas's birthplace, was constructed in 1902, and built by Sandy Johnston, a local builder. All the timber needed for construction was sourced and pit sawn on site (Cowling no date) and has remained in the same family (occupied by six generations) since that time (SFHS 2003: v.1 p58). The Binks' had eleven children, the eldest son (John ["Josh"], 1866 - 1929) was the father of the husband (Alfred John Devire Binks 1916 -) of the current resident, Mrs Margaret Binks (Margaret Binks, oral history interview August 2008). All of the daughters were married in the front room of the homestead.

Thomas is believed to have travelled to England in 1906 to learn cheese making and subsequently made cheese at Sedgeford, including flavoured cheeses. There was a single cheese room (to the south of the Dairy) which had walls packed with charcoal to assist in maintaining a constant temperature. In addition, there were milk and cream rooms. Cheese production had ceased by the 1940s and the associated buildings had also gone by this time.

Many of the original family made a lasting contribution to the local and wider community. John ('Josh") Binks (1866 – 1929), eldest son of Thomas and Mary, was a prominent local dairyman and cattle breeder, and was a long standing alderman of the Berry Council. He also served as Mayor for a period (SFHS 2003). When he died in 1929 he was described as one of the oldest members of the Agricultural Society, and a past President (Sydney Morning Herald 14 Sep 1929 p18).

Alfred Noble Binks (1873 -1953) another son of Thomas and Mary, was a Member of the NSW Legislative Council from 1932-1934. He also assisted in the founding of the Better Farming League in 1943; was a chairman of directors of the Berry Rural Co-operative Society from 1928 until 1953; director of Dairy Farmers Co-operative Milk Company from 1923; president of South Coast Butter Factories Association; member of Primary Producers Union, president of Illawarra District Council, New South Wales vice president from 1936 until 1943; chairman of Dairy Council (1932); assisted to found the Kiama Animal Health Centre; and was president of the Berry Agricultural and Horticultural Association (Parliament of NSW website).

The original plantings in the property grounds were selected from, and sourced from the Yates catalogue around 1903. One of the grandchildren of Thomas and Mary, lived to be 107 and could remember planting some of the trees when she was 4 years old.

Two former weatherboard houses have been moved from the site and re-positioned on Fern Street, Gerringong. One of these was built for John ("Josh") when he was married. It was located in the NE corner of the homestead grounds. The remains of the hearth are still evident in the grounds.

A homestead of similar age to *Sedgeford*, owned by the brother of an owner of Sedgeford is reportedly situated on an opposite property (pers. comm. John Flett, Shoalhaven City Council, 6 Feb 2008).

The Binks family dairy farm began as a Berry Estate leasehold of 50 acres, which upon the breakup of the Estate was purchased and then added to, with purchases of adjacent blocks, to form a farm of around 196 acres. In the 1970s the majority of the holding was sold off, leaving just the original homestead and grounds on a 5 acre Lot.

A remnant of the original road (prior to the later nineteenth century alignment, located adjacent to the eastern boundary of the homestead grounds), can be seen on the opposite (northern) side of the valley, above the later nineteenth century alignment). Prior to the construction of Sedgeford, it is remembered that this original road passed to the west of homestead site, west of the current Dairy building (a memory of Mrs Binks' husband's father).

The *Sedgeford* homestead and grounds were reportedly withdrawn from consideration for inclusion in the 2007 revision of the Shoalhaven City Council Heritage Schedule due to objections raised by members of the owner's family (pers. comm. John Flett, SCC., 6 Feb 2008). Margaret Binks states that she assisted the Council in registering the property in the 1990's and that it was deregistered late in 2006 (oral history interview August 2008, in NOHC 2009b & c, AECOM 2009). A local newspaper article at the time reported that the withdrawal was because "its listing might inhibit the proposed Princes Highway upgrade between Bomaderry and Gerringong" (South Coast Register July 11 2007).

Figure G.117 A glimpse of the Sedgeford homestead and grounds looking southwest

Figure G.118 The eastern front of the Sedgeford homestead (Cowling no date)

Figure G.119 Floor plan sketches of original and current homestead configurations made by Cowling (no date; additional details added in blue)

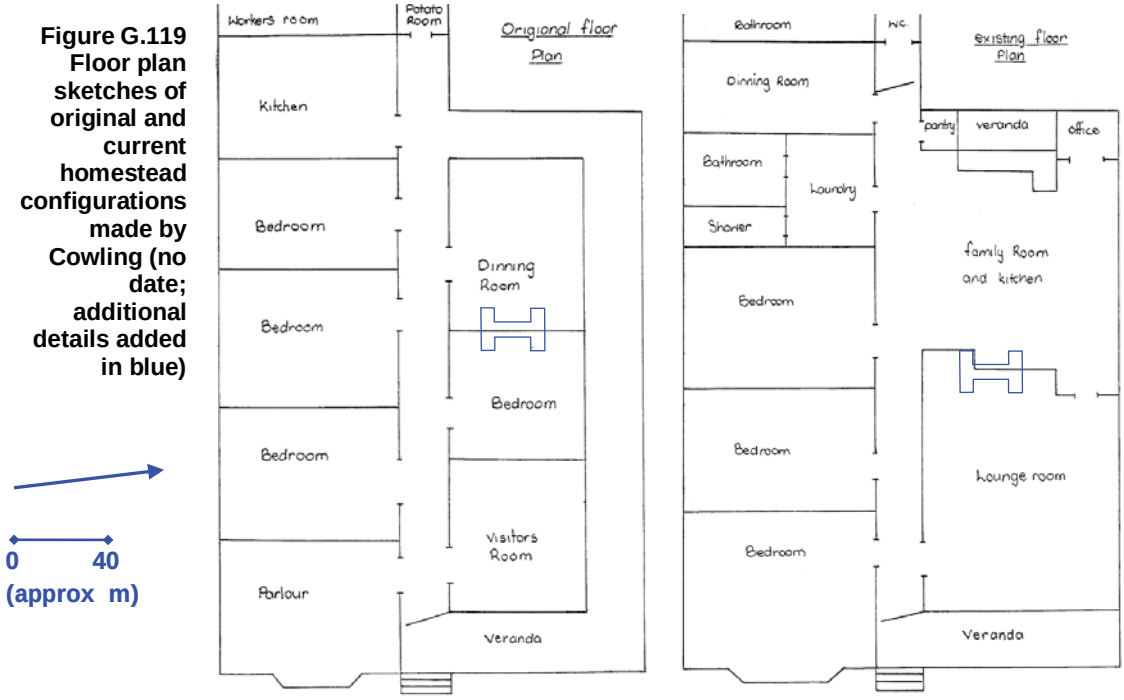

Figure G.120 Extract from 1890s map of the northern Berry Estate, showing the original Binks leasehold farm (top left) and location of 1902 (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.121 Aerial image (2007) of Sedgeford and associated plantings and grounds. Note changes in out-buildings (Google Earth Pro 2011)

Figure G.122 Aerial image of Sedgeford and associated plantings in 1958 (SHI Dapto-Ulladulla 697-5105, Run GK10 10/07/58)

Recording ID: G2B H28		**GDA Map Reference:**	**294107.6151865**
Name/Description:	***Brookside* homestead**	*Cadastral Location*: *Street address:*	Part Lot 1 DP 919179 A540 Princes Highway Broughton Village
Item/Site Type:	Early twentieth century homestead		

Context/setting: Homestead and associated existing and former outbuildings are situated on flats and basal slopes on the west bank of Broughton Creek, in the southern portion of Broughton Village. A small tributary streamline approaches the homestead from the west. The homestead is located on the basal terminal slopes of a low spur between Broughton Creek and the tributary stream. A former orchard was located on creek flats to the south of the homestead.

Description/fabric: This recording consists of a grouping of elements, including existing buildings, former building remains and platforms, any associated archaeological deposits, and traces of a former orchard.

The Brookside homestead building was constructed by combining two salvaged structures from separate and unrelated local sites. Both are wooden frame and horizontal weatherboard clad structures. The front portion of the building, which is identifiable by the north facing veranda and single gable roof aligned northeast – southwest (Figure G.125), was recovered from a homestead site 570 metres to the northeast (G2B H59). This site appears to be the original occupation site for portion 181, a grant of 100 acres to Antony Finn in the 1830s. This structure now consists of three rooms, however the roof structure suggests an original configuration of four rooms (pers. comm. 20/09/2011 Mrs Chittick).

The back portion of the homestead has two parallel gable roofs, aligned at right angles to the front roof line. A side, east facing veranda and brick chimney may have been added when the structure was installed at the current site. The former location of these back buildings prior to relocation is not known but presumed to be local.

Features of the homestead include one brick chimney at SE end of homestead, paling fence around front homestead enclosure, corrugated iron roofs, sandstone foundations.

A recently constructed residential cottage constructed using timber frame and recycled vertical wooden slabs, (possibly from former on-site outbuildings, Figure G.132) is located behind the main homestead, in the location of a similar sized former structure, evident in 1958 aerial photography (Figure G.136).

Two detached weatherboard garages, one adjacent to the homestead, the other closer to the highway (Figure G.130).

One long horizontal weatherboard storage shed (open on one side), which appears to incorporate structural elements and a former dairy (the back wall now partly clad with corrugated iron). A small outbuilding at the W end of the shed houses an *in situ* copper (heating basin) (Figure G.129).

Immediately behind (south of) the storage shed, an elevated former building platform, with cement footings, *in situ* wooden poles, surface drains , and sandstone retaining walls probably constitute the remains of a former dairy complex (Figure G.130).

	A former structure is also indicated by a low earth rectangular platform and low, downslope retaining wall, on elevated basal slopes on the south side of the tributary stream southeast of the homestead (the platform is within SW corner of the defined area of the heritage recording). Remnant paling and four rail wooden fencing survives around the yards and enclosures behind homestead (Figure G.131). The area of a former orchard is evident on the creek flats south of the storage shed. The remains of a water pump, cement slab and small shed are located at the northern edge of the former orchard (Figure G.133).
Dimensions:	The existing buildings and the remains of former structures and yards are present within an approximate area of 150 x 150 metres.
Physical condition:	Homestead is an active home, and in relatively good condition. Some outbuildings are run-down and require maintenance or repair. Some former structures now evident as traces only. Fencing around homestead and yards is dilapidated in places.
Integrity:	The homestead retains an early twentieth century character but has been subject to some modifications, and the current format relates to multiple periods of installation, renovation and maintenance. The identification of original features of the front portion of the homestead, those that may relate to its construction and occupation when located at G2B H59, would need to be the subject of a detailed analysis. Potential original features include parts of the veranda, some windows, the internal frame and some of the weatherboards. Some obvious later additions and changes include, the installation of French doors, brick pillar bases for the veranda posts, and decorative cast iron brackets (interior not inspected). The former Dairy building has been modified considerably, although the separate small building, housing an *in situ* copper, at its western end, appears original.
Associated features:	The homestead*,* original outbuildings, and former building platforms (one at SW corner of defined recording area), all form part of this recording
Current use:	residential home and associated farm buildings
Heritage listings:	no current listings

Historical background/interpretation:

The following information was provided by Mrs Helen Chittick (born 1936), during interviews on the 23 Sep 2008 (NOHC 2009b & c) and 18 Feb and 20 Sep 2009. Additional information was provided by Scott and Stuart Chittick.

The *Brookside* property has been owned by members of the Johnston family since the early twentieth century. The current owner, Mrs Helen Chittick, was born at *Brookside* in 1936, as was her father in 1905. Her grandfather, Gerard Johnston owned the property at the time of her birth. He had previously rented the land from the Berry Estate prior to its purchase by the Johnsons. In the 1890s the lease holder of the approximately 80 acre property appears to have been a T. Connors (Fourth Edition Broughton Parish Map 1890s).

The core of the homestead consists of two earlier nineteenth century structures, which were disassembled and transported from other locations. One was built by Mrs Chittick's great grandfather, another has a connection to the Stewart family. The front section of the homestead originally stood at G2B H59. It was purchased from the Stewarts, dismantled in sections, dragged using horse drawn skids to the present site of "Brookside" and re-assembled in its current position. This portion of the home now consists of three rooms, however on an occasion when an electrician was working in the roof he commented that the structure of the roof suggested that the front room may originally have been made up of two rooms.

The cremated remains of a good friend of the Chittick family, Mr Ray Barter, were scattered and memorialised at a small plot and planted tree, located on the property, some 240 metres upstream of the homestead at the foot of a low escarpment (Figures 6.133 and 6.134). A Buddhist monk performed the ceremony. Ray died on 11/11/1996. Ray used to periodically camp on the creek bank at this location when he was a boy, often with William Chittick (the current owner's late husband). Barter and his wife lived at Heathcote Sydney.

Figure G.123 General view of *Brookside* homestead, looking N

Figure G.124 View of *Brookside* homestead, looking SE

Figure G.125 Detail of front of *Brookside* homestead, looking SW. The front section of the homestead was originally located at G2B H59 and re-constructed at the present site to form *Brookside*.

Figure G.126 Front verandah and yard, looking E, enlarged detail of left hand door (inset)

Figure G.127 Detail of eastern side of homestead, looking S

Figure G.128 Separate garage adjacent to homestead, looking S

Figure G.129 Storage Shed incorporating elements of a former dairy, looking SE

Figure G.130 earth platform behind (south of) storage shed, with cement footings, drains, *in situ* poles and sandstone retaining wall, probably indicative of a former dairy complex, looking E

Figure G.131 remnant four rail fencing behind homestead, looking NE, (new timber cottage in background)

Figure G.132 New timber cottage, with re-used vertical timber slabs, looking SE

Figure G.133 Remains of a water pump and shed at the edge of a former orchard area (behind pump), looking SW

Figure G.134 Memorial tree planting and location of cremated remains of Mr Ray Barter, looking SW. Detail of collar of Mr Barter's dog, who's remains are also here

Figure G.135 Aerial image of Brookside and associated features (ACD15 NSW 3108-197 8/11/92)

Figure G.136 Aerial image(and enlargement) of Brookside and associated features in 1958, note former orchard and pump house south of homestead, out building/cottage(?) behind homestead, and small structure on opposite side of tributary west of the orchard (SHI Dapto-Ulladulla 697-5103, Run GK10 10/07/58)

Recording ID: G2B H29		**GDA Map Reference:**	**294861.6152838**
Name/Description:	**Princes Highway**	*Cadastral Location*:	Princes Highway easement
	Broughton Creek Bridge **(RTA Bridge no.704)**	*Street address:*	Princes Highway Broughton Village
Item/Site Type:	Twentieth century (1935 & 1994) concrete beam bridge		

Context/setting:	Bridge forms the current Princes Highway carriageway and spans Broughton Creek, at Broughton Village. The valley floor is characterised by extensive flats, terraces, drained swamp basins, minor flood channels and adjacent, low gradient, basal slopes.
Description/fabric:	This concrete bridge is a widened structure of three longitudinal beams which are simply supported at the central pier and curve down to frame compositely with the abutment walls. Each span has a cross girder at the pier. Widening of the bridge has been effected by means of attaching cantilever deck to each side of the bridge. These cantilevers are supported by small composite cantilever beams which are tapered upward from the main beam. To assist in distributing the twisting effect of loads outside the main beams coming through the cantilevers, three rows of steel struts per span brace the main beams. The new deck edge supports a kerb and Thriebeam style guard railing (RTA S170 citation). The central pier has two columns which frame into a cross girder which has a wider upper section to accommodate the two simply supported decks. The abutments, of wall type, have been extended to accommodate the new deck width, and gabion box walls have been used to stabilise the abutment fill (RTA S170 citation). The bridge was originally constructed in 1935, and widened in 1994
Dimensions:	Approximately 40 metres long and 15 metres wide
Physical condition:	very good condition
Integrity:	Good. Although widened in 1994 this bridge retains the capacity to demonstrate the key structural and aesthetic characteristics of reinforced concrete beam bridges of the period 1925-48.
Associated features:	Approximately 50 metres south of the bridge, a two cell cast in-situ box culvert services an overflow channel of the stream. This has had its endwalls and wingwalls raised to allow for increased formation width
Current use:	Highway bridge
Heritage listings:	Listed on the RMS s170 Heritage and Conservation Register (item no. 4309596), as an item of local significance with historical, aesthetic and representative values

Historical background/interpretation:

The concrete bridge was constructed in 1935 as part of a bypass of Broughton Village. It replaced a timber truss bridge on the old highway alignment (650 metres upstream), which was probably constructed in the 1890s. In the 1950s the old timber truss bridge was still in use by landowners, as part of the private access routes to their properties. Its demolition occurred subsequent to this time.
This crossing of the Broughton Creek corresponds with a ford location on perhaps the earliest European pathway along the valley floor, shown on a 1860s County map (refer Figures 6.216 and 217).

Figure G.137 General view of bridge from upstream west bank

Figure G.138 General view of central pier, longitudinal beams and cantilever supports for widened deck

Figure G.139 General view of road top and approaches to bridge, looking NE

Figure G.140 Aerial image (2007) of bridge (Google Earth Pro 2011)

Figure G.141 Aerial image of bridge in 1958 prior to widening (SHI Dapto-Ulladulla 697-5101, Run GK10 10/07/58)

Recording ID: G2B H45		**GDA Map Reference:**	**292662.6151257**
Name/Description:	***Glenvale* homestead former Berry Estate Tenant Farm**	*Cadastral Location*: *Street address:*	Lot 12 DP1098617 A371 Princes Highway Broughton
Item/Site Type:	Mid Nineteenth Century Homestead		

Context/setting:	The homestead is located on the floor of a minor and unnamed tributary valley which drains in a south easterly direction into Broughton Creek. The valley forms part of the northern fall of the Broughton Creek catchment. The homestead is situated between two nearby drainage lines, and 700 metres upstream from the confluence with Broughton Creek.
Description/fabric:	Vertical (sawn) slab homestead with hipped roof (corrugated iron) and five original rooms on a revered 'L' shaped plan with kitchen forming back wing. Other features include: • Verandas around all sides of building. Only the front verandah (facing SE) is considered by the owners to be original, the others having been added at a later date. • Two brick chimneys, made of sandstock bricks, rendered and detailed to resemble ashlar, one on eastern side of main front building, and one on eastern wall of kitchen wing. • Symmetrical Victorian Georgian front with central French doors and 2 x 2 sash windows on either side (Shoalhaven Heritage Inventory). • Vertical wall slabs have been sawn using a circular saw. • Central hall with two rooms on either side, kitchen on side wing. • Exposed timber framing around external and internal doors, and windows, with verticals extending to ceiling. • Rafters sit on ceiling joists (rather than a wall top plate). This is a style of construction suited to shingle roofs and went out of style in Sydney in the 1840s but probably persisted in regional areas (pers. comm. Mr Phil Bragg owner, based on inspection of roof space by John Tropman ARAIA 23/09/2011).
Dimensions:	Approximate building dimensions (including verandas): 27 x 30 metres
Physical condition:	Good, some deterioration of timbers evident (detailed inspection not made)
Integrity:	This building appears to have a relatively high degree of integrity. According to the owners, the verandas, on all but the front aspect (SE) have been added. Some fittings such as doors are modern additions or replacements.
Associated features:	Remnant alignments of the 1856 Berry Estate Road occur to the south and southeast of the homestead (G2B H22 & 23).
Current use:	Private residence on active farm.
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7 Shoalhaven Heritage Inventory

Historical background/interpretation:

The construction date for this homestead is thought to be around 1860. This is based on construction techniques, an oral history reference to a woman living at Glenvale in the 1870s and the first documentary record being in 1889 (pers. comm. Mr Phil Bragg, owner 23/09/2011).

The owners have been advised that the construction of the kitchen as an integral wing of the main building (rather than as a separate structure attached by a breezeway), follows a Scottish tradition which allowed better use of the kitchen's warmth. It reportedly is a characteristic of the Berry Estate tenant farms (pers. comm. Mr Phil Bragg, owner 23/09/2011, quoting advice from Mr John Tropman ARAIA).

A 1890s map of the northern portion of the Berry Estate (probably dated 1892, refer Graham 1998), shows a W. Fletcher as the tenant farmer in residence. Five buildings are shown on the map, the existing homestead appears to be shown on the right and a long out-building to the back left (Figure G.145).

William Fletcher presumably went on to purchase the farm. The Shoalhaven Heritage Inventory notes that Fletcher resided here for many years before moving to Jaspers Brush in the late 1890s (Shoalhaven Heritage Inventory).

A William Fletcher (born 1833 Drumadravey, Co. Fermanagh, Ireland) is noted to have arrived in Australia in 1864 on the *Sirrocco*. He married Rebecca Keys in 1867 (registered at Newtown). One daughter Mary Jane was born in 1880 (Berry). He died in 1909 at Jaspers Brush aged 76 (www.rootsweb.ancestry.com /~nswgdhs/12720.htm; SFHS 2003:187).

In 1914, the property became part of the Closer Settlement Promotion Act (1910) as portion 247 (Settlement purchase 14.3) and reverted back to the crown prior to being allotted to Ronald Hollands (5th Ed parish map of Broughton, Parish preservation project ID no. 13803901). The Closer Settlement Promotion Act allowed three to five discharged soldiers to purchase privately owned land under agreement with the vendor with the terms to be approved by the Minister of Lands. Under the 'promotion scheme' the land was subsequently occupied as a 'Settlement Purchase'. The provisions of the Closer Settlement Act 1910 under which many of these soldier settlers applied for land was extended by Section 4C of the Returned Soldiers' Settlement Act 1916.

Hollands did not achieve freehold title. The holding was transferred to Edith Coates in 1922, and then to two brothers Harold and Cyril Couzens in 1927. In 1939 the property was owned by Cyril Ernest Couzens. The property was later leased to Phil Bragg's father, who later purchased it in 1956, three years after Cyril's death (aged 50) (Sydney Morning Herald 17 Aug 1953 p.12). Phil purchased the property from his father in 1979 (pers. comm. Mr Phil Bragg, owner 23/09/2011)

Figure G.142 General view of front of Glenvale homestead in 1999 looking NW (Shoalhaven Heritage Inventory)

Figure G.143 View of southern side of homestead and storage shed, looking SE

Figure G.144 Detail of southern side of homestead, looking NE

Figure G.145 Extract from 1890s map of the northern Berry Estate, showing four buildings at the location of *Glenvale* (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.146 Detail of 1958 aerial photo showing reverse 'L' configuration of homestead

Figure G.147 Extracts from 1958 and 2006 aerial photography showing Glenvale homestead complex and replacement of out-buildings in same arrangement (SH.I Dapto-Ulladulla Run GK11 699-5030 23/07/1958; Google Earth Pro 2011)

Recording ID: G2B H47

GDA Map References
Convent: 288660.6149702
Church: 288688.6149694

Name/Description:	**former St Patrick's Convent, St Patrick's Church, and grounds**	*Cadastral Location*:	Lot 1 DP86897
		Street address:	80 North St Berry

Item/Site Type: Former Roman Catholic Convent (1921) and Interwar (1936) Church and Grounds

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Context/setting: This grouping including the St Patrick's Church, former Convent, and grounds is located on a large square block of around 7.6 hectares which extends between Albert St in the south, and North St to the north. The site is situated on level ground, 50 metres northeast of Town Creek, a small tributary which traverses diagonally across the Berry township area.

Description/fabric: *St Patrick's Convent (constructed 1921)*

The style and form of this building is characteristic of late nineteenth and early twentieth century ecclesiastical architecture throughout the Shoalhaven District (Shoalhaven Heritage Inventory).

Two storied building constructed of fairface brick with tiled hipped roof and gabled projection. The two storey verandah runs along two sides of the building from the gabled projection. Open eaves. Windows overhung sash with single large lights set in openings with brick soldier arches and brick sills. Gable decorated with battened fibre cement panels in similar manner to the detailing employed for the verandah balustrade/frieze.

Mature landscape/garden setting.

St Patrick's Church (constructed 1936)

This building has been described in the following way by George Adams (a Sydney based architect with GM Adams & Associates, who has designed many religious buildings):

> "the building has a Romanesque quality with Gothic Revival style windows. This building would possibly be the finest example of brickwork in the Illawarra... this was the first building in the Illawarra-Shoalhaven to express 'modern' materials with concrete coping and quoins revealed on the outside facade." (in Faherty accessed 2011).

The building features include:

- Small or relatively small windows in comparison to the wall proportions (providing a Romanesque character).
- Gothic arched windows.
- Decorative brickwork above windows and recesses (shaped bricks are used to form hood mouldings over doors and windows, to deflect driving rain running down the face of the building into the window).
- Surface wall patterning created using colour variation in brickwork bond.

	• Concrete coping and quoins revealed on the outside façade.
Dimensions:	Convent: approximately 15 x 10 metres
	Church: approximately 24 x 15 metres
Physical condition:	Both buildings in excellent condition
Integrity:	Convent: Verandas formerly partially enclosed at first and ground floor levels, these additions now removed. Upper storey windows inserted into north facing wall, possibly as part of 2003 renovations. New ground level brick connection in northern wall to new Church centre.
	Church unchanged since construction.
Associated features:	-
Current use:	The former convent building is now part of the Church Centre and made available for Church related conferences, accommodation needs, retreats and functions
Heritage listings:	Both the Church and the Convent building are listed on Shoalhaven LEP 1985 (as amended) Schedule 7
	Both the Church and Convent are included in the Shoalhaven Heritage Inventory

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Historical background/interpretation:

The following outline is sourced primarily from Faherty (2011) and Lidbetter (1993).

The first baptism recorded in the Broughton Creek parish register was in 1862. The following year the first resident Catholic priest arrived in the Shoalhaven District. By 1866 a small chapel had been constructed on the east side of Broughton Mill Creek (opposite to the current Mananga homestead). By 1872, Mass was being celebrated at both Broughton Creek (Berry) and Coolangatta. A report in 1880 described the condition of the chapel as poor and soon to be replaced. Following the formal survey of the new town grid, west of the creek, in 1883, a new church was built on the present site in 1884. It was a wooden frame and horizontal weatherboard building with an iron roof. The site was donated by David Berry.

The 1884 building served as both church and school until the Sisters of Saint Joseph came to reside in 1891. A six room wooden cottage was purchased adjacent to the church and served as the first convent.

A convent was constructed adjoining the church in 1921. This replaced the older cottage which was then sold and transported to Queen Street, Berry. A priest's apartment was attached to the new building at the rear (Figure G.150).

The foundation stone for the present church building was laid by the Rev. Michael Sheehan Co-Adjutor Archbishop of Sydney on 24 November 1935. It was completed the following year in May and situated parallel and just northeast of the 1884 church building. The church was designed by Clement Glancey (Sydney) and the builder was H.A.Taylor (Concord). The contract price for the building was 3,000 pounds, with an extra 500 pounds allocated for furnishings.

The old church continued to be used as a school until 1954 when a new school was constructed on the opposite side of Albert St.

Following declining enrolments and government rationalisation policy in the 1970s the school closed in 1978. The almost 90 year community presence of the Sisters of St Joseph also ended with the school's closure.

The school building subsequently served as a Church Centre and Hall, but the former school grounds were eventually sold in 2001 for residential development. The old school building was relocated and donated to the Berry Public School. Funds from the property sale went towards the construction of a new Church Centre situated directly behind, and connected to the old convent building. This was completed in 2003 and designed by Irwin architects and built by Peter Rein. The convent building was renovated as part of this new infrastructure program.

Figure G.148 General view of front of St Patrick's Convent building, looking N

Figure G.149 Front view of St Patrick's Convent in 1999, looking N (Shoalhaven Heritage Inventory)

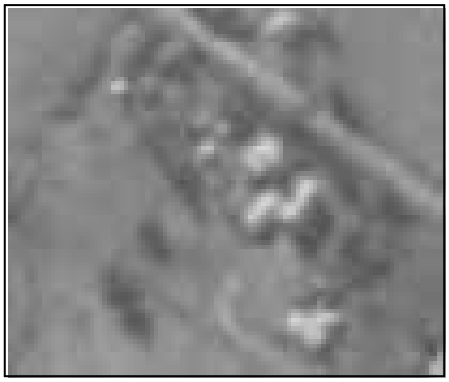
Figure G.150 Rear view of the convent building (date unknown) showing the adjacent priest's quarters (now demolished) (Faherty accessed 2011)

Figure G.151 Recent view of rear of the convent building showing the adjacent 2003 Church Centre (Faherty accessed 2011)

Figure G.152 Front view of St Patrick's Church, looking N

Figure G.153 Rear view of St Patrick's Church, looking S

Figure G.154 Church grounds (blue) in 1949 (below) and 1958 (right) aerial photo extracts (SH.I Dapto-Ulladulla Run GK11 699-5038 23/07/1958)) (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949



Note presence of 1880s wooden church between convent and current church building

Recording ID: G2B H49 **GDA Map Reference: 289727.6150118**

Name/Description:	***Oakleigh* Farmhouse**	*Cadastral Location*:	Lot 7 DP815023
		Street address:	59 Woodhill Mountain Rd Berry
Item/Site Type:	Inter War Bungalow Style Farmhouse		

Context/setting:	This 1930s farmhouse is located on locally elevated level ground within the valley floor flood plain of Bundewallah and Broughton Mill Creeks. It is situated more or less equally distant between the two creeks 250 metres away to the south and east.
Description/fabric:	Inter war farmhouse with corrugated roof (projecting gables at SE and NW corners) and encircling verandah to three sides (west, north and east [front]). Fibro cladding to front gable, cement rendered chimney to front room. The inclusion of many pre 1930s architectural elements (such as 2 x 6 pane sash windows), reflects the use of recycled components, and may relate to the use of transported buildings sourced from the Commercial Hotel (refer background section). Outbuildings include twin concrete silos and associated shed. A new separate cottage has been constructed over the foundations of a former dairy.
Dimensions:	Farmhouse: approximately 16 x 14 metres The farmhouse, associated plantings, grounds and location of current and former outbuildings occur within an approximate area of 180 x 100 metres
Physical condition:	Farmhouse in excellent condition. Roof and chute cladding on silos now dilapidated. No clear surface indication of original tenant farm structures remains, however archaeological deposits may exist.
Integrity:	The farmhouse retains its original 1930s configuration, however interior changes to dividing walls etc may relate to later renovations.
Associated features:	G2B H13 Overseer's Cottage for the Burnett Estate
Current use:	Private farmhouse residence
Heritage listings:	Shoalhaven Heritage Inventory No current statutory listings

Historical background/interpretation:

The following information is based on information presented in the Shoalhaven Heritage Inventory.

An 1890s map of the Berry estate lists Robert Virture Boyd as the tenant farmer of 172 acres, which included the land later known as *Oakleigh*.

R V Boyd was a member of the Boyd family that migrated from Donegal, Ireland in the 1860s and settled in the Woodhill and Broughton Vale areas. He was a Justice of the Peace and Mayor of Berry for the years 1894, 1895 and 1896. In 1898 he was reported to be leaving the district to take up farming activities on the Hunter. In 1911 he owned land along Broughton Creek south of Berry.

In 1912, former Lot 47 (DP4497), situated immediately south of the *Oakleigh* farmhouse land (former Lot 48), was purchased from the trustees of the Berry Estate, by Alexander Burnett, This formed part of a large Burnett holding extending between North Street and Bong Bong Road. These holdings were purchased by himself and other family members at around the same time (Lots 38-41, 43-46 and 50 DP4497, Refer Figure G.80 and G2B H13). One of those family members was Alexander's sister Alice, who married Sir Joseph Carruthers, was a friend and business associate of Sir John and Alick Hay, Secretary for Lands 1899, Premier of NSW 1904-1906 and instrumental in the passing of the David Berry Hospital Act.

It is unclear, but assumed by the existing historical documentation, that the Oakleigh homestead (on former Lot 48) also formed part of the Burnett land holdings (Shoalhaven Heritage Inventory).

From 1914 to 1921 the McGee family managed the Burnett property. They milked 80 cows of mixed varieties. There was an orchard with loquats and apples. Burnett visited regularly to pay the family and check the property. He paid Mr McGee six pounds per week out of which the two sons received 10/- each.

Sometime in the 1930s the original tenant farm homestead burnt down to its foundations.

Josiah Masters who was the owner of a Bundewallah farm bought the property in 1938 for his two sons and sons-in-law. The house had burnt down when Master purchased the property so he purchased two rooms from the Commercial Hotel that was being renovated and used them in the construction of a new home. A large fig tree (*Ficus oblique*) growing by the former dairy site is thought to have been planted in the 1930s by the Masters' who were interested in gardening. (J & J Robson) (Figure G.160).

The Masters kept stud Ayrshire cattle and farmed there until 1948 when they sold to Jack Pomeroy. Jack also grew crops and made silage. The farm was run by him and his son John. When Jack retired from farming and moved into Berry the farm was taken over by John. He sold off 133 acres in 1990 to the McIntosh family. Phil and Jan Monaghan (nee McIntosh) resided on the property until it was purchased recently by the RMS.

Figure G.155 General view of front of farmhouse, looking W

Figure G.156 View of front of farmhouse, looking W

Figure G.157 View of farmhouse looking SW

Figure G.158 View of farmhouse looking SE

Figure G.159 Detail of southern side of farmhouse looking NW

Figure G.160 Fig tree, thought to have been planted in the 1930s, located adjacent to former Dairy concrete slab looking N

Figure G.161 Extract from 1890s map of the northern Berry Estate, showing the location of tenant farm homestead in the approximate location of the later *Oakleigh* homestead (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Recording ID: G2B H50 **GDA Map Reference: 296794.6152462**

Name/Description:	***Clare Moy* Cottage**	*Cadastral Location*:	Lot 2 DP 626929
		Street address:	342 Princes Highway Toolijooa
Item/Site Type:	Late nineteenth or early twentieth century homestead		

Context/setting:	This cottage is situated on the north side of the Princes Highway, just west of the Toolijooa Road turnoff. It is situated on the upper slopes of a prominent spurline which descends on a south easterly alignment from Toolijooa Ridge
Description/fabric:	Original Georgian horizontal weatherboard cottage with corrugated iron roof, brick footings, with Federation style extension on the southwestern corner of the original building. Verandas on the Eastern (Front) and southern side of building. Corrugated iron exterior wall cladding. Single brick chimney. Separate garage Veranda partially enclosed at SE corner.
Dimensions:	Area within which cottage, garage and immediate grounds occur is approximately 20 x 20 metres
Physical condition:	Homestead is an active home, and in a habitable condition though some elements are run down and require maintenance.
Integrity:	Many details, finishes and individual elements, such as windows and awnings, have been modified or added. Interior not inspected.
Associated features:	-
Current use:	residence
Heritage listings:	no current listings

Historical background/interpretation:

This cottage is situated on the north side of the Princes Highway, just west of the Toolijooa Road turnoff. It may date to the late nineteenth or early twentieth century when a portion of approximately 50 acres was taken up by a B. Fields following the break-up of the Berry Estate (Fourth Edition Broughton Parish Map 1890s). This was part of a larger property divided between two brothers, Bartholomew and James Fields (SFHS 2003:v.2 p.21). The roofline of the building suggests that an original rectangular building of Georgian proportions was later extended to the south and west, probably in the first half of the twentieth century.

Figure G.162 General view looking W

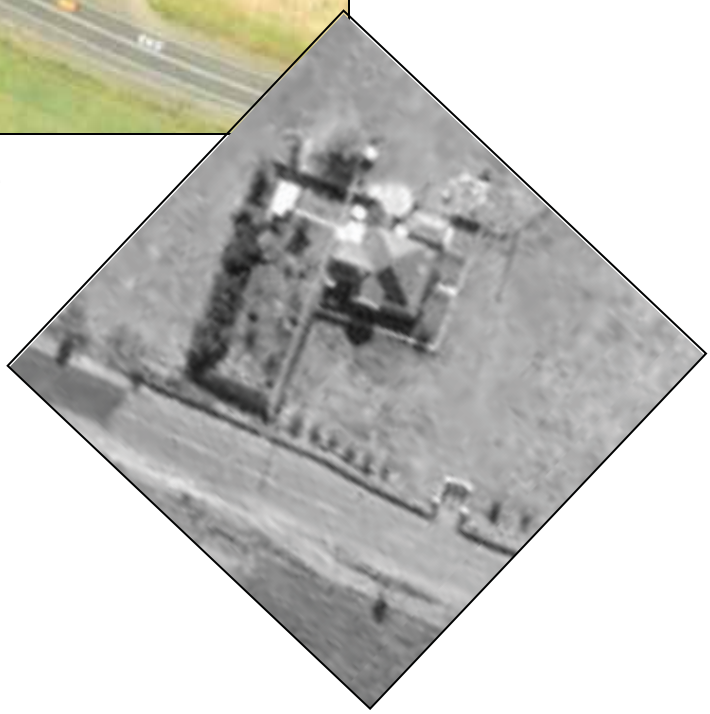
Figure G.163 General view looking NW

Figure G.164 View of Federation style extension at SW corner of building

Figure G.165 Detail of awnings and corrugated iron cladding on N side of building

Figure G.166 Aerial image of cottage (ACD14 NSW 3108-182 8/11/92)

Figure G.167 Aerial image of cottage and grounds in 1958 (SHI Dapto-Ulladulla 697-5088, Run GK9 10/07/58)



Recording ID: G2B H51 **GDA Map Reference: 287479.6148712**

Name/Description:	**Graham Park Former Agricultural Research Station**	*Cadastral Location*:	Lot 50 DP1074441 Lots 88 & 89 DP48603
		Street address:	8, 9 & 13 Schofields Lane, Berry
Item/Site Type:	Twentieth Century (1957) Agricultural Research Station		

Context/setting:	A complex of buildings, laboratories, sheds and enclosures situated at the intersection of Schofields Lane and the Princes Highway at the southern edge of Berry. The facility is situated at the southeastern end and basal slopes of a low spurline near the western margin of the Broughton Creek flood plain (former swamp basin).
Description/fabric:	A complex of administrative and research based buildings, constructed in 1957, (brick, glass, iron sheet, cement), some multiple storey, landscaped entrance grounds, fenced animal enclosures and sheds, circular entrance drive and associated car parks, entrance gates and metal feature sculpture.
Dimensions:	Area within which smaller enclosures and buildings occur is approximately 390 x 360 metres
Physical condition:	Appears to be in good and functional condition (not inspected in detail).
Integrity:	Site remains relatively intact, especially with regard to items considered to have significance including: the administration buildings and laboratories, entrance grounds, circular drive and gates, including the entrance sculpture (Minutes of Heritage Council State Heritage Register Committee 5 Oct 2005 File H99/00007). The original entrance driveway, from the highway was foreshortened as part of the realignment of the Schofields Lane intersection, sometime between 1992 and 2006. These works necessitated the re-positioning of the entrance gates and feature sculpture to their current position just short of the circular drive.
Associated features:	-
Current use:	not known
Heritage listings:	Not currently listed. This site has been the subject of previous discussion by The State Heritage Register Committee of the NSW Heritage Council, and a notice of Intention to Consider Listing (on the State Heritage Register). A site inspection by the Heritage Branch determined that the site was relatively intact and further investigations should take place to explore opportunities for adaptive reuse of some structures. A proposed heritage curtilage was restricted to just the significant buildings (administration and laboratories), entrance grounds, circular drive and gates, inclusive of the sculpture at the entrance. Four submissions were received during the notification period which concluded in December 2005. Beechwood Homes, the then owner, declined to comment but advised verbally that they did not support listing. The owner had a Development Application (DA) to demolish the site. Shoalhaven City Council approved the DA on the condition that significant heritage elements (as proposed for listing) were retained. The demolition approval was not acted upon.

The Heritage Committee was advised in April 2006 that the proposed State Heritage Register curtilage did not include the entire site, but only those areas with significant items, consistent with the DA approval. The Heritage Branch and Shoalhaven Council were both of the view that some adaptive reuse of the site was feasible. The Committee resolved to recommend to the Minister that the item be listed on the State Heritage Register if the Minister considered the item is of State heritage significance.

In September 2006, the Committee noted the Minister's decision to decline to list Graham Park on the State Heritage Register.

(Minutes of Heritage Council State Heritage Register Committee 5 Oct 2005 File H99/00007; 5 April and 6 September 2006).

Historical background/interpretation:

During the last decade of the nineteenth century, when Alexander Hay was the Manager of the late David Berry's 'Coolangatta Estate', a more scientific approach was adopted towards dairying in the Shoalhaven. Following an investigative trip to Europe by Alexander, the Trustees of the Estate erected a state-of-the-art butter factory at Berry and established a select herd of imported pure bred dairy cattle on a stud farm at Coolangatta.

At the urging of Alexander Hay, a Bill was passed through the NSW Parliament to vary the will of David Berry to the extent that a Stud Farm and an Experimental Farm should share in the endowment bequeathed by him for a Cottage Hospital established at Berry. That was agreed upon and a transfer of Port Jackson foreshores belonging to the Estate and judged to be of equal in value to the endowment was satisfactorily arranged. The Crown then assumed the Trusteeship of all three institutions (the Hospital, Stud Farm and Experimental Farm) and established them at Berry (Antill 1982:355).

The Berry Experiment Farm opened near the river beside the road from Berry to Coolangatta in October 1899, being the first of its kind on the coast. This was one of several experimental farms to be established near the end of the nineteenth century, many attracted public funding and developed into research and/or teaching institutions. Another example is the Wagga Wagga Experimental Farm established in 1893. It became an Agricultural College in 1948 and an Agricultural research Institute in 1954 (History of the Graham Centre http://www.csu.edu.au/research/grahamcentre/aboutus/ history.htm).

In 1903, the Government Stud Farm at Berry was described as,

> '…the most important institution on the coast from the dairymen's point of view. It is well situated, and is within two miles of the town. On one side it has a mile frontage to the deep, navigable waters of Broughton Creek, and the new Moeyan Bridge connects it with Berry and the railway' (Town and Country Journal, 11 February 1903).

The Experiment and Stud Farms were co-located on the east side of the Berry - Coolangatta Road (Wharf Road), either side of Broughton Creek, between one and two kilometres south of the present town of Berry.

In the 1920s, a Pasture Research Unit was established off Wharf Road, Berry, by the Department of Agriculture.

The farms continued under the Department of Agriculture until they was taken over by the Child Welfare Department in April 1934. It was remodelled with the provision of a dining room, dormitories and other facilities with cottages to house 40 boys to take farm training. In 1939, additional buildings were added, together with more modern farming facilities.

In the 1970s the Child Welfare Training Farm on Wharf Road was closed and re-opened as a holiday home for the underprivileged and was later transferred to the Department of Sport and Recreation (Bayley 1975:206, Berry Museum 2006:2).

In the 1950s, the first Artificial Insemination Breeding Station (AIBS) in New South Wales was established by the NSW Milk Board at the Pasture Research Unit, Berry.

In 1958, the AIBS was moved to the Graham Park facility which was built in 1957. At this location it occupied a total area of approximately 75 hectares, including bull yards, buildings and a quarantine area from which the semen collection and processing occurred.

The Graham Park research station was the first commercial artificial stock breeding centre in NSW and made major contributions to Australia's stock breeding industry. The centre was named after the Hon. Edgar Hugh Graham who died, the year the facility was built.

Graham was born near Wagga in 1897 and developed long term vocational and financial interests in primary production. He became the proprietor of a large butchery and subsequently founded one of the largest and most successful pig studs in Australia (the Kinilibah Stud Farm). After disposing of his pig stud he raised Poll Herefords and fat lambs on his property, *Whyanawah*, near Wagga.

Graham was a member of the Australian Labour Party and was elected to the NSW Legislative Assembly in 1941 as the local member for Wagga Wagga. He defeated the sitting Country Party member, Matthew Kilpatrick in the landslide victory that allowed William McKell to form a government. He held the seat at the next 5 elections and died as the sitting member in 1957. During the premierships of William McKell, James McGirr and Joseph Cahill, Graham held numerous ministerial positions but he is most notable for his long tenure as Minister for Agriculture which he took on in 1944. He died during his 14th year as Minister which at the time was reported as a record in that portfolio, at both State and Commonwealth levels (Obituary in *Pastoral Review and Grazier's Record* 18 Dec 1957). His achievements as Agricultural Minister include:

- The construction of an artificial insemination centre for dairy cattle (Graham Park) and the introduction of artificial insemination on a commercial basis.
- The establishment of four new country killing works at Goulburn, Wagga, Dubbo, and Gunnedah. These works were amongst the most modern in the world and cost in the vicinity of £500,000 each.
- The construction of bulk wheat storage facilities.
- The purchase of high quality stock from overseas.
- The expansion of operations at experimental farms and research institutes, including increased accommodation at Hawkesbury Agricultural College.
- The establishment of the Wagga Agricultural College.
- The decentralisation of the activities of the Department of Agriculture with the introduction of regional offices throughout rural NSW (Obituary in *Pastoral Review and Grazier's Record* 18 Dec 1957, Blocklow 2005).

Ownership of Graham Park was transferred to the NSW Department of Agriculture in 1980. Activities at the centre were reduced, and final in the 1990's the Centre was closed. Portions of the site were leased to the University of Wollongong as an off-campus research station until new premises were built for them in Nowra in 2000 (*Berry Museum 2006: 2*). Nowra Council (now the Shoalhaven City Council) purchased the site in the late 1990's. It was then sold in 2003 to Huntington Developments (Beachwood Homes) (Minutes of Heritage Council State Heritage Register Committee 5 Oct 2005 File H99/00007).

Figure G.168 General view of entrance to Graham Park (2007 image)

Figure G.169 Detail of entrance feature sculpture

Figure G.170 Entrance to Graham Park research station in 1969 (State Library of NSW image no.d2_35989r)

Figure G.171 View, looking SE across animal pens and enclosures at Graham Park in 1969 (State Library of NSW image no.d2_36000r)

Figure G.172 View, looking W towards animal pens from eastern boundary of Graham Park (Princes Highway boundary) (2007 image)

Figure G.173 Aerial image of research station in 1958 (SHI Dapto-Ulladulla 699-5051, Run GK12 23/07/58)

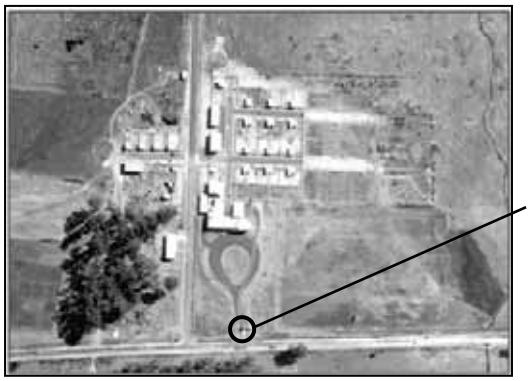
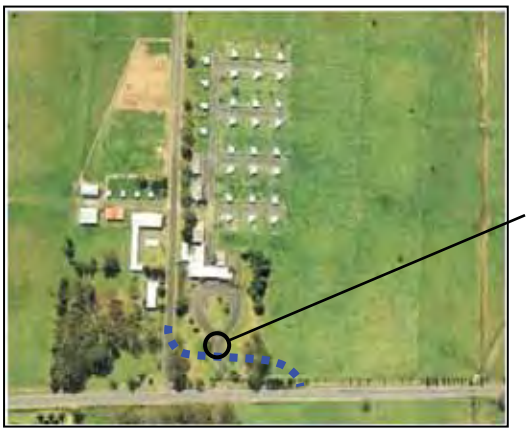


Figure G.174 Aerial image of research station in 1992. Note that since this time, a new alignment of the Schofields Lane intersection (dashed blue line) has required for-shortening of the driveway and relocation of the entrance gate and feature sculpture (ACD16 NSW 3108-247 8/11/92)



Recording ID: G2B H56		**GDA Map Reference:**	**289005.6149857**
Name/Description:	***Broughton Mill* Homestead and Dairy**	*Cadastral Location*: *Street address:*	Lot 31 DP818336 117 North St Berry
Item/Site Type:	Early twentieth century homestead, dairy, outbuildings and grounds (ruin)		

Context/setting:	The homestead and dairy are located on the edge of an upper terrace, on the flood plain, and south side, of Bundewallah Creek. The complex is located 100 metres to the east of the current *Broughton Mill* homestead which was constructed in the late 1980s.
Description/fabric:	Homestead constructed using a sawn timber frame and asbestos cement wall panelling. Four rooms in original building, plus additional back rooms under scillion roof. One chimney for kitchen stove on southern side of building. Veranda on at least western side of building, probably also on eastern (front?) side. Corrugated iron roof. Interior wall cladding labelled as "Surface Sealed and Sized by "Sealite" Process Patented 1916 Beaver Board [logo] Pure Wood Fibre" At least one out-building constructed using sawn timber frame and corrugated iron, remnants of other small structures, possibly animal pens/runs. Remains of truck, plough equipment and multiple drays in back enclosure. Two disused metal silos (one cylindrical and one rectangular) located adjacent to a ruined outbuilding at southwestern end of complex. Remnant two rail wooden fencing around homestead. Dairy (disused) constructed from brick (interior surfaces rendered), timber, corrugated iron and cement/concrete
Dimensions:	Area including homestead ruins, dairy and associated yards is approximately 90 x 80 metres
Physical condition:	Homestead in poor and uninhabitable condition – wooden frame still standing, however roof, ceiling, wall cladding and floor now unstable and structurally compromised. Building is no longer weather proof. Most of verandah has collapsed except for western side. Whole building now obscured by vegetation and vine growth. Outbuildings adjacent to homestead, except for Dairy group in similar condition. Broken asbestos sheeting poses a health risk. Dairy still structurally sound and weather proof, but no longer used as Dairy.
Integrity:	Structures still display details and characteristics of early Twentieth century homestead, and mid century Dairy. Evidence of some later additions and veranda infill.
Associated features:	planted tree wind breaks and associated fenced enclosures
Current use:	Homestead is abandoned and in ruinous state. Dairy apparently only used for storage. Whole site forms part of larger operating farm.
Heritage listings:	no current listings

Historical background/interpretation:

It is known that the great Uncle (George) of the current owner (Mr John Miller), lived in this homestead and that it was extant in the 1920s when he was born. George died in 1962 and the house has not been lived in since that time. In the last 5 to 10 years the building has become overgrown and is no longer used for storage (pers. comm.. John Miller 26/08/11).

Figure G.175 General view of complex looking south from creek flats, Dairy on left, homestead behind vegetation on right

Figure G.176 General view of homestead site looking north, note disused silos

Figure G.177 Interior view of north eastern room

Figure G.178 Detail of ceiling and light fitting

Figure G.179 Remains of dray

Figure G.180 Southern side of disused dairy, looking NE

Figure G.181 Interior view of Dairy and "Dangar-G" Milker apparatus, looking SE

Figure G.182 Aerial image (2006) of homestead remains (Google Earth Pro 2011)

Figure G.183 Aerial image of homestead complex in 1958 (SHI Dapto-Ulladulla NSW Run GK11 699-5037 23/07/58)

Recording ID: G2B H58

GDA Map Reference:
Original position: 289326.6149627
Current position: 289344.6149573

Name/Description:	***Uniting Church Hall (formerly Wesleyan Chapel)***	*Cadastral Location*:	Lot 1 DP745962
		Street address:	69 Albert St
		(formerly:	140-146 North St) Berry
Item/Site Type:	Late nineteenth century Carpenter Gothic Chapel		

Context/setting:	This building was originally located on the southern side of, and parallel to North St, on an east-west alignment, with its entrance facing east (Figures 6.184-6.185). Following the recent sale of this land, the building has been retained by the Uniting Church and moved to a new location (October 2011), 50 metres to the southeast, next to the 1932 church building, on a north-south alignment, with the entrance facing south (Albert St) (Figures 6.187-6.188). As part of the preparation for this move, a skillion roofed weatherboard addition to the western end of the building was demolished (Figure G.186).
Description/fabric:	Victorian Carpenter Gothic style chapel, constructed using timber frame, horizontal weatherboards and corrugated iron roof. - gabled roof, attached porch, finial to porch, pointed arch (gothic) windows, brick footings.
Dimensions:	Chapel dimensions are approximately 20 x 10 metres
Physical condition:	Good. Deterioration issues noted in 2002 (paint condition, weatherboard rot, roof leaks) appear to have been addressed. Following the recent re-positioning of the building, the consequential installation of new piles and higher ground clearance will address previously noted issues of dampness from soil contact.
Integrity:	Decorative bargeboards, observable in past photography, have at some time been removed from the building. These are currently being re-created and reinstated. Roof iron has been replaced with Colorbond. A skillion roofed weatherboard room (including a wheel chair access ramp) was added to the western end of the building sometime before 1949. This was demolished prior to the re-positioning of the building (Figure G.186). The Chapel retains its original form and character. The new building location maintains its historical association with the Wesleyan Church but substantially changes its landscape context. The original position was associated with mature tree plantings, surrounded by open space and included pastoral views across the road to the north. The original east-west alignment related to the large area of the surrounding Lot owned by the Church. The new position and alignment, parallels an adjacent church building. In contrast to the pastoral and open space character of the original location, this new paired arrangement, merges with adjoining urban lots and reinforces the urban character of the streetscape.
Associated features:	Twentieth century church and buildings on same Lot
Current use:	Church Hall
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7, as an item of local significance Shoalhaven Heritage Inventory

Historical background/interpretation:

The building was erected as a Wesleyan Church in 1884 following donation of the land by David Berry in 1883. At its opening, by the Rev. J.W. Brown on 13 April 1884, it was reported to be the first building to be erected on land legally acquired in the "new township" (Peter Freeman Pty Ltd 1998).

The building functioned as a Chapel until a new church was built in 1932 (Wesleyan to 1907, and then as part of the Methodist church). After 1932 it was used as a Church Hall until 1965 when a new church hall was completed (Conybeare Morrison and Partners 1999).

The opening of the chapel was reported in the Shoalhaven Telegraph (17/4/1884):-

> The chapel is a neat weatherboard structure 43 x 23 feet on wooden block foundations in the designing management of which Mr William Boyd of the firm of English and Boyd, Broughton Creek was the leading chief spirit. It is built of stud and weatherboard, lined with clear pine and roofed with corrugated iron. The building is entered by a porch 8 x 8 with a door at each side. The principal entrance into the main building is by a 4 feet door opening in two parts. It is lighted through 8 spacious Gothic topped windows, 4 on each side, the place being built east and west.
>
> The chapel is furnished with 24 pews, 12 on each side, and will seat up to 200 worshippers if required, and the officiating worshipper is provided with a light and handsome open rostrum, of varnished cedar, decorated with panels, and turned work, and is reached by a flight of steps on each side. The communion rail is also of turned work, lined with green rep.
>
> The walls inside are painted a stone colour, and bordered with a lilac paint up to about 4 feet above the floor. The height of the walls is 12 feet and the roof being half opened and ceiled (sic). Outside the building is painted in a stone colour, and the gables of the roof and porch are decorated with barge boards of unique design and finished with turned finials. Mr Herbert Pettit was the contractor, and he has completed a very creditable piece of work. (in Shoalhaven Heritage Inventory - Shoalhaven City Council).

Figure G.184 General view of original location of Chapel, looking SW

Figure G.185 General view of original location of chapel, looking SE

Figure G.186 Detail of demolition of skillion roofed addition to rear of chapel prior to relocation of main building (October 2011)

Figure G.187 General view of former chapel location, with new building position visible in middle distance, looking SE

Figure G.188 The new location of the former chapel, on the west side of the 1932 church building looking SE

G.4 Known or potential archaeological deposits

Recording ID: G2B H14		**GDA Map Reference:**	**290063.6149874 to 290019.6149750**
Name/Description:	**Former buildings at northern end of Broughton Creek township**	*Cadastral Location*:	Princes Highway easement Lot 4 DP602348
		Street address:	Nos. A29, A45 and adjacent highway easement Princes Highway Berry

Item/Site Type: Archaeological deposit – former buildings at northern end of Broughton Creek township

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Context/setting: This deposit is situated between the pre 1955 alignment of the Princes Highway and Broughton Mill Creek, and may potentially extend for approximately 180 metres across the interval where the post and pre 1955 alignments diverge. Archaeological test pits conducted within the grassed land surface between the highway platforms confirm the presence of archaeological material (refer Chapter 7). The potential for archaeological deposits below the existing highway platform remains untested. This potential is greatest under the downslope side of the platform where fill probably overlays original slope deposits. The area of confirmed or likely archaeological deposit, based on test excavation results equates roughly to the grassed area between the old and new highway platforms – with approximate dimensions130 x 15 metres.

Description/fabric: The site is defined as the archaeological deposit which potentially preserves traces of former nineteenth and twentieth-century Broughton Creek town buildings that were located along the western side of the former highway alignment (G2B H15), roughly opposite *Mananga*. Based on historical research compiled by members of the Berry and District Historical Society (refer Figure G.192), the following structures are known or reliably predicted to have once occurred in this area:

- The Berry Butter Factory (1889).
- Court House (1870s).
- Roman Catholic Church (1866).
- The Council Chambers (1868).
- Overseers Cottage (1858).
- A Carpenter's Cottage.

Refer Chapter 7 for a description of the deposits and archaeological items encountered during test excavations.

It should be noted that the G2B H14 deposit, by definition, does not include the potential archaeological remains of the original Mananga homestead, which was situated immediately south of this recording, and on the east side of the pre-1955 highway alignment. Remains of this former homestead may partially occur under the current highway pavement, and on the slope immediately to its east. Similarly, the infilled trench through which the water race for the Berry Estate saw mill traversed the spurline would also be present under the current highway and probably indivisible from the original Mananga homestead site.

Dimensions: Potential area including area under existing highway platform: 180 x 55 metres

Confirmed area (grassed areas between highway platforms: 130 x 15 metres

Physical condition: Results from an archaeological subsurface testing program confirm that archaeological deposits occur under a variable layer of construction related overburden in the grassed area situated between the pre and post 1955 highway alignments. The deposit has probably been totally or substantially removed along the upslope (eastern) half of the current highway platform. However, due to the probable use of fill to create an elevated and benched platform on the downslope margin of the highway, there remains good potential for archaeological deposits to remain under the western half of the highway platform.

Integrity: The deposit has been partially impacted by cable trenching in the first half of the twentieth century, road construction in the 1950s, root displacement from the extant tree avenue, and the installation of the current Berry sign and pediment.

Despite this, the remaining areas of confirmed and potential deposit have considerable research value and potential.

Associated features: This archaeological deposit forms part of a related group of items which relate to the history, economy, development and structure of the Broughton Creek township. Some of these items are located outside of the area of interest for this assessment:

- G2B H15 1870s - 1955 highway alignment (Adjacent to *Mananga* homestead)
- G2B H12 Remnant of 1870s – 1955 highway alignment (around Stewarts Hill)
- G2B H16 *Mananga* Homestead and property, including archaeological sites of old Mananga homestead and portion of Berry Estate saw mill water race
- G2B H55 Remnant of 1856 Berry Estate Road
- Archaeological remains of Berry Estate saw mill industrial complex, including the mill race, mill site, and Tannery works
- *Wyndree*, Former Constables Cottage A15 Princes Highway (Schedule 7, Shoalhaven LEP 1985)
- Pulman Street Heritage Conservation Area (Schedule 7, Shoalhaven LEP 1985)

Current use: Easement and platform of the current Princes Highway,

Rural residential Lots: Lot 7 DP1040653
Lot 4 DP602348

Heritage listings: no current listings

Historical background/interpretation:

The documentary basis for the identification of the potential location of former town structures and works within the G2B H14 area is based on historical research conducted by the Berry and District Historical Society. Sources used in this research include:

- Published references based on historical accounts and research conducted by Cousins (1948), Bayley (1975), Antill (1982), Lidbetter (1993).
- Original and local and State newspaper articles. Examples specific to the Berry Butter Factory include Sydney Morning Herald (SMH) (27 July 1888 p7, 23 Jan 1889 p9, 4 Feb 1890 p7, 11 Sep 1901; Clarence and Richmond Examiner and New England Advertiser 8 June 1889 p8.
- Various oral histories from local identities documented by the Berry and District Historical Society.

The Berry Butter Factory (Berry Dairy Company, 1889 - 1901)

A decision to establish a butter factory at Broughton Creek with a capital of 2000 pounds was taken at a meeting chaired by the Mayor, Lewis McIntyre in July of 1888 (SMH 27 July 1888 p7). A factory site was suggested in John Stewarts paddock, opposite his residence [old Mananga homestead], on the northern side of the South Coast Road beside Broughton Mill Creek where there was good permanent water. It was recommended they sell "refuse milk" rather than have piggeries near the factory. The latter proposal however was not adopted (Bayley 1975:150).

In January 1889 it was reported that directors of the Berry Dairy Company had been elected and the factory was nearly completed and operations were expected to commence in early February (SMH 23 Jan 1889 p9).

The *Broughton Creek Register* provided a description of the Berry Butter Factory when it was opened in March 1889. This description is presented by Bayley (1975:151):

> It was built of timber on brick piers, lined and ceiled with tongued and grooved pine, with floors of tallow wood. It had a manager's room, office, director's room and a large room for the separators and churns. Piggeries were nearby with drainage away from the factory. The hill became known as Factory Hill and overlooked the growing township of Berry. It was proposed to install refrigeration in 1901 but it was decided to close instead.'

In 1890 it was reported that the factory was processing 2000 gallons of milk daily (SMH 4 Feb 1890 p7)

On the 7 September, 1895 John Hay established the, The Berry Central Butter Factory, with the considerable financial backing of the Berry Estate. This was sited adjacent to the newly completed rail line on the site of the present Co-operative factory. The company aimed to provide a state of the art facility with the aim of promoting the Dairy industry across the Estate and its tenant farms. This factory would later be bought by a consortium of dairyman from the Estate for 5,500 pounds in 1911 and formed a Co-Operative, the Berry Rural Co-Operative Society Ltd (SMH 6 Apl 1911 p7).

In 1897 it was reported that the Berry Dairy Company was supplying cream to Dr Hay's Central Butter Factory, paying suppliers 6 ¾ d per gallon of milk (SMH 8 July 1897; also The Queenslander 24 July 1897 p37).

In 1900 a report of the annual meeting of the Berry Dairy Company indicated that the 'shareholders pronounced against pasteurisation' (Clarence and Richmond Examiner 24 July 1900 p4). In contrast, and in the same year the Berry Central Creamery became the first factory in NSW to adopt pasteurisation of cream for manufacture into butter (http://www.southcoastdairy.com.au/our-history.htm, accessed June 2011).

Faced with the competition, rail line location, and superior Estate resourcing of the Berry Central Creamery, the viability of, and justification for the Berry Dairy Company appears to have been substantially and progressively eroded.

In September of 1901, it was reported that a meeting of the shareholders of the Berry Dairy Company Limited, ratified the previous resolution to dispose of the goodwill of the premises to Dr John Hay, proprietor of the Berry Central Factory, for £1000. It was resolved to wind up the Berry Dairy Company by voluntary liquidation Mr James Stewart was appointed liquidator, subject to confirmation on October 1 (SMH 11 Sept 1901 p10).

The eventual fate of the building is yet to be determined. It is shown standing in a 1903 photograph published in the Town and Country Journal 11 Feb 1903 (Figure G.193).

A photograph entitled “The Factory” from Broughton Creek, shows the Berry Butter Factory building, looking south along, and viewed from the bottom of Broughton Mill creek. The estimated date of the image is circa 1910 (Wollongong City Library, image no. P01/P01210).

The building is no longer present, or traces in evidence, in aerial photography taken in 1949 (SVY 552/Nowra 5164 Run2(155-166) 4/04/1949).

Figure G.189 General view of the portion of archaeological deposit G2B H14 situated between the former (left) and current (right) highway platforms, looking S

Figure G.190 General view of archaeological deposit G2B H14, looking N from its southern end. Note 1870s to 1955 highway alignment diverging from current highway on right hand side (middle of picture). The potential for archaeological deposits under the road platform remains untested

Figure G.191 General view of archaeological deposit G2B H14, looking N W, along the downslope side of the current highway platform. There is an untested potential for archaeological deposits to survive under the fill which supports this 1955 roadway

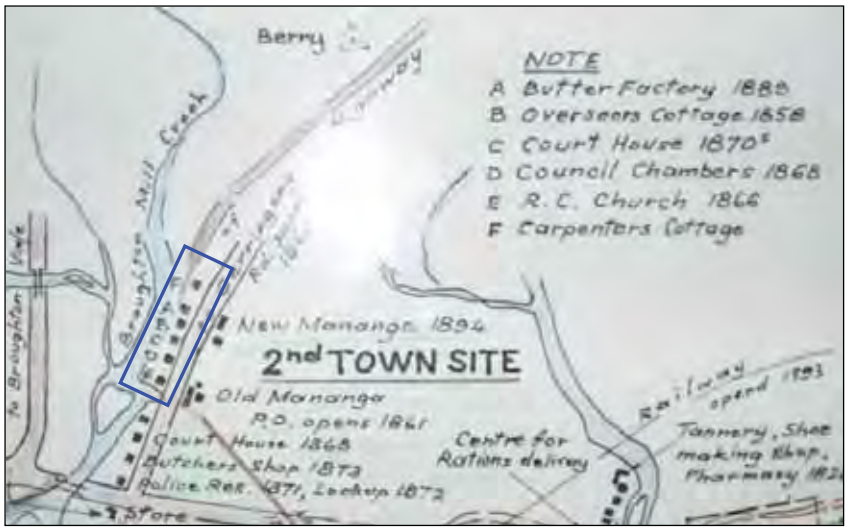

Figure G.192 Extract from display map in Berry Museum, showing potential former structures which may have been located within the G2B H14 area (blue) (courtesy Berry and District Historical Society Inc.)

Figure G.193 View looking SW down highway in area of G2BH14 (left end of photo) ('The town of Berry, from Stewarts Hill' *Town and Country Journal* 11th February, 1903)

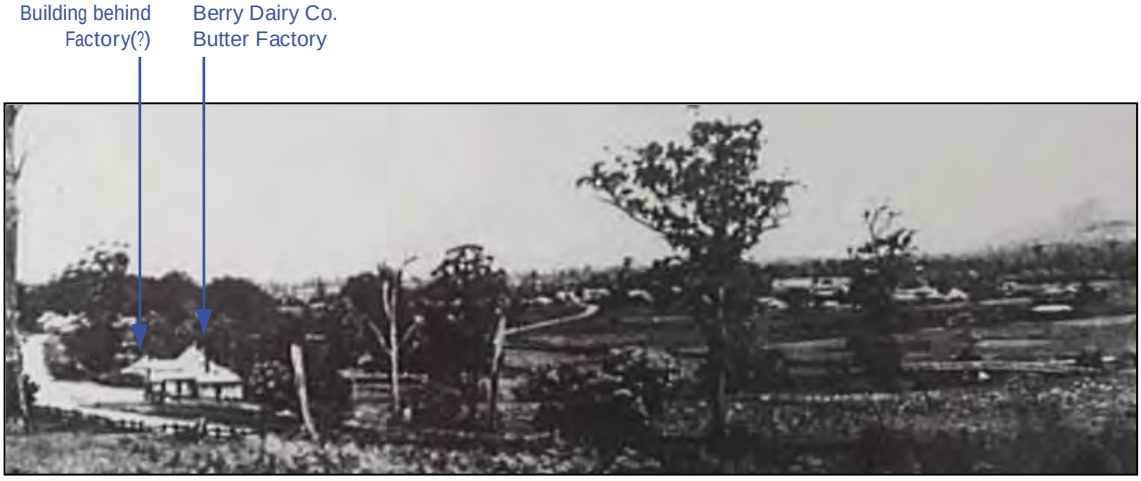

Figure G.194 'Butter Factory, Berry' (from Shoalhaven Estate page 19, Wollongong City Library Image no. P03/P03737; also [this copy, dated 1891] courtesy Berry and District Historical Society)

Recording ID: G2B H48 **GDA Map Reference: 294547.6152597**

Name/Description:	**Site of former Berry Estate Tenant farm**	*Cadastral Location*:	Lot 9 DP3344
		Street address:	161 Princes Highway Broughton Village

Item/Site Type: Potential Archaeological Deposit - Site of former Berry Estate Tenant Homestead

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Context/setting:	This site is situated on locally elevated ground (a low gradient and broad spurline, grading into creek flats), adjacent to a small tributary streamline which drains southwards into Broughton Creek. It is situated on the northern basal slopes of the open Broughton Creek valley, as they merge with the valley floor and flood plain.
Description/fabric:	Apart from two large old growth trees, a fig and a deciduous species (Figures 6.197 & 6.198), which pre-date the current farmhouse and probably relate to a former phase of European occupation, there are no surface traces of the former Berry Estate tenant farm which is indicated at this location on an 1890s map (Figure G.200). This map appears to show a main building surrounded by four outbuildings. Both of the remnant trees are likely to have been planted. The deciduous tree is an exotic species, and the fig tree is low and spreading, indicating development in an open and cleared (unforested) context. As such they are likely to have been planted in relative proximity to the former homestead. Given its close proximity, the current farmhouse may be wholly or partly superimposed on the footprint of the former homestead building(s)
Dimensions:	Not determined. The area of potential probably occurs within an approximate area of 100 x 100 metres (inclusive of former outbuildings).
Physical condition:	Potential for subsurface archaeological remains. The construction of the existing farmhouse (sometime between 1958 and 1975), is likely to have substantially disturbed or removed at least portions of this potential deposit.
Integrity:	The integrity of this deposit has not been determined but it is probable that at least a portion of the site has been substantially disturbed or removed by the construction of the current buildings.
Associated features:	-
Current use:	Rural residential farmhouse (leased and tenanted by the RMS)
Heritage listings:	no current listings

Historical background/interpretation:

An 1890s map of tenant farms across the northern portion of the Berry Estate (probably dating from 1892, refer Graham 1998), shows a homestead complex at this location leased by a J. Hicks. The farm consisted of approximately 28 acres (Figure G.200).

Figure G.195 General view of location of former Berry Tenant farm homestead, note slightly elevated spur (right) adjacent to the valley floor, looking S

Figure G.196 View of current *Greystanes Lodge* farmhouse, showing two large old growth trees (a fig tree(right), and a deciduous tree (left)) which predate the farmhouse, looking SW

Figure G.197 Views of the large old growth trees which pre-date the current farmhouse, looking S (left picture) and W (right picture)

Figure G.198 Aerial image of location of former homestead in 1958. Note remnant trees (blue circled) (SHI Dapto-Ulladulla NSW Run GK10 697-5101 10/07/58)

Figure G.199 2007 aerial image showing current homestead, remnant trees (blue circled) (Google Earth Pro 2011)

Figure G.200 Extract from 1890s map of the northern Berry Estate, showing a group of former tenant estate farm buildings located at the current Greystanes farmhouse (blue circle). The current highway is shown in red for reference. ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Recording ID: G2B H52	**GDA Map Reference:**	**293659.6151844 (approx.)**

Name/Description:	**Site of former Berry Estate Tenant homestead**	*Cadastral Location*:	Lot 2 DP593476
		Street address:	A441 Princes Highway Broughton Village

Item/Site Type: Potential Archaeological Deposit - Site of former Berry Estate Tenant Homestead

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Context/setting: This site is situated on the floor of a small tributary valley, adjacent to a minor tributary stream. The stream flows roughly west-east into Broughton Creek at Broughton Village. The homestead was situated close to the 1856 Berry Estate road, and the subsequent 1870s to 1930s highway alignment. In both cases, the roads appear to have been purposefully aligned to connect with the homestead site, creating a 'corner'. In the latter alignment this corner approximated 60 degrees and came to be known as "Bink's Corner" after the adjacent land owner family.

The exact micro-topographic location of this site is yet to been determined. The only map of the site, identified to date (Figure G.203), from 1892 (Graham 1998), shows the homestead slightly to the southwest of the highway bend and on the northern bank of the streamline. The current alignment of the stream is now further north of this mapped course and the mapped homestead location is uncharacteristically situated on moderately graded slopes. If some or all of the mapped locations, and associations, are indicative or relative, then a wide field of possible homestead locations can be predicted. For this reason a large approximate area of potential, has been identified, within which this archaeological site is likely to be situated (Figure G.204, Appendix A).

Description/fabric: This site was not subject to surface archaeological survey, as it is situated more than 200 metres away from the bypass. Apart for some nearby Coral trees, there are no traces (observable from aerial photography) of the former Berry Estate tenant farm which is indicated at this location on an 1890s map (Figure G.203). This map appears to show a main building with three outbuildings to one side and the back.

Dimensions: Not determined. The area of potential probably occurs within an approximate area of 100 x 100 metres (inclusive of former outbuildings).

Physical condition: Potential for subsurface archaeological remains. The site has probably been subject to ploughing and cropping since the removal/destruction of the homestead. The extent to which this has impacted the deposit is not known.

Integrity: The integrity of this deposit has not been determined. Its proximity to the former highway alignment, which was bypassed in the mid 1930s, means that this is the only surviving archaeological site of a former Berry tenant estate farm which retains its original configuration to the 1856 and 1870s highway alignment, exclusive of the impact from later twentieth century highway upgrading including widening, sealing, and side railing.

Associated features: This deposit forms part of a complex of recordings which, as a group, have value in understanding and interpreting the evolution of the highway, its various alignments, and its interrelation with adjoining land holdings and homesteads. These recordings are:

- G2B H27 remnant section of 1856 Berry Estate Road.
- G2B H26 remnant section of 1870s – 1930s Highway ("Binks Corner").
- G2B H25 *Sedgeford* homestead.

Current use: Agricultural pasture grassland

Heritage listings: no current listings

Historical background/interpretation:

An 1890s map of tenant farms across the northern portion of the Berry Estate (probably dating from 1892, refer Graham 1998), shows a homestead complex at this location leased by a Mrs. Wiley The farm consisted of approximately 50 acres (Figure G.203).

Recording ID: G2B H52

Potential Archaeological Deposit
Site of Former Berry Estate Tenant Farm

Figure G.201 General view of site area (middle distance, behind and to left of trees) from current highway, looking W

Figure G.202 General view of site area (lower middle distance, behind and to left of deciduous trees) from spurline on opposite side of current highway, looking W

Figure G.203 Extract from 1890s map of the northern Berry Estate, showing a group of former tenant estate farm buildings at "Bink's Corner" (blue circle) ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLM SS315_Map 17

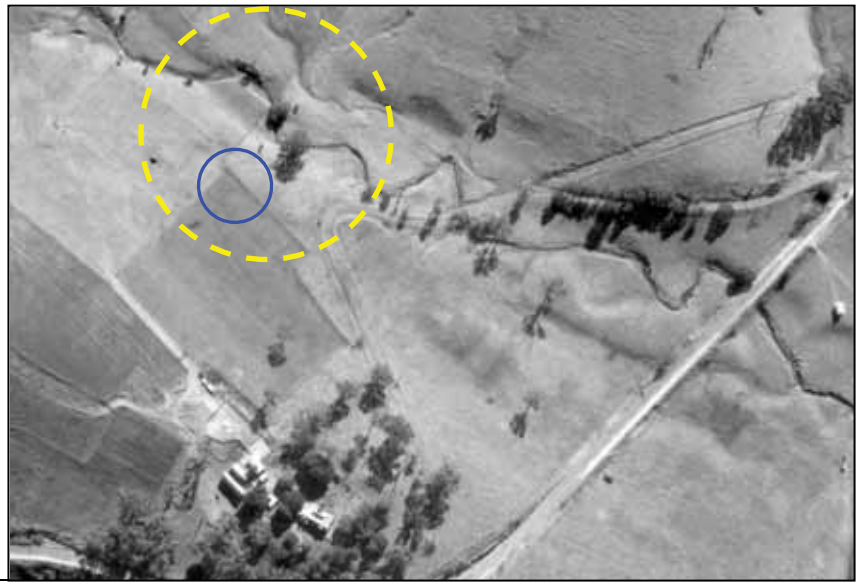


Figure G.204 1958 aerial image of location of former homestead based on 1892 map (blue circle) and potential actual location based on topography and map interpretation options (yellow dashed circle) (SHI Dapto-Ulladulla NSW Run GK10 697-5103 10/07/58)

Recording ID: G2B H53 **GDA Map Reference: 296227.6152738**

Name/Description:	**Site of former Berry Estate Tenant Farm Structure**	*Cadastral Location*:	Lot 1 DP255171
		Street address:	403 Princes Highway Broughton Village (Toolijooa Ridge)
Item/Site Type:	Potential archaeological deposit and indeterminate rock rubble alignment		

Context/setting: This recording is located on the moderately graded crest and upper slopes of a prominent spurline which forms part of the eastern fall of the Toolijooa Ridge. The current Princes highway is located 35 metres downslope to the north.

Description/fabric: This recoding combines the location of a former structure, shown as part of a Berry tenant farm on an 1890s map, and an indeterminate alignment of rock rubble situated within the same area. Apart from the alignment, there is no other surface evidence which could relate to nineteenth and early twentieth century occupation.

The former structure is drawn on the 1890s map as a single structure, and could conceivably be a farmhouse or homestead (without out-buildings), or a less substantial and non-residential structure (Figure G.208).

A modern sealed driveway, aligned east-west, is situated immediately south and adjacent to the location of the former structure, and follows the original alignment of the 1856 Berry Estate Road. The structure may thus relate to this first, or the subsequent existing highway alignment (1870s onwards).

The alignment of stone rubble extends for approximately 35 metres and runs exactly parallel with (and north of) the driveway and alignment of the former Berry Estate Road. The driveway, and a downslope (disused) extension of this alignment into the adjoining property, is significantly recessed into the natural ground level. Construction of the driveway, or its antecedent, would have involved excavation of a substantial degree of sub-surface rock.

The rubble consists of natural bedrock (latite) cobbles, with both larger gravels and smaller boulders represented. The alignment has an average height of around 0.9 metres and a width at its base of around 1.5 – 2.0 metres. A majority of the cobbles appear to have been quarried, with sharp angular faces, but there are no jumper marks or other traces of careful or hand shaping/working. In addition there are cobbles with natural rounded cortex.

Dimensions: The area of potential, within which it is likely the former tenant farm structure was located is approximately 30 x 30 metres.

The stone rubble alignment is approximately 35 metres long, and averages 0.9 metres high and 1.5-2.0 metres in width. It is aligned approximately 290 degrees (grid north)

Physical condition: Potential for subsurface archaeological remains. The site has been subject to vegetation clearance and driveway construction since the removal/destruction of the homestead. The extent to which this has impacted the deposit is not known.

Integrity: The integrity of this deposit has not been determined.

Associated features:	A portion of the 1856 Berry Estate Road which has not been impacted by modern road construction occurs 20 metres downslope of the rubble alignment (G2B H30).
Current use:	Mown landscape setting for modern residence.
Heritage listings:	no current listings

Historical background/interpretation:

An 1890s map of tenant farms across the northern portion of the Berry Estate (probably dating from 1892, refer Graham 1998), indicates that a farm of around 52 acres was leased by a B. Fields (Figure G.208).

There are a number of possible interpretations of the stone rubble alignment:

1. It is the graded remains of a former agricultural dry stone wall (a surviving wall is located 80 metres to the northwest).
2. It is the graded/disturbed remains of stone walls or foundations from the former tenant farm structure.
3. It is a spoil dump from the construction of the 1856 Berry Estate Road.
4. It is the spoil dump from the construction of a more recent road, either the 1870s highway (35 metres downslope), or a farm access track and/or the most recent residential driveway.

Of these, option 3 seems least likely given the form of the Berry Estate roadway elsewhere across the study area, and especially the general disregard for gradient (and thus the need for excavation) evident in its design. Based on the present evidence, option 4 seems the most likely, however the close spatial association of the alignment with the former tenant farm structure cannot yet be discounted.

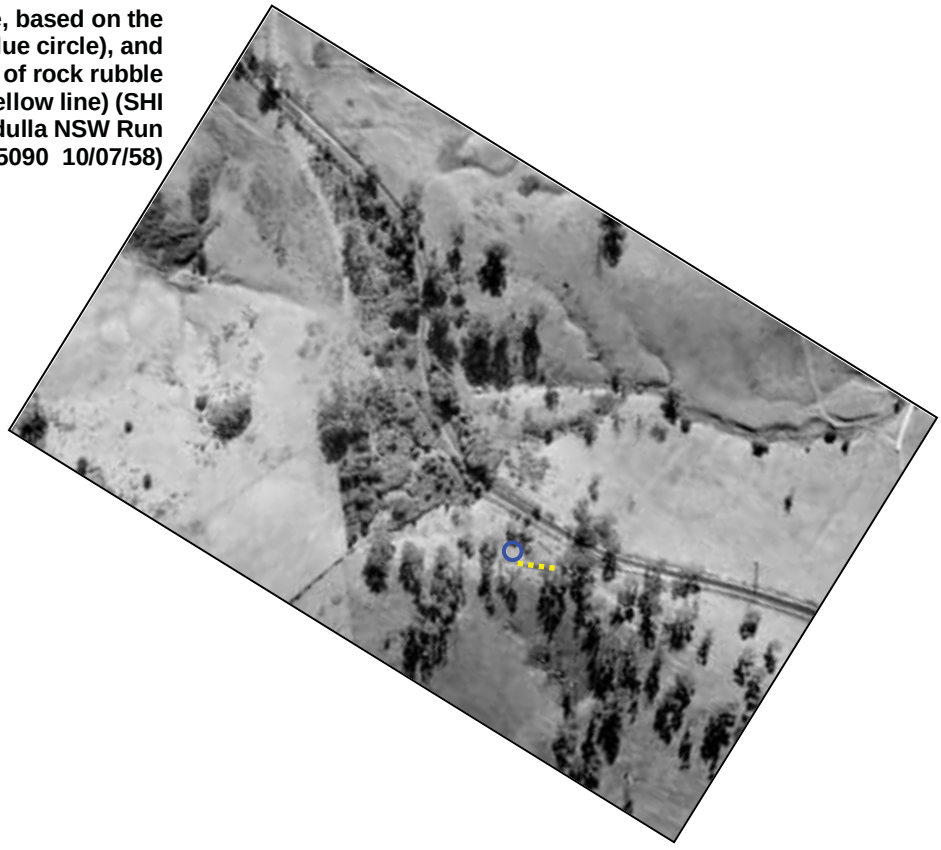
Figure G.205 General view of piled alignment of rock rubble, looking NE

Figure G.206 View of piled alignment of rock rubble, looking NW

Figure G.207 View looking SE along modern driveway (which parallels the rubble alignment, just left of the picture) and which follows the alignment of the 1856 Berry Estate Road (yellow dotted line), G2B H30 along spurline shoulder in middle distance

Figure G.208 Extract from 1890s map of the northern Berry Estate, showing a single structure on the B.Fields leasehold (blue circle ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.209 Location of the site of the former tenant farm structure, based on the 1890s map (blue circle), and the alignment of rock rubble (dotted yellow line) (SHI Dapto-Ulladulla NSW Run GK9 697-5090 10/07/58)



Recording ID: G2B H59 **GDA Map Reference: 294612.6152138**

Name/Description:	**Site of former homestead former Portion 181, (Finn/Wood/Grant/Stewart/Dinning)**	*Cadastral Location*: *Street address:*	Lot 181 DP751254 - Broughton Village
Item/Site Type:	Early Nineteenth century homestead site (Archaeological deposit and remnant plantings)		

Context/setting: This site is located 80 metres south of the southern bank of Broughton Creek, on former portion 181 (parish of Broughton). It is situated at the junction of creek flats and the low gradient basal slopes of a spurline which descends towards the west. This spur forms a partial bedrock barrier along the eastern side of the valley floor, forcing the course of the Broughton Creek to turn eastwards before meeting steep slopes on the western side and turning southwards again.

Description/fabric: The site consists of a range of remnant garden plants, including a mature live pine tree, two standing pine tree stumps, and ground storey succulents. The pine trees are aligned approximately north south. An extensive area (at least 10 x 10 metres) of low mounded and aligned rock cobbles (most being alluvial in origin) are evident at the northern end of the grouping of pine trees. These appear to relate to former hearth and wall foundations.

There may be remnants of earthen building platforms situated between the tree grouping and the creek bank to the north.

Dimensions: The area of remnant plantings and surface cobbles is approximately 35 x 25 metres. This may approximate the area of the former homestead residence and immediate surrounds. A broader area which may include the location of former outbuildings has been defined as 100 x 120 metres.

Physical condition: The presence of remnant trees and garden plants, and of stone alignments and low mounds suggests that ploughing and other ground disturbance has been minimal in the area of the surviving trees. Elsewhere there is likely to have been some degree of disturbance to subsurface features from ploughing.

One mature pine tree remains alive and standing, stumps of two further examples survive. Some ground cover plants remain.

This site presents considerable archaeological potential for *in situ* and largely undisturbed remains.

Integrity: The occupation of this site as a residence may potentially extend from the 1830s, to the 1940s. The site may have undergone a number of phases of construction, renovation and/or demolition in this time. There is considerable potential for the integrity of this site, as an archaeological record of this occupation sequence.

Associated features: The above ground residential building from this site was dismantled and re-assembled to form the front section of the Brookside homestead (G2B H28). This possibly occurred sometime in the 1930s or 40s.

Current use: Agricultural pasture grassland

Heritage listings: no current listings

Historical background/interpretation:

This recording is situated in portion 181, Parish of Broughton, County of Camden. This portion was a land grant of 100 acres to Antony (or Anthony) Finn. The date of the grant was 23 Dec 1829, and was formalised by Lt Gen Sir Richard Bourke on the 27 July 1837. Authority to take possession occurred on 4 June 1830. The grant was advertised in Government Notice of 17 November 1835. Lands department documentation of the grant describes it as a 'Deed …of the situation allotted for small settler' and in 1837 lists the property name as "Finn Valley", and states that Finn was in residence (SRNSW Reel 1127 Item 27857).

There is an Anthony Finn recorded on the NSW 1828 Census. He is listed as a retired soldier, 30 years of age, and living in Kent Street, Sydney. The listing is paired, as a family grouping, with an Ann Finn, who is 29 years old. Anthony is noted as 'Came Free' and arriving in the Colony on the *Caledonia* in 1822. Ann is noted as 'Free by Servitute', having served a seven years sentence after arriving in 1818 on the *Friendship* (Sainty and Johnson 1980:146).

Lands department documentation describes Finn as "late a soldier in the Buffs (from which regiment he has been discharged)" (SRNSW Reel 1127 Item 27857 Finn; and Land Title records). 'Buffs' is a reference to the Royal East Kent Regiment which served in Australia in four separate detachments between 1823 and 1827. Anthony Finn is listed as one of the Third Regiment soldiers sent to Australia on Garrison Duty. The third detachment is reported to have left Deptford for Sydney in 1823, arriving the same year (Chapman 2010). Finn was supported by his former regiment captain, Archibald Clunes Innes, later a brigade Major, as a referee in his grant proceedings (SRNSW Reel 1127 Item 27857 Finn).

When the regiment returned to England Finn remained in Australia and joined the Police Force. He was appointed an Ordinary Constable on 19th January 1928, serving in the Cumberland area (Government Gazette Notice 25 Jan 1828, in Florance 2011:9).

Finn's Broughton Creek property is notable in that it constitutes the only land grant on the floor of the middle and lower Broughton Creek valley, which does not constitute a grant or purchase by Alexander and David Berry. It appears that Finn had already selected this land, and entered into a Bond, prior to being awarded the grant, which then allowed him to secure freehold.

Frank McCaffrey, an Illawarra historian active in the first half of the twentieth century noted that Finn's 100 acre land grant was in recognition of his role in the apprehension of a bushranger (McCaffrey 1914 in Caldwell 1999). This reference relates to the capture of William Dalton on the 22 June 1830 in the neighbourhood of Liverpool, Parramatta.

Dalton, a runaway from a government convict work gang, was one of a party of five bushrangers who were involved in a shoot out on the Windsor Road (close to its modern junction with Pennant Hills Road), with a party of at least six, persons including two wardsmen, (Wells and Samuel Horn) a constable (Ratty) and a chief constable (John Thorn). Three of the bushrangers were shot dead (Cook, Ward and McNamara), one escaped (Currey) and Dalton was later caught following some hours of tracking by Horn and Thorn. Dalton was executed at the gallows on 28 June 1830 (Alexandra and Yea Standard, Gobur, Thornton and Acheron Express, 2 Sep 1904, Uebel 2001).

McCaffrey was probably mistaken in linking the portion 181 grant with the capture of Dalton, because the grant dates from December 1829, six months prior to Dalton's capture. However, Finn's role in Dalton's capture, and his consequential reward with a further grant of lands is documented in a notice of Land Grants in April 1836:

> '32 Anthony Finn, Three hundred and twenty acres, parish of Branxton, at Anvill Creek…
> Promised to him on 1st July, 1830, by General Darling, for his zeal in capturing the bushrangers Dalton and Macnamara, and possession authorised on 1st October 1830, free of quit rent.' (Sydney Gazette and New South Wales Advertiser 5 April 1836 p.4)

In December 1836 this grant was readvertised in the name of John Thompson, with a note that it was, 'originally promised' to Finn and 'is now readvertised at his [Finn's] request in favour of the claimant' (The Sydney Gazette and New South Wales Advertiser 24 Dec 1836 p4).

Possibly as a result of a financial transaction surrounding the transfer of this subsequent grant, Finn appears to have ceased residence at Broughton Creek and subsequently leased the property, first to a William Kerr in 1837, and subsequently to Charles Edwards and Edward Bailey in 1838. The lease was in respect of "…all that Messuage or Tenement and Farm House situate in the District of Illawarra …. Called and known as Finn's Valley together with 100 acres of land thereunto belonging" (Land Title records Bk M No.904). This is the first reference to a residence on the portion.

Finn subsequently became a publican, and owned and operated several Sydney Hotels including the William Street Hotel in 1854, and the Pelican Hotel, South Head Road, prior to 1860 (The Empire 3 May 1854 p.3; Sydney Morning Herald 22 March 1860 p.3). He died in 1871 at his residence in Darlinghurst, aged 75 years, leaving a widow and five children (Sydney Morning Herald 28 November 1871 p1; Florance 2011:9).

Richard Woods (or Wood), of Shoalhaven, purchased portion 181 in 1842 for 400 pounds. The property is referred to as 'Finns Valley or the Little Meadow" (Land Title records Bk 9 No.203, but see also Elliott 2009, and McCaffrey 1914 in Caldwell 1999)). 'Dick' Woods was employed at one time as a cook on one of the boats owned by the Berry and Wollstonecraft partnership. He was joined by his brother William, a carpenter, who is reported to have built the second house erected in Goulburn (McCaffrey 1914 in Caldwell 1999). Dick Woods was remembered to have bred dairy cows and horses on the property and was considered an 'excellent horse doctor". Both of the Woods brothers had been transported to New South Wales, and neither married (McCaffrey 1914 in Caldwell 1999).

In 1866 Richard Woods of Broughton Vale, farmer, sold to George Tate, also of Broughton Vale, Farmer, for 2000 pounds (Land Title records Bk 100 No.853). A mortgage of 1000 pounds was subsequently discharged from Woods to Tate in 1870 (Land Title records Bk 100 No.855; Bk119 No.124).

McCaffrey notes that following the death of William Woods, Richard sold the farm to George Tate for 1000 pounds. The horses and cattle on the property realised 250 pounds which was "handed over" to George Adams of the Steam Packet Hotel, Kiama, 'to keep him for life – which was most faithfully carried out" (McCaffrey 1914 in Caldwell 1999).

At this time, George Tate owned a large proportion of the original Broughton Vale town subdivision which he called "The Pines" (Elliott 2009; Plan of Broughton Creek Village Reserve 1855, folio 256-672). Portion 181 thus became part of a larger estate holding and it is probable that Tate's primary residence was, and remained, elsewhere. This was most probably the homestead complex still known as *The Pines* today, situated west of the bend in the current highway 285 metres west of the Thompson Rd intersection. It is worth noting that one live and two dead mature pine trees are evident at G2B H59, suggesting that this site may have formed the Tate residence

In 1879, the portion was subdivided into two 50 acre lots, with the Broughton Creek dividing the two. The southern lot was purchased by James Mitchell of Gerringong (Land Title records Bk191 No. 56). In 1900, the northern portion was still owned by George Tate, but occupied by George Thompson. The southern lot was owned by Dinning (Crown Plan 6721-1603).

In 1914 McCaffrey noted that the property was "in the hands of the executors of the estate of George Thompson", and added that the Wiley Brothers "have a stiff mortgage over it" (McCaffrey 1914 in Caldwell 1999).

Given that the homestead site, G2B H59, is situated in portion 181, on the south bank of the creek, and in association with a track marked on the 1866 County map (and which most certainly pre-dates the Berry Estate Road constructed in 1856), there is a high probability that this site dates from its earliest European settlement under Finn, possibly from 1830 onwards. (Figures 6.216 & 6.217). The association of the homestead site with a pre 1865 track strongly suggest that it was, at least, the residence for the Woods' occupation, between 1842 and 1866. The residence may have been leased during Tate's ownership, followed possibly by a return to owner-occupation after subdivision in 1879. Later owners, south of the creek were Dinning, Stewart, and then Johnson (refer below).

Mrs Chittick, the current owner of the original portion 181 lands, south of the creek, told of the following relevant information (pers. comm. 20 Sep 2012):

- The surname Finn remains known to locals through the use of the name "Finn's Valley", a nearby gully.
- The property was purchased by Irvin and Charlie Johnson, and Mrs Johnson (Mrs Chittick's mother) in 1948, from Eddie Stewart (Jnr).
- Eddie Stewart used the property as a "dry run" for cattle, together with a larger property in Kiama. Eddie Stewart was Mrs Chittick's grandfather's cousin.
- In Mrs Chittick's grandmother's time (her father's mother) the house (the above ground structure) located at G2B H59, was purchased from the Stewarts, dismantled in sections, dragged using horse drawn skids to the present site of "Brookside" and re-assembled to form the front portion of the Brookside homestead. This portion of the home now consists of three rooms, however on an occasion when an electrician was working in the roof he commented that the structure of the roof suggested that the front room may originally have been made up of two rooms. The relocation of the G2B H59 building possibly occurred in the 1930s or 40s.
- Prior to the Stewarts owning the property, it was owned by members of the Dinning family, three sisters and a brother. The brother died, and the three sisters finally left to reside in Berry around 1904. Mrs Chittick's grandfather always referred to the property as Dinnings.
- The homestead used to include stables which were situated between the homestead and the creek, they may have been made of brick.
- There are still remnant garden plantings at the homestead site. Mrs Chittick can remember a large quince tree (possibly now dead), a pink and red rose, a large spiky Lilly and Aloe Vera plants, as well as the obvious large pine trees.
- The Hamilton family used to own the land on the north side of the creek (Mrs Chittick's fathers grandmother was a Hamilton).
- The Mitchells may also have owned land (belonging to the original portion 181).

Recording ID: G2B H59 **Site of former homestead (plantings and archaeological deposit)**

Figure G.210 General view across the southern portion of former portion 181, looking E, location of G2B H59 outlined with yellow dotted line

Figure G.211 View looking SE at G2B H59 site, showing remnant mature pine plantings

Figure G.212 Detail of remnant garden plantings (succulents in foreground) at site, looking NE

Figure G.213 Detail of aligned cobbles, probably indicative of relatively undisturbed foundations and associated archaeological deposits

Figure G.214 Extract from 1890s map of the northern Berry Estate, showing the land grant to A.Finn ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17

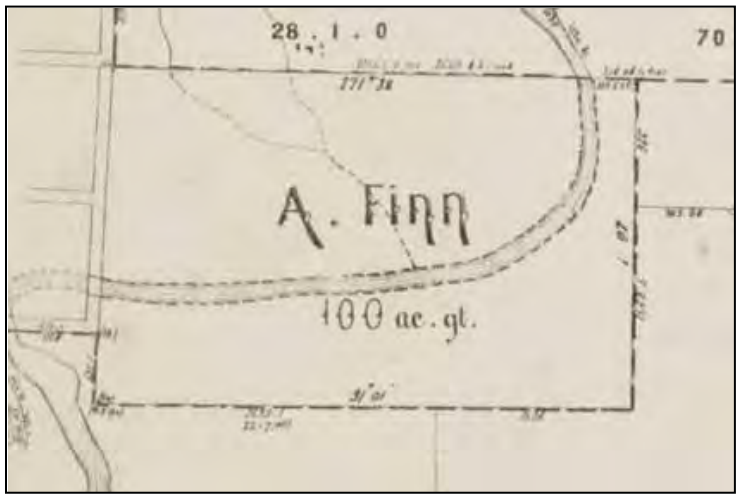
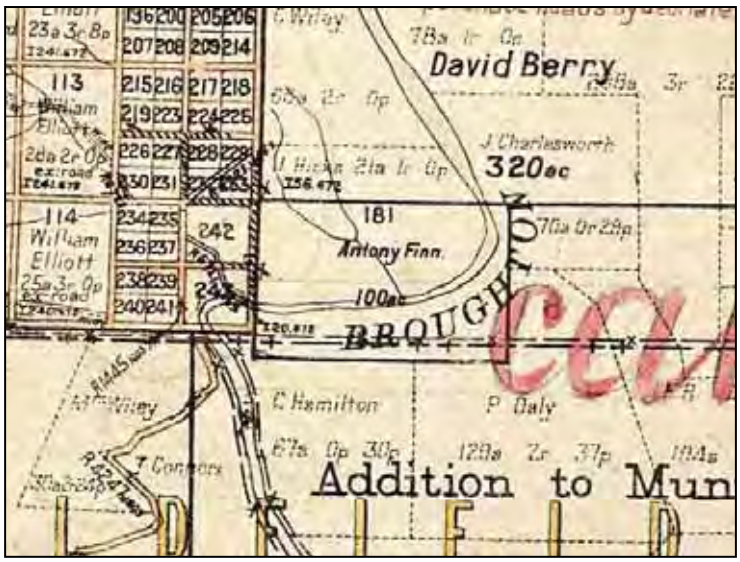


Figure G.215 Extract from 4th Edition parish map for Broughton, showing portion 181 and adjacent Broughton Village Lots (1893, cancelled 1902, Parish map preservation project ID no. 10353801)



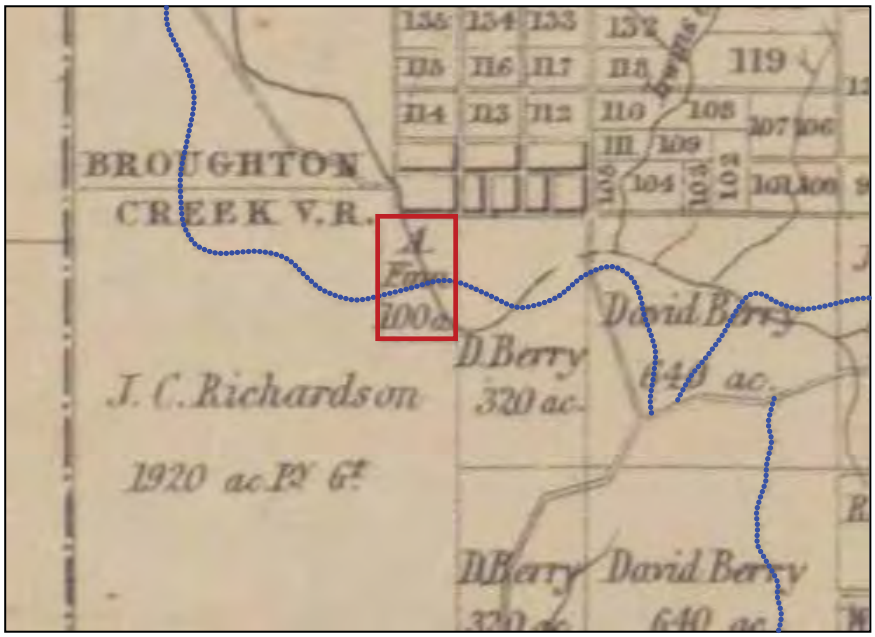


Figure G.216 Extract from County map showing location of the Finn land grant (red line), relative to: surrounding Berry Estate landholdings; and early tracks (dotted blue lines) (County of Camden, National Library of Australia (Braddock and Baly 1866))

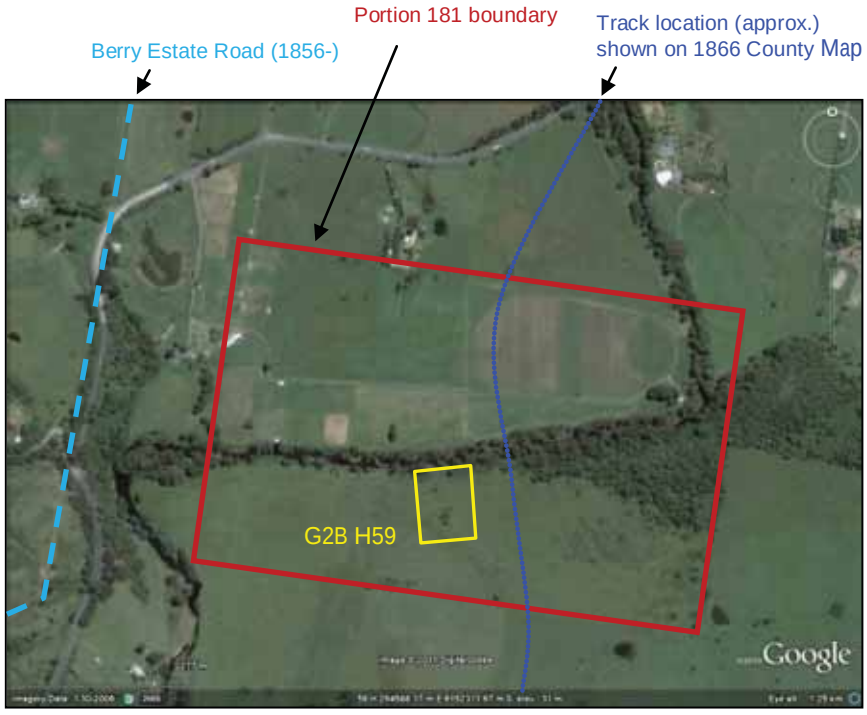


Figure G.217 Location of G2B H59 relative to former portion 181 boundary and nineteenth century tracks and roads (2006 aerial photo, Google Earth Pro 2011)

G.5 Miscellaneous sites types

Recording ID: G2B H61 **GDA Map Reference: 292261.6150863**

Name/Description:	**Quarried stone outcrop**	*Cadastral Location*:	Lot 4 DP801512
		Street address:	A350 Princes Highway Broughton
Item/Site Type:	Quarried rock outcrop		

Context/setting:	This site consists of a natural sandstone outcrop exposed within the bed of a minor tributary streamline. The outcrop forms three benches over which the stream forms a cascade, approximately two metres in total fall. The stream drains roughly southwest into Broughton Creek. The rock exposure is situated on south facing basal slopes within the Broughton Creek valley. The outcrop is situated immediately adjacent to and south of the current highway platform. A concrete highway culvert now directs water flow across the rock outcrop. It is probable that sandstone exposures of this nature, and in this low valley context, are relatively rare across the region.
Description/fabric:	The site consists of a series of three rock benches which display evidence of quarrying along their roughly vertical edges. Quarrying is indicated by a small number of vertical drill (or jumper) marks, and quarrying scars created by the removal of stone blocks from the leading edge of the benches (Figures 6.220 & 6.221).
Dimensions:	The rock exposure extends across a creek bed interval of approximately 10 metres, and averages three metres in width.
Physical condition:	The rock outcrop and quarrying features are well preserved
Integrity:	The modern concrete culvert and property fenceline above the outcrop provide modern visual intrusive elements, but overall, the integrity of the quarry features and outcrops has not been compromised.
Associated features:	The age of the quarrying is yet to be determined. If associated with early road construction, it may relate to the 1856 Berry Estate Road which at this point was located approximately along the current highway platform, immediately adjacent to outcrop. Remnants of the Berry Estate road have been recorded 45 metres to the northeast (G2B H22), and 240 metres to the west (G2B H19).
Current use:	Natural drainage line.
Heritage listings:	no current listings

Historical background/interpretation:

The age of the stone quarrying evidenced at this site is yet to be determined. There are a number of alternative interpretations of the quarrying activity:

1. Early quarrying related to the construction of the 1856 Berry Estate Road (which followed the current highway alignment at this location. Procures stone may have been used for the construction of a culvert or gutter.
2. Quarrying related to the construction of the later 1870s highway alignment, or for later upgrading or maintenance of this road.
3. Quarrying unrelated to the adjacent road, and most probably associated with construction of piers and foundations for local homesteads.

Recording ID: G2B H61 **Quarried rock outcrop**

Figure G.218 General view of quarried outcrop, during rain event, looking N

Figure G.219 View of upper rock ledge with area of drill or jumper mark indicated, looking N

Figure G.220 Detail of drill or jumper mark (yellow dotted line) and quarried edge (blue dotted line) evident on upper ledge, looking NW

Figure G.221 drill or jumper mark (yellow dotted line) and quarried edge (blue dotted line) evident across the second ledge

Recording ID: G2B H62		**GDA Map Reference:**	**289862.6149907 to 289819.6149672**
Name/Description:	**Avenue of Mature Poplar Trees**	*Cadastral Location*:	Woodhill Mountain Road easement *and/or:* Part Lot 24 DP5270 Lot 8 DP1040653
		Street address:	76 Woodhill Mountain Road Berry
Item/Site Type:	Avenue of mature Poplar Trees, Woodhill Mountain Road		

Context/setting: This avenue of trees is located on the east side of Woodhill Mountain Road between its intersection with the Princes Highway and just north of the Bundewallah Creek bridge. The terrain consists of relatively level valley floor flats and flood plain.

Description/fabric: The description of this avenue in Schedule 7 of the Shoalhaven LEP 1985 specifies nine Lombardy poplars (*Populus nigra*). The Shoalhaven Heritage Inventory includes a sketch of the avenue which makes it clear that only the nine mature poplars at the southern end of Woodhill Mountain Road are included. These trees are around 40 to 50 years old. They are absent in 1958 aerial photography, and appear as nine (only) trees in 1986 and 1992 aerial photography (NSW 2625-138 XD15 7 March 1986; NSW 3108-205 ACD15 8 Nov 1992).

Sometime after 1992, several phases of poplar tree planting are in evidence, forming avenues on both sides of Woodhill Mountain Road, north from Bundewallah Creek bridge, up to the driveway of Broughton Mill Farm Guesthouse (almost as far as the intersection with Bong Bong Road). There are twenty eight on the western side (of varying ages), and forty six on the eastern side, many very young, especially towards the northern end. Many of the trees on the eastern side of the road have been cut to protect overhead powerlines.

The mapping of heritage items associated with the 1985 Shoalhaven LEP and Draft 2009 Shoalhaven LEP includes all of the poplar trees along Woodhill Mountain Road between the Princes Highway and Bong Bong Road. This is contrary to the specification of nine trees in the Schedule, and the mapping in the Shoalhaven Heritage Inventory. As a consequence, the definition of this LEP listed heritage item is unclear. This assessment has adopted the Schedule definition and includes only the area of the original nine plantings.

Since 1992, two of the original trees have fallen and are no longer extant. Another example, the southernmost, has recently died but remains standing.

Dimensions: The original nine trees created an avenue 244 metres long. The total length of the avenue, including the additional plantings to the present time is 760 metres. The Shoalhaven Heritage Inventory states that the average height of the original poplars is 25.6 metres, and average canopy diameter is four metres.

Physical condition: Of the remaining seven of the original nine trees (from the original Schedule citation), one is dead and standing, and the remaining six, alive and standing. The health and vigour of some of the live trees may be compromised, as evidenced by the gradual attrition of three trees since 1992. These losses may be due in part to strong winds, but may also relate to structural instability and disease.

Integrity:	Due to past and recent tree losses, the remaining avenue formed by the original trees presents an incomplete and irregularly spaced avenue. The original avenue appears to have had a planting interval of approximately 12 metre.
Associated features:	-
Current use:	Roadside tree avenue, which presents a landscaped entry and departure from Berry.
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7
	Shoalhaven Heritage Inventory

Historical background/interpretation:

The original tree avenue appears to have been planted in the 1970s.

Figure G.222 General view of poplar avenue, looking S from the bridge over Bundewallah Creek

Figure G.223 View looking N from the Bundewallah Creek bridge. Note the northern most of the mature poplars at the near end of the avenue

Figure G.224 View, looking W at the same section of tree avenue shown in the figure above. Note the northern most of the mature poplars situated at the left end of the avenue shown in this picture

Figure G.225 View looking SW towards Bundewallah Creek in the late 1890s. No poplars are evident at this time along Woodhill Mountain Rd (then known as Broughton Vale Rd) and appear not to have been a feature of the roadscape until the second half of the twentieth century ("Town of Berry from Stewarts Hill" Government Printing Office , 1898 State Library of NSW d1_12472r.jpg; also Wollongong Library)

Recording ID: G2B H63 **GDA Map Reference: 288189.6149433**

Name/Description:	**Mark Radium Park**	*Cadastral Location*:	Lot 1 DP925241
		Street address:	Victoria Street Berry
Item/Site Type:	Mark Radium Park		

Context/setting:	Mark Radium Park is located at the intersection of Victoria Street and the Princes Highway, at the western margin of the town grid of Berry. The Park is located on southeast facing, low gradient basal slopes of a low spur which extends in a south-easterly direction from Berry Mountain. A small intermittent tributary stream traverses the southwestern corner of the park.
Description/fabric:	The park serves as a general recreation and rest area and includes: a public toilet block, gas BBQ, shelter and picnic furniture, car parking bays on a looped single entrance gravelled track, a shallow ornamental pond retained by a low masonry dam wall, landscaped and planted grounds, walking paths and seats. The trees and other plantings in the park follow a local area native theme. All but a small number of the established trees are relatively young. An arboretum of local endemic species has recently been established at the northern upslope end of the park. The name of the park commemorates a local champion show ring pony named “Mark Radium”, owned by Jack McGee. An outline of the pony’s story is provided on a park sign (Figure G.226). The pony held high jump records at Adelaide, Albury and Melbourne (1938) and between 1947 and 1955 competitions was beaten only once. He was 23 in his last year of competition (1955). Although Mark Radium was foaled in 1932 at Taree, he was stabled at Berry during non-competitive times.
Dimensions:	Approximately 170 x 107 metres
Physical condition:	Good condition – eastern abutment of pond wall is leaking.
Integrity:	not applicable
Associated features:	-
Current use:	Community space - public recreational park and rest area
Heritage listings:	Shoalhaven LEP 1985 (as amended) Schedule 7 Draft Shoalhaven Local Environmental Plan 2009 – Schedule 5 Shoalhaven Heritage Inventory

Historical background/interpretation:

The park was initially developed by the Berry Apex Club and some years later handed over to the Shoalhaven Shire Council. The park continues to be developed with the aid of Landcare grants and community volunteers.

The park was established on the site of the old pound.

Figure G.226 View of park sign at southern entrance to park

Figure G.227 Park area (blue line) relative to 1958 aerial image (SHI Dapto-Ulladulla NSW Run GK11 699-5039 23/07/58)

Figure G.228 Park area on 2006 aerial image (Google Earth Pro 2011)

Recording ID: G2B H54		**GDA Map Reference:**	**296197.6152799 to 296152.6153045**
Name/Description:	**Dry Stone Wall**	*Cadastral Location*: *Street address:*	Lot 2 DP224377 455 Princes Highway Broughton Village
Item/Site Type:	Dry stone wall, Toolijooa Ridge		

Context/setting:	This site consists of a section of dry stone wall located approximately along the western (upslope) boundary of the current highway easement where it traverses the upper slopes of the Toolijooa Ridge.
Description/fabric:	Access to the wall is currently severely limited by dense overgrowth. As a consequence, the remaining length of the wall and its condition over that interval remains to be confirmed. The wall is accessible and visible in only a small number of places. Based on limited observation, and an interpretation of the contouring of the densely vegetated western side of the highway easement, it is possible that an approximately 230 metres section of wall may be present. The wall appears to vary in height above the road, from roughly level or below at its southern end, where it appears to end at a small gully, and up to three metres above mid way along its possible length. Based on observations at its southern end, the wall appears to have been constructed using the 'double dyke' technique which is characteristic of the Kiama and Foxground walls (Figures 6.229 & 6.234). The wall is currently acting as a partial retaining wall, with a substantially higher ground level on the upslope side. It is unclear however if the wall was constructed with this function in mind, or downslope soil creep has created this effect.
Dimensions:	The base of the wall is approximately 1.0 metres to 1.2 metres wide and the height roughly 1.1 metre. The confirmed length of wall is in the order of 100 metres. The potential surviving length is around 230 metres.
Physical condition:	Areas of partial collapse and missing copestones are noted. The full condition of the wall remains to be documented. The wall is no longer relied upon to define or enforce an enclosure.
Integrity:	Yet to be determined.
Associated features:	-
Current use:	Disused, partially ruined
Heritage listings:	The Kiama Municipal Council considers that all dry stone walls within the Kiama Local Government Area are included within a listed item for 'dry stone walls' on Schedule One (Items of Environmental Heritage) of the Illawarra Regional Environmental Plan No. 1 (first gazetted in 1986) (pers. comm.. Andrew Knowlson, Director of Environmental Services, Kiama Municipal Council, 5 Oct 2011). This Schedule listing consists of: 'Dry stone walls, Jamberoo, Dunmore and Foxground Areas, Kiama.' Given the reference to specific areas, the degree to which this definition is inclusive or exclusive of walls elsewhere across the Kiama LGA remains ill-defined. The Draft Kiama LEP 2010 (Kiama Heritage Inventory), contains an inclusively defined item for all 'stone walls' in the Kiama Local Government Area.

Historical background/interpretation:

The following historical outline has been drawn from Mayne-Wilson 1998, 2000; and RTA Environmental Technology 2006).

As part of the land clearing process, loose and surface rock was often removed and d. Where the collected rock was of a suitable quality, this practise provided a ready resource for early landowners to define property boundaries and enclose sections of their properties through the construction of dry stone walls. The earliest examples were probably built using convict labour or by early farmers in the 1840s lacking technical knowledge of dry stone wall building. As a result, it is expected that few walls of this period have survived (Mayne-Wilson 1998: 2).

The earliest skilled stone wall builder in the Kiama region is recognised as being Thomas Newing (1832 – 1927), who arrived from Kent in 1857 aged 22. Newing was taught stone wall building by Mr W. Cook of Longbrush (south of Kiama), and built his first wall in Foxground that same year. He soon perfected the 'double dyke' or twin skin technique of dry stone wall construction, and after 18 months began to undertake work independently throughout the region, having been said to have surpassed the skills of Mr Cook (Mayne-Wilson 1998: 3). This method, which is well distributed throughout Kiama, consists of two walls leaning toward each other (in an A-frame), with smaller stones used as infill, and heavier coping stones laid on top to bind the walls together (Figure G.229). The walls were generally built for the demarcation of property alignments, both along roads and Lots, as well as internal subdivisions.

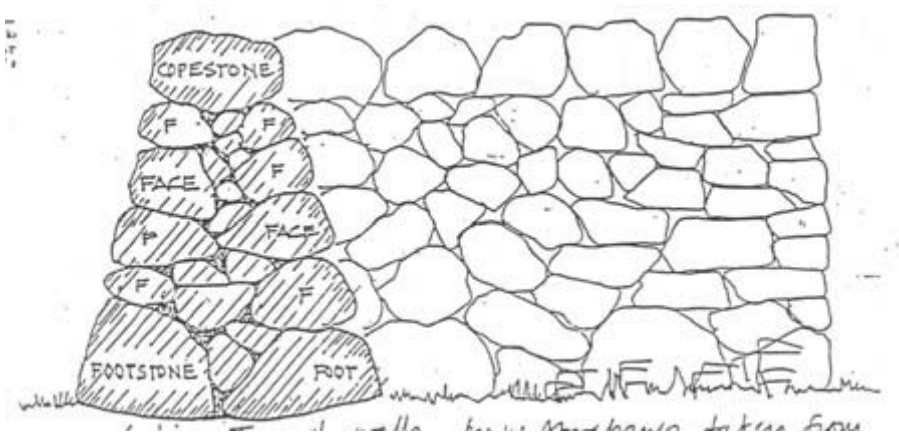


Figure G.229 Diagram illustrating the typical form of a 'double dyke' dry stone wall (from Register of the National Trust inventory listing for 'Dry Stone Walls Conservation Area' Kiama, In RTA Environmental Technology 2006)

From an account in the Sydney Morning Herald (24th March 1936), Newing's son Thomas, recounted that following the successful construction of a stone wall for Mr Joseph Pike of Kiama, his father sought to master the trade, and later became an expert at it. He was noted for his skill in manipulating the local stone and for his ability to interlock the facing stones to attain maximum stability and strength. Having generated interest from local landowners, Newing continued to construct walls around Kiama with his son until 1917, aged 85. Newing Jr stated that his father was responsible for the creation and/or overseeing of 95% of the stone walls in Kiama, with other wall builders of the time, Prott and Dietz, unable to compete to the same degree (Mayne-Wilson 1998: 16).

Stone walls were built extensively until 1880, when wire became cheaply available for fencing.

In a 2000 study commissioned by the Kiama Shire Council, Mayne-Wilson and Associates aimed to locate, record and assess the heritage values of every wall within the Shire. Over a three month period 379 walls were located and recorded (Mayne Wilson and Assoc 2000). Five different types of walls were identified:

- Roadway boundaries.
- Lot and paddock boundary fences (the most numerous).
- Holding yards (often found surrounded by stands of cultural plantings).
- Retaining walls (uncommon).
- modern examples (including town markers and private constructions in suburban subdivisions).

The G2B H54 wall has not been formally recorded before and does not appear in the inventory of known walls within the Mayne-Wilson 2000 study. It is the only dry stone wall as yet to be formally recorded on the Toolijooa Ridge. Given the surface geology of the ridge crest, there is potential for other dry stone walls to be present, although no obvious examples are visible on aerial photography (including the G2B H54 example).

The alignment of the G2B H54 wall along the upslope boundary of the highway easement suggests that it served as a roadway boundary. An alternative, or additional function, would be as a retaining wall on this steep slope. The close association with the current highway corridor provides a maximum age of approximately the 1870s - the period when the current highway alignment, replaced the Berry Estate Road, which is situated on the spur crest some 80 metres to the south. The construction of this wall may have been a component of the 1870s highway alignment, or subsequently sponsored by the Berry Estate for a leasehold farm, or by a freehold farmer following the sale of the farm around the turn of the twentieth century.

These potential time frames place construction within the active career of Thomas Newing, however further research and site recording is required before this wall can be linked with the Newing legacy.

Figure G.230 General view of the Princes Highway corridor, just east of the Toolijooa Ridge crest, looking S. A dry stone wall, obscured by vegetation, is located approximately along the western road easement boundary (yellow dotted line)

Figure G.231 General view of the Princes Highway corridor, east of the Toolijooa Ridge crest, looking NW. A dry stone wall, obscured by vegetation, is located approximately along the western road easement boundary (yellow dotted line)

Figure G.232 Extract from 1890s map of the northern Berry Estate, with an overlay of the approximate location of the G2B H63 dry stone wall (blue line. The condition and extent of the northern end of the wall is yet to be determined ('Part of the Berry Estates, Parishes of Broughton and Coolangatta, County of Camden' original at State Library of NSW, M_Ser4_000_1_MLMSS315_Map 17)

Figure G.233 Detail of dry stone wall , looking NW from near the southern known extent of the wall. Note partial collapse in foreground and large foot stones

Figure G.234 Detail of dry stone wall , looking NW from near the southern known extent of the wall. . Note clear double-dyke technique and higher ground level on upslope side of fence

G.6 Movable items

Recording ID: G2B H60 **GDA Map Reference: 294536.6152562**

Name/Description:	**Skid mounted work-site shed**	*Cadastral Location*:	Lot 9 DP3344
		Street address:	161 Princes Highway Broughton Village
Item/Site Type:	**Skid mounted work-site shed**		

Context/setting:	This recording is a movable (towable) shed, currently located at the rear (southeastern end) of the Greystanes Lodge farmhouse, 161 Princes Highway, Broughton Village.
Description/fabric:	The shed consists of a rectangular sawn hardwood stud frame clad with corrugated iron on the exterior walls and roof (painted green), and masonite panelling on the interior (painted cream). The floor is hardwood boards. The roof has a single slope, elevated on the door side. A single window is set on one side, opposite a ply and cross-boarded single door. The window is protected by a metal grid mounted over the exterior of the window. Two cupboards (now missing doors and shelves) have been installed into the two corners on the right side of the door, and a bench top spans the two cupboards. Two hardwood skids, separated and supported by two horizontal metal supports and a diamond configuration of angle iron, have been attached to the floor beams parallel to the long axis of the shed Use of the shed in the past as a horse bridle and tackle shed has been accompanied by the fixing of multiple wooden boards around the walls to fix nails and hooks for hanging items.
Dimensions:	The shed has approximate dimensions of 2.3 x 3m and up to 2.3 metres high
Physical condition:	The shed is in relatively good condition with the exception of some missing and torn sections of the masonite cladding on the interior (window) wall and, all of the ceiling cladding. A limited amount of paint and spirit felt tip pen graffiti is evident on the interior walls. Some related to the recent use as a horse tackle shed.
Integrity:	The cupboards installed into two corners of the shed and associated bench appear to be contemporaneous with the construction of the shed. Apart from the superficial addition of wall boards to affix hooks and nails, there does not appear to have been major additions or renovations to the shed. The original exterior swing bolt door latch has been replaced for a larger example.
Associated features:	-
Current use:	Ad hoc storage (especially for swimming pool equipment and supplies.
Heritage listings:	no current listings

Historical background/interpretation:

Masonite was invented in the USA in 1924 and production started in 1925. It was licensed for production in Australia and became available from 1931 (http://www.fundinguniverse.com/ company-histories/Masonite-International- Corporation-Company-History.html; http://mileslewis.net/australian -building/pdf/05-timber-frame/5.11%20bldg%20boards.pdf).

The 1930s are thus a maximum age for this structure. It is considered likely that by the 1960s metal framed and prefabricated sheds would have replaced this form. The utilitarian character of this structure, including the window grill, and absence of air vents, suggests a function as a storage or low frequency works shed/site office for a building site or other industrial activity area. The installation of skids points to a need for flexibility in positioning and ease of re-location. These all point to an original function as an on-site work shed or office at a construction site or depot. Skids are still used on work sheds today.

The materials, construction, colour, fittings all suggest a 1940s or 50s origin.

Figure G.235 Exterior of shed and door side, viewed from a corner

Figure G.236 Detail of metal grid over window

Figure G.237 Detail of the metal cross bracing between the wooden skids and floor

Figure G.238 Interior views, showing interior of door and cupboards and bench constructed at one end.

Figure G.239 Interior view showing damage to interior wall cladding and addition of wall boards for hanging items

Figure G.240 Detail of wood skid mounted below floor (door side)

Appendix H

Detailed significance assessment

Detailed significance assessment

H.1 Nineteenth century road remnants

Recording ID:	**G2B H19, 22, 23, 27, 30 & 55**	**Name/*Description*:**	**Remnants of Berry Estate road (c.1856 – 1870s)**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The nineteenth century remnants of the Berry Estate road are examples of a former transport corridor that was locally important as the first north-south communication route that moved inland and bypassed Seven Mile Beach. These remnants are also important as an example of a private road that was distinctive in its use of long straight sections, which often traversed steep spurs and ridges without apparent regard for the consequentially steep gradients. The Berry Estate road is also important as a transport corridor that has in many places been retained to the present day by the current Princes Highway alignment.

The six remnants (G2B H19, 22, 23, 27, 30 and 55) of this road identified in the course of this project are all assessed to be of local importance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The remnants of the Berry Estate road have a strong association with Messrs Alexander and David Berry, who were instrumental in the private construction of this road. Alexander and David were also of local importance due to their prominent role in European settlement. They were key figures in the nineteenth century development of the lower Shoalhaven through their development and promotion of their estate lands. This included the establishment of private towns, promotion of local industry and development of agricultural infrastructure.

The six remnants (G2B H19, 22, 23, 27, 30 and 55) of this road identified in the course of this project are all assessed to be of local importance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The nineteenth century remnants of the Berry Estate road are not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. These items are assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the remnant sections of the Berry Estate road. These items are assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The remnant sections of the Berry Estate road have the potential, both individually and as a group, to yield information that would contribute to an understanding of nineteenth century road construction and use. In particular, these items have the potential to provide insights into the nature of what was once a ubiquitous road type, but for which relatively little information or evidence is readily available.

A combination of archaeological excavation and survey could potentially provide information on road dimensions, pavement types, methods of construction, drainage and other aspects of design, phases of modification and site chronology.

While all six of the road remnants identified in the course of this project are assessed to have local significance against *criterion e*, it is noted that items G2B H23, 27 and 30 are all particularly good examples with relatively good integrity.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Examples of nineteenth century private roads are a relatively little known site type. Moreover, the once ubiquitous bullock dray roads that provided one of the primary transport routes between many nineteenth century settlements are rarely preserved/identified. It is also unusual to be able to identify a series of road sections such as these that can all be traced to the same road alignment at a fairly discrete period in time.

The six remnants (G2B H19, 22, 23, 27, 30 and 55) of this road identified in the course of this project are all assessed to be of local importance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The remnant nineteenth century road sections are important as local examples of bullock dray routes; they are also locally important as examples of the private road established by Alexander and David Berry across the Berry Estate. Item G2B H23 is of note as the longest and best conserved example identified. G2B H27 is notable for containing a series of straight section, which are characteristic of the Berry Estate road. G2B H30 is important as an example that demonstrates both shallow road cuttings and well defined sections of road with side ditches. G2B H55 notable as a remnant that is easily discernible due to the significant relief of its features.

Four (G2B H23, 27, 30 and 55) of the six remnants of this road identified in the course of this project are assessed to be of local importance against *criterion g*. Items G2B H19 and 22 are assessed as not having significance against this criterion.

Assessment of constituent elements

Element	Grading	Justification
G2B H19	Moderate	Comprises vestigial remnants
G2B H22	Moderate	Is a relatively small section that is used as a modern track - contributes to the overall significance of this group of items.
G2B H23	High	Large, well conserved remnant
G2B H27	High	Series of original characteristic straight segments
G2B H30	High	Well preserved road section that displays side ditches and varying ground relief
G2B H55	High	Readily discernible road remnant

Statement of heritage significance:

The remnant sections of the nineteenth century Berry Estate road are representative and relatively rare examples of a transport corridor that was locally important as a private road and as the first inland route that bypassed Seven Mile Beach.

These road remnants have a strong association with Messrs Alexander and David Berry, who were of local importance due to their prominent role in European settlement. They also display the potential to yield information, through archaeological excavation and survey, that would contribute to an understanding of nineteenth century road construction and use.

H.2 Twentieth century highway remnants

Recording ID:	**G2B H12, 15, 18, 20, 21, 24, 26 & 57**	**Name/*Description*:**	**Remnant portions of twentieth century highway**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The section of remnant highway at G2B H26 was established in the late nineteenth century; it replaced the 1856 Berry Estate road and was in use until the 1930s. This item encompasses a corner that was known as "Binks' Corner", a danger spot that was eventually bypassed in 1936. This recording is locally important as an example of significant changes to the road network, including modifications in response to dangers for motorised transport on a road initially developed for non-motorised transport.

Item G2B H26 is assessed as being of local significance against *criterion a*.

Items G2B H12, 15, 18, 20, 21, 24 and 57 are assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The remnant highway at G2B H26 is directly linked to a family of local importance: the Binks Family. The name, T. Binks, presumably Thomas Binks, is listed on an 1890s map as the tenant farmer of 128 acres of upper catchment slopes within the Berry Estate. The Binks' were also a large family who made a lasting contribution to the local and wider community through the dairy industry. The link between the Binks family and G2B H26 is demonstrated by the fact that the tight corner within this remnant portion of highway is known as "Binks' Corner"; it owes its name to its proximity to the Binks Family property, *Sedgeford* (G2B H24)

Item G2B H26 is assessed as being of local significance against *criterion b*.

Items G2B H12, 15, 18, 20, 21, 24 and 57 are assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The twentieth century highway remnants are not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. These items are assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the remnant sections of the twentieth century highway. These items are assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

Items G2B H20, and 21 are remnant sections of the 1930s highway that appear to be relatively well preserved. It is likely that further investigation, such as archaeological survey and excavation, would contribute to an understanding of construction standards and tolerances of a main road corridor from the first half of the twentieth century.

Similarly, G2B H26 appears to be a well preserved and relatively extensive section of road. Further investigations at this item may reveal whether culverts exist in association with the creek crossings, and if any original road surface has survived, which would in turn contribute to an understanding of early twentieth century highway design and construction.

Items G2B H20, 21 and 26 are assessed as being of local significance against *criterion e*.

Items G2B H12, 15, 18, 24 and 57 are assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Items G2B H15 and 26 are both notable for their rarity. G2B H15 is unusual as a portion of the early twentieth century highway (alignment formalised in the 1880s) that is preserved as a sealed section of road that, while no longer part of the Princes Highway, remains in use for access to private properties. This item retains many features of the 1950s highway easement.

The recording G2B H26 is unusual as a relatively well preserved example of an early twentieth century danger spot on the highway. It is rare to have an extant section of road that is directly associated with a fatal accident from the early years of motorised transport.

Items G2B H15 and 26 are both assessed as being of local significance against *criterion f*.

Items G2B H12, 18, 20, 21, 24 and 57 are assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The remnant sections of twentieth century highway at G2B H15 and 26 are important in demonstrating the principal characteristics of late nineteenth century road alignments and early twentieth century road design and construction (specifically the characteristics of 1930s (G2B H26) and 1950s (G2B H15) highway easements). As outlined above, these items are relatively rare, which adds to their importance as items that display these characteristics.

Items G2B H15 and 26 are assessed as being of local significance against *criterion g*.

Items G2B H12, 18, 20, 21, 24 and 57 are assessed as not having significance against this criterion.

Assessment of constituent elements

Element	Grading	Justification
G2B H12	Little	Poorly preserved, difficult to interpret
G2B H15	Moderate	Well preserved section of road that displays elements of the 1950s highway easement.
G2B H18	Little	Poorly preserved, difficult to interpret
G2B H20	Moderate	Relatively well preserved corner from the turn of the century; has the potential to contribute to overall understanding of the twentieth century highway.
G2B H21	Moderate	Relatively well preserved corner from the turn of the century; has the potential to contribute to overall understanding of the twentieth century highway.
G2B H24	Little	Poorly preserved, difficult to interpret
G2B H26	High	Well preserved section of road that is integral to the overall significance of this group of items.
G2B H57	Little	Poorly preserved, difficult to interpret

Statement of heritage significance:

The twentieth century road remnants comprised by the recordings G2B H15, 20, 21 and 26 form an important example of elements of early twentieth century highway design, construction and modification.

In particular, G2B H26 is important in the course of local highway upgrades; it is also directly associated with the Binks, an early tenant farming family that is of importance due to its involvement with the development of the local dairy industry.

Items G2B H20, 21 and 26 all have the potential to yield information regarding standards in early twentieth century road design and construction, and G2B H15 and 26 are notable in terms of their rarity and representativeness.

Remnant recordings G2B H12, 18, 24 & 57 all fall below the threshold of significance defined in the assessment criteria.

H.3 Standing buildings and structures

Recording ID: G2B H10 **Name/*Description*: Cottage (72 North St. Berry)**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The cottage at G2B H10 was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The cottage at G2B H10 does not have strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The cottage at G2B H10 is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the cottage at G2B H10. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The cottage at G2B H10 does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Early twentieth century cottages such as the one at G2B H10 are a relatively common site type. There are numerous local examples of such buildings. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The cottage at G2B H10 is not a good example of its type, it has few original exterior materials or features. This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The cottage at G2B H10 does not meet any of the significance criteria. This item falls below the threshold for heritage listing.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The house at G2B H11 was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The house at G2B H11 does not have strong or special association with the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The house at G2B H11 is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the house at G2B H11. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The house at G2B H11 does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The house at G2B H11 is not rare or uncommon. There are numerous local examples of Federation period farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The *GlenDevan* house is a well conserved example of Federation architecture and it is representative of accommodation constructed late in the history of the Berry Estate. As such, G2B H11 is important in demonstrating the principal characteristics of a Federation period tenant farm house on the Berry Estate.

The house at G2B H11 is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The *GlenDevan* house (G2B H11) is of local significance as a representative example of Federation period housing on the Berry Estate.

Recording ID: G2B H13	Name/*Description*:	Burnett Estate Overseer's Cottage

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The overseer's cottage at G2B H13 was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The overseer's cottage at G2B H13 does not have strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The overseer's cottage at G2B H13 is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the overseer's cottage at G2B H13. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The overseer's cottage at G2B H13 does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The overseer's cottage at G2B H13 is not rare or uncommon. There are numerous local examples of early twentieth century cottages. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

With the exception of the enclosed verandah, the overseer's cottage at G2B H13 is in original condition. It is a very good example of an early twentieth century, horizontal weatherboard cottage and is typical of an overseer's cottage from this period.

The Burnett Estate Overseer's Cottage at G2B H13 is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The Burnett Estate Overseer's Cottage at G2B H13 is a well preserved and locally representative example of an early twentieth century weatherboard overseer's cottage.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

Mananga Homestead is of local historical importance as the former residence for the Berry Estate Manager. It was a key component of the Berry Estate and as such is of integral importance to the course of the history of the estate.

This item is also of local importance as a component of the development and operation of Broughton Creek village.

G2B H16 is assessed to be of local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The original 'Mananga Cottage' was built for William Stewart, who was an individual of local importance. He was an acquaintance of David Berry and he helped control the Berry Estate through his role as first Commissioner of Peace for the Broughton district. William's brother, Donald, was the first Post Master at Berry, the Post Office being 'Old Mananga Cottage'.

William's son John purchased the Mananga land following the break-up of the Berry Estate. He built the existing 'Mananga Homestead', within which he set up his office as the first registered auctioneer in NSW.

William and John were also both involved in the formation of the Municipality of Broughton Creek and Bomaderry and the establishment of the local Agricultural Society and the School of Arts.

The Mananga homestead remained in the ownership of the Stewart family until 1992.

Due to this item's association with the Stewart family, and in particular William, Donald and John, G2B H16 is of local significance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

Mananga Homestead has landmark qualities and is important in demonstrating a Federation Queen Anne homestead with Art Nouveau character within in a mature garden setting.

G2B H16 is assessed as being of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Mananga Homestead complex at G2B H16. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

G2B H16 comprises a series of buildings that relate to a variety of activities and phases of occupation from the nineteenth century through to the present day. The site also includes traces of water race for the 1830s Berry Estate saw mill.

Further investigation in the form of archaeological survey and excavation would be likely to yield information that would contribute significantly to an understanding of the history and development of Mananga homestead, Broughton Village, the Berry Estate mill and the Berry Estate as a whole.

Mananga Homestead is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The Mananga homestead complex is not rare or uncommon. There are numerous local examples of late nineteenth to early twentieth century homesteads. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The Mananga homestead complex demonstrates the principal characteristics of a site that has been occupied and modified over various phases since the early nineteenth century, including an accretion of outbuildings and a shift in location of the main house from 'Mananga Cottage' to the current 'Mananga Homestead'. The current homestead is also an excellent example of a Federation Queen Anne style house with Art Nouveau character.

G2B H16 is assessed as being of local significance against *criterion g*; it is representative of its type.

Assessment of constituent elements

Element	Grading	Justification
Old Mananga	Exceptional	An integral component of the complex that is linked to William, Donald and John Stewart.
Mananga Homestead	Exceptional	An excellent example of its type, readily interpretable, directly linked to John Stewart.
Outbuildings	Moderate	Important in understanding the site complex as a whole, not of direct heritage significance on their own
Mill race deposits	High	An important component of the complex that has direct potential to yield information.

Statement of heritage significance:

The Mananga Homestead and the broader site complex are of local historical importance due to their role in the course of the history and development of the Berry Estate and Broughton Creek Village. Mananga Cottage and Mananga Homestead are both directly linked to important members of the Stewart Family, and as such have a strong and special historical association.

The complex as a whole, and the Mananga Homestead in particular, display landmark qualities and are important in demonstrating aesthetic characteristics of a Federation period homestead. The site also has the potential to yield information that would contribute significantly to an understanding of the history of and development of the site, the Berry Estate and Broughton Creek Village. Of particular note is the existence of traces of the water race from the 1830 Broughton Creek saw mill.

This item is also locally representative of a complex with multiple phases of occupation and a Federation Queen Anne style farm house with Art Nouveau character.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Hillview* homestead is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Hillview* homestead does not have strong or special association with the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Hillview* homestead is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Hillview* Homestead. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The homestead at *Hillview* is an example of a relatively early vertical slab 'L' shaped house from the Berry Estate. It is likely that archaeological/architectural survey of the building, and possibly even excavation of associated deposits, would yield significant information regarding the construction techniques, influencing styles, and occupation phases. Investigations of this nature would contribute to an understanding of the organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

G2B H17 is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

This item is a well preserved example of an early slab house from the Berry Estate. While the sites of structures of a similar age are known to occur locally (eg G2B H52), examples of extant buildings such as this, particularly slab structures, are rare.

G2B H17 is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The *Hillview* homestead is a relatively well preserved example of a vertical (sawn) slab homestead with hipped roof and five original rooms on a revered 'L' shaped plan with kitchen forming the back wing. It is characteristic of a Scottish style of house layout that appears to be associated with the Berry Estate.

This item is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The *Hillview* homestead is a locally rare and representative example of a mid-nineteenth century slab house from a Berry Estate tenant farm. It is characteristic of a Scottish style of house layout and it has the potential to contribute, through archaeological survey/excavation to an understanding of organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Sedgeford* homestead and gardens were not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Sedgeford* homestead and gardens were established by Thomas Binks and Mary Hetherington. The Binks' were a large family who made a lasting contribution to the local and wider community through the dairy industry. All of Thomas and Mary's daughters were married in the front room of the homestead.

This item is assessed as having local significance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Sedgeford* homestead and gardens are not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Sedgeford* homestead and gardens. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The *Sedgeford* homestead and gardens do not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The *Sedgeford* homestead and gardens form a relatively common site type. There are numerous local examples of Federation period farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

While the *Sedgeford* homestead and gardens are not a rare site type, G2B H25 is representative of an early twentieth century dairy farm in association with a disused highway alignment; it retains well preserved examples of the Federation period homestead and the associated gardens.

G2B H25 is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The *Sedgeford* homestead and gardens have a strong and special association with the Binks Family, a well-known local family who have, since the beginning of the twentieth century, made a lasting contribution to the local and wider community through the dairy industry.

G2B H25 is representative of an early twentieth century dairy farm in association with a disused highway alignment; it retains well preserved examples of the Federation period homestead and the associated gardens.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The Brookside homestead was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The Brookside homestead comprises two salvaged structures, one of which appears to be from portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. Anthony Finn was an individual of local importance as someone granted land, due to his role in the apprehension of a bushranger, in an area dominated by larger estates. The element of the homestead that originates from portion 181 appears to date to the mid to late nineteenth century, and as such is unlikely to be the original Finn residence; it is more likely the residence of Dicky Woods, who does not have the same level of local importance.

On the basis of the available information from research and field survey, G2B H28 cannot be definitively assessed against this criterion. It appears unlikely to be of significance against *criterion b,* however this may be revised if stronger link can be established between this site and Anthony Finn.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Brookside homestead is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Brookside homestead. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The sandstone retaining walls and earth platforms that mark the location of former structures and yards, notably in association with a former dairy, and a former structure on slopes to the south of the tributary stream at G2B H28 have the potential to yield information, through archaeological excavation and survey, that will contribute to an understanding of the history of the local dairy industry.

The Brookside homestead comprises two salvaged structures, one of which appears to be from portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. This portion is somewhat unique in the local area as an example of an early small farm that was not a tenant farm of one of the larger estates. As such, investigation and analysis of the Brookside homestead's constituent elements, in particular the section from portion 181, may yield information that will help in interpretation of deposits at G2B H59.

The Brookside homestead is assessed as having local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The Brookside homestead is a relatively common site type. There are numerous local examples of similar early twentieth century farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The retaining walls, earth platform and yards associated with the former dairy at G2B H28 have the potential to be representative of archaeological remains of an early twentieth century dairy.

This item is assessed as potentially having significance against *criterion g*.

Statement of heritage significance:

The Brookside homestead comprises two salvaged structures, one of which appears to be from portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. Investigation and analysis of the Brookside homestead's constituent elements, in particular the section from portion 181, may yield information that will help in interpretation of deposits at G2B H59.

The archaeological traces of former structures, including a dairy, at G2B H28 have the potential to yield information that will contribute to an understanding of the history of the local dairy industry. They also have the potential to be representative of such a site.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The Broughton Creek Bridge was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The Broughton Creek Bridge does not known for any strong or special association with the life or works of anyone of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Broughton Creek Bridge embodies the design principles and construction techniques applied to modest concrete bridges during the period 1925-1948, being a sturdy structure of a standard concrete beam design, poured on site and neatly finished. The widened bridge represents an excellent adaptation to achieve a wider deck without the need for additional piers, and has retained the spacious and clean lines of the original structure, with most of the original fabric remaining unaltered, and the views to and from the structure, which allow its interpretation, have been maintained.

G2B H29 is assessed as being of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Creek Bridge. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The bridge has the ability to contribute to an understanding of heritage conservation itself and to sympathetic approaches to the continued use and adaptation of older structures.

G2B H29 is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

This bridge is apparently unique in its method of widening which has minimised the impact of supporting the extra width on the basic structural support system.

G2B H29 is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Although widened, the bridge retains the capacity to demonstrate the key structural and aesthetic characteristics of reinforced concrete beam bridges of the period 1925-48.

G2B H29 is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The Broughton Creek Bridge's construction is associated with the grand scheme of highway improvement undertaken by the Main Roads Board cum Department of Main Roads in an attempt to bring the State's main roads up to the standard required by the modern motoring age emerging in the inter-war period. As a widened bridge, it represents the continual process of upgrading required in response to the increased volume, weight and speed of traffic on this busy highway.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Glenvale* homestead is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Glenvale* homestead does not have strong or special association with the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Glenvale* homestead is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Glenvale* Homestead. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The homestead at *Glenvale* is an example of a relatively early vertical slab 'L' shaped house from the Berry Estate. It is likely that archaeological/architectural survey of the building, and possibly even excavation of associated deposits, would yield significant information regarding the construction techniques, influencing styles, and occupation phases. Investigations of this nature would contribute to an understanding of the organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

G2B H45 is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

This item is a well preserved example of an early slab house from the Berry Estate. While the sites of structures of a similar age are known to occur locally (eg G2B H52), examples of extant buildings such as this, particularly slab structures, are rare.

G2B H45 is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The *Glenvale* homestead is a well preserved example of a vertical (sawn) slab homestead with hipped roof and five original rooms on a revered 'L' shaped plan with kitchen forming the back wing. It is characteristic of a Scottish style of house layout that appears to be associated with the Berry Estate.

This item is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The *Glenvale* homestead is a locally rare and representative example of a mid-nineteenth century slab house from a Berry Estate tenant farm. It is characteristic of a Scottish style of house layout and it has the potential to contribute, through archaeological survey/excavation to an understanding of organisation and operation of the Berry Estate as well as the living conditions and social status of tenant farmers.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

St Patrick's Church and grounds is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

St Patrick's Church is not notable in terms of a strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

St Patrick's Church is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

St Patrick's Church (constructed 1936), and associated grounds, has a history of association with the Catholic Church dating back to the 1880s, when the original weatherboard church was built on this site. It continues in use as a Church and the convent is used as a Church centre.

Due to this continued strong association with the local Catholic community this item is assessed as being of local significance against *criterion d.*

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

St Patrick's Church and grounds do not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The former St Patrick's Convent is a locally rare item. Examples of convents are uncommon.

This item is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

St Patrick's Church and former Convent are locally representative in terms of an early twentieth century Catholic site complex and inter-war religious architecture.

G2B H47 is assessed as being of local significance against *criterion g*.

Assessment of constituent elements

Element	Grading	Justification
St Patrick's Church	High	The Church is a well preserved and integral component of this site; it is readily interpreted and continues in use.
St Patrick's Convent	High	This is an excellent example of a locally rare site type.

Statement of heritage significance:

St Patrick's Church and grounds, including the former St Patrick's Convent, are strongly associated with the local Catholic community; the site has been associated with the Catholic Church since the late nineteenth century.

The former convent is a locally rare site type and the complex as a whole is representative of inter-war religious architecture and a Catholic site complex.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Oakleigh* homestead at G2B H49 is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Oakleigh* homestead at G2B H49 does not have strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Oakleigh* homestead at G2B H49 is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Oakleigh* homestead at G2B H49. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The *Oakleigh* homestead does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The *Oakleigh* homestead is not rare or uncommon. There are numerous local examples of 'inter war' period farmhouses. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The farmhouse at *Oakleigh* homestead is in excellent condition and retains its original 1930s configuration, including the characteristic incorporation of many pre 1930s architectural items that were recycled. This building is representative of construction from this period.

The *Oakleigh* homestead is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The homestead at G2B H49 is locally representative of 1930s farm house construction. It is a well preserved example of its type.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The *Clare May* Cottage was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The *Clare May* Cottage is not known for any strong or special association with the life or works of anyone of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The *Clare May* Cottage is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the *Clare May* Cottage. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The *Clare May* cottage does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The *Clare May* Cottage is a relatively common site type. There are numerous local examples of similar late nineteenth/early twentieth century farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The *Clare May* Cottage is not a good example of its type; many of its exterior materials or features have been altered. This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The *Clare May* Cottage does not meet any of the significance criteria. This item falls below the threshold for heritage listing.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

Graham Park Research Station is of importance at local and State levels as one of the first Artificial Insemination Breeding Stations (the AIBS) in New South Wales. The Graham Park research station was the first commercial artificial stock breeding centre in NSW and made major contributions to Australia's stock breeding industry.

This item is important at local and State levels in terms of the history of agricultural research, and in particular stock breeding. The historical importance of the research station derives in part from the fact that it is a legacy of earlier agricultural research (the Experiment and Stud Farms), established by the Berry Estate in 1899 under the direction of Alexander Hay.

G2B H51 is assessed as being of local and State significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

This item is named after the Hon. Edward Graham, one of the longest serving NSW Minister's for Agriculture. As such, Graham Park Research Station has a direct link with the life and work of an individual of State importance.

The research station is also historically linked with Alexander Hay and the sponsorship of agricultural research in the final decades of the Berry Estate by its trustees.

G2B H51 is assessed as being of State significance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

Graham Park Research Station played an important role in the development of artificial insemination in NSW; it also made major contributions to Australia's stock breeding industry.

Due to the role of Graham Park in agricultural research during the twentieth century, this item is assessed as being of local and State significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for *Graham Park*. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

Archaeological analysis of the Graham Park Research Station, inclusive of survey and potentially excavation, has the potential to contribute to an understanding of the establishment, development and operation of agricultural research stations. While there are various historical documents that relate to different aspects of the site's history, archaeological investigation of such a comprehensive and well conserved site would undoubtedly provide alternative insights into the complex's history.

G2B H51 is assessed as being locally significant against *criterion e*. There is also the potential that this item may be of State significance against this

criterion, however this could only be determined through investigation of, and comparison with, similar sites across NSW

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

This item is relatively unusual as a fairly intact example of an agricultural research institute. It is also rare in terms of its role in the early development of artificial insemination in NSW.

G2B H51 is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Graham Park Research Station is an excellent example of a twentieth century agricultural research station. The site remains relatively intact and includes administration buildings, laboratories and entrance grounds.

G2B H51 is of local and state significance against *criterion g*.

Statement of heritage significance:

Graham Park Research Station is of local and State importance in terms of its role in the development of agricultural research, in particular artificial insemination and stock breeding. It is also historically linked to pioneering research sponsored by the Berry Estate under Alexander Hay, and directly linked to the life and works of Edward Graham, an individual of State importance in the context of government policy on agriculture and agricultural development.

Graham Park also derives significance at local and State levels due to its contributions to agricultural research. The complex of buildings, laboratories, sheds and enclosures has the potential to yield information, through archaeological investigation, that would contribute to an understanding of the development and operation twentieth century agricultural research stations.

It is a locally rare site that is also representative of its type at local and State levels.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The Broughton Mill homestead and dairy was not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The Broughton Mill homestead and dairy is not known for any strong or special association with the life or works of anyone of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Broughton Mill homestead and dairy is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Broughton Mill homestead and dairy. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The Broughton Mill homestead and dairy site does not have the potential to yield significant information regarding local cultural history that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The Broughton Mill homestead and dairy is a relatively common site type. There are numerous local examples of similar early twentieth century dairy farms. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The Broughton Mill homestead and dairy was constructed in the early twentieth century and abandoned around the middle of the century. During its period of use it appears to have undergone relatively few modifications. As such, it is a good and locally representative example, albeit somewhat dilapidated, of an early twentieth century dairy farm.

G2B H56 is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The Broughton Mill homestead and dairy is a good and locally representative example, albeit somewhat dilapidated, of an early twentieth century dairy farm.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The Uniting Church Hall was the first building to be erected on land legally acquired in the new township of Berry; it was constructed in 1884 following donation of the land by David Berry in 1883.

The building originally operated as a chapel, and then as a church hall when a new church was built in 1932.

This item is important in the course of the development of Berry township and, in particular, the history of local religious worship. G2B H58 is assessed as being of local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The Uniting Church Hall is not known for any strong or special association with the life or works of anyone of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Uniting Church Hall is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

This item continues in use as a church hall; it has a strong association with the local Uniting Church community.

G2B H58 is assessed as being of local significance against *criterion d*.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The Uniting Church Hall does not have the potential to yield significant information regarding local cultural history that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Examples of Victorian Carpenter Gothic style buildings are locally rare. While there are other examples of Victorian Gothic churches (eg St Luke's Anglican Church), they are not weatherboard. The rarity of this item is increased by the fact that it was the first building erected on legally acquired land in the town and the building's history of use as, first a chapel and then a church hall.

This item is assessed as being of local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The Uniting Church Hall is a good example of a Victorian Carpenter Gothic style chapel. It displays the characteristic elements of the style including horizontal weatherboards and pointed gothic windows. Decorative bargeboards, consistent with the building's original style are currently being re-created and installed. The Chapel retains its original form and character.

This item is assessed as having local significance against *criterion g*.

Statement of heritage significance:

The Uniting Church Hall is of local historical importance as the first building to be erected on land legally acquired in the new township of Berry; it is also important in the course of the development of the township and its places of religious worship.

This item is also of local social significance due to its ongoing connection with the Uniting Church community.

The church hall is also a locally rare and representative item in terms of a Victorian Carpenter Gothic building.

H.5 Known or potential archaeological deposits

Recording ID: G2B H14 **Name/*Description*: Archaeological deposit (former C19th *Broughton Creek* town buildings)**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

On the basis of the available historical and archaeological information for G2B H14, the site appears to have played an important role in the nineteenth-century development of local commercial and government premises. While much of the site has been destroyed or disturbed by the current highway alignment, the test excavations at this site suggest that the site still contains evidence relating to spatial and chronological aspects of the urban development at Broughton Creek.

This item is assessed to be of local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

On the basis of the available historical and archaeological information regarding this item, it does not appear to have a strong or special association with the life or works of a person or group of local or State importance.

G2B H14 is assessed as not having significance against this criterion

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The site is not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. While the Berry Butter Factory was undoubtedly of importance at local and state levels as an early dairy factory, the site has been significantly impacted by construction of the current Princes Highway alignment, which has compromised the site's value against this criterion.

This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The archaeological deposits at G2B H14 have been assessed, on the basis of the test excavations, as having potential to provide information on the following aspects of the site's history:

- The width of the street frontage and the activities that took place in this area.
- The location of individual buildings or portions of their eastern limits.
- The location of individual lot boundaries that extend east to west across the site.
- Differing site functions across these lots.
- Overall site chronology from the mid nineteenth to mid twentieth-century.

As such, this item is assessed as having local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The archaeological deposits at G2B H14 are likely to be the only remaining evidence of the northernmost urban development at Broughton Creek. Furthermore, the deposits have not been subject to the same levels of ongoing development and disturbance as the street frontages in the centre of Berry.

As such, the deposits at G2B H14 are assessed to be of local importance against *criterion f* in terms of their rarity.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

G2B H14 is not considered to be exemplar in terms of archaeological evidence for either butter factories or nineteenth-century urban landscapes. This is due primarily to the extent of prior disturbance across the site.

However, given that the surviving portion of the site relates primarily to remains of street frontages from the turn of the nineteenth to twentieth-century, including early service easements; and since the site has not seen continued development into the twentieth and twenty first-century, it provides a potentially valuable window into a local example of the relationship between public and private spaces.

This item is assessed as having local significance against *criterion g* as a representative example of archaeological evidence for street frontages from the late nineteenth to early twentieth-century.

Statement of heritage significance:

The site G2B H14 is of importance in terms of the local history, particularly the development of nineteenth-century commercial and government premises and the road network. Excavations at the site have demonstrated that the G2B H14 archaeological deposits have the potential to yield information that will contribute to an understanding of site function(s), the spatial organisation of the urban landscape at Broughton Creek, and site chronology and formation processes.

The remaining deposits at G2B H14 are rare within the local Berry context as the only remnants of this northernmost portion of the urban landscape and as a representative example of a relatively undisturbed portion of a nineteenth century street frontage.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The site of the former Berry Estate tenant farm at G2B H48 is not a place that could be described as important in the course, or patter, of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

On the basis of the available historical and archaeological information regarding this item, it does not appear to have a strong or special association with the life or works of a person or group of local or State importance.

G2B H48 is assessed as not having significance against this criterion

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The site is not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

While it appears likely that construction of the twentieth century farmhouse has disturbed, or removed a portion of, the potential archaeological deposit at this site, potential remains for G2B H48 to yield information regarding late nineteenth century settlement. In particular, it has the potential to contribute to an understanding of the chronology, social status, living conditions and architecture of nineteenth century tenant farms on the Berry Estate.

The archaeological deposits at G2B H48 are assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Berry Estate tenant farms, both extant houses and places with potential archaeological deposit, are not locally rare or endangered.

This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Given that this site has been disturbed by later phases of occupation, it is not a particularly good example of its type.

This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The potential archaeological deposits at G2B H48 are locally significant as a site that may contribute to an understanding of life on Berry Estate tenant farms.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The site of the former Berry Estate tenant farm at G2B H52 is not a place that could be described as important in the course, or patter, of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

On the basis of the available historical and archaeological information regarding this item, it does not appear to have a strong or special association with the life or works of a person or group of local or State importance.

G2B H52 is assessed as not having significance against this criterion

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The site is not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

Although the integrity of deposits at this location have not been confirmed, its proximity to a former highway alignment that was bypassed in the mid 1930s means that this is the only surviving archaeological site of a former Berry tenant estate farm which retains its original configuration with the 1856 and 1870s highway alignment. As such, it forms part of a complex of recordings (including G2B H25, G2B H26 and G2B H27), and it has the potential to contribute to an understanding of the history of road alignment modifications as well as the history and nature of Berry Estate tenant farms as a whole.

This item is assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

As outlined above, this item is unusual as the only known local example of a former Berry tenant estate farm which retains its original configuration with the 1856 and 1870s highway alignment. It is also likely to be one of the less disturbed archaeological deposits associated with a Berry Estate tenant farm.

The potential archaeological deposits at G2B H52 are assessed as having local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Because this site appears to be a relatively rare example of a former Berry tenant estate farm which retains its original configuration with the 1856 and 1870s highway alignment, it is also important as a site that demonstrates the interrelationship between these early transport corridors and the locations of early farms.

The site is also important as an example of archaeological deposits for an early tenant farm that appears to potentially be relatively undisturbed.

Statement of heritage significance:

The potential archaeological deposits at G2B H52 relate to a nineteenth century Berry Estate tenant farm. This site is of local significance as a place that has the potential to yield information about tenant farms and the interrelationship between such sites and sequences of transport corridor modifications through the nineteenth and early twentieth centuries. It is also locally important as an example of a former tenant farm that maintains its original configuration with the 1856 and 1870s highway alignment and as a representative example of such a site.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The site of the former Berry Estate tenant farm structure at G2B H53 is not a place that could be described as important in the course, or patter, of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

On the basis of the available historical and archaeological information regarding this item, it does not appear to have a strong or special association with the life or works of a person or group of local or State importance.

G2B H53 is assessed as not having significance against this criterion

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The site is not of importance in terms of demonstrating aesthetic characteristics or a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

While it appears likely that the potential archaeological deposit at this site have been disturbed by more recent vegetation clearance and driveway construction, potential remains for G2B H53 to yield information regarding late nineteenth century settlement. In particular, it has the potential to contribute to an understanding of the chronology, social status, living conditions and architecture of nineteenth century tenant farms on the Berry Estate.

The archaeological deposits at G2B H53 are assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Berry Estate tenant farms, both extant houses and places with potential archaeological deposit, are not locally rare or endangered.

Given the relatively limited extent of this site, this item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Given that this site has appears to have been disturbed by later phases of occupation, and given the apparently limited extent of deposits, it is not a particularly good example of its type.

This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The potential archaeological deposits at G2B H53 are locally significant as a site that may contribute to an understanding of life on Berry Estate tenant farms.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The archaeological deposits at G2B H59 are potentially directly associated with the original land grant of Anthony Finn. This grant is of local importance as the only early small-scale land grant amongst the larger Berry *et al* grants. It is also important as a grant made in relation to Anthony Finn's role in apprehending a bushranger.

Due to this site's place in the local pattern of land alienation G2B H59 is assessed as having local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The archaeological deposits at G2B H59 are on portion 181, a 100 acre block associated initially with Anthony Finn and later with Dicky Woods. Anthony Finn was an individual of local importance as someone granted land, due to his role in the apprehension of a bushranger, in an area dominated by larger estates.

The deposits at G2B H59 are provisionally – to be confirmed through additional archaeological/historical investigations confirming this as the site of the Finn settlement – to be of local significance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The archaeological deposits at G2B H59 are not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for this item; it is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

This site appears to display relatively high levels of integrity in terms of the potential archaeological deposits. G2B H59 has the potential to yield information, through archaeological excavation/survey, to an understanding of early European settlement on a relatively small land grant. Investigations at this site may clarify the timing and nature of Finn's settlement and the subsequent occupation by the Woods. This is a period of local history, and a location, for which there are relatively few historical records; archaeological investigations would thus contribute significantly to an understanding of this aspect of local history.

The potential archaeological deposits at G2B H59 are assessed as being of local significance against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Portion 181 was an unusual land grant as it was such a small parcel of land amongst much larger estates. The potential archaeological deposits at this site are also relatively unusual as an example of early to mid-nineteenth century occupation that appears to have been subject to limited disturbance from later phases of occupation.

The potential archaeological deposits at G2B H59 are assessed as having

local significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

This item is important as an example of nineteenth century occupation on a small land grant. The potential archaeological deposits at this location appear to be a relatively well preserved example of a site with multiple phases of occupation dating back to the 1840s.

This item is assessed as having local significance against *criterion g* as a representative example of archaeological evidence for a small nineteenth century farm.

Statement of heritage significance:

The potential archaeological deposits at G2B H59 are of local significance as a site associated with early land alienation, in particular an unusually small land grant amongst a series of larger estates. The site also appears to be directly associated with Anthony Finn, an individual of local importance.

The potential deposits at G2B H59 have the potential to contribute to an understanding of the nature and phases of nineteenth century occupation. This site is also important as a relatively intact, rare and representative example of archaeological deposits relating to a local, small nineteenth century farm.

H.6 Miscellaneous site types

Recording ID: G2B H54 **Name/*Description*: Dry Stone Wall**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The dry stone wall at G2B H54 is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

The dry stone wall at G2B H54 does not have strong or special association with the life or works of a person or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

While the dry stone wall at G2B H54 is largely obscured by vegetation, dry stone walls are regionally (within the Illawarra) recognised as items with important aesthetic characteristics. As such, this item has the potential to be of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the dry stone wall at G2B H54. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The dry stone wall at G2B H54 has potential to yield information that is not readily available from other sources, given that it is a geographic outlier from the main distribution of walls and this may provide a revealing basis for comparison. It may be found that it reflects the traits of a separate builder, or owner. This item is assessed as having local significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

There are no other dry stone walls recorded on Toolijooa Ridge (although this does not mean that they do not exist). This recording is potentially the southernmost site of its type in the broader Illawarra region. Furthermore, dry stone walls built as retaining walls are rare: this recording currently acts as a retaining wall, although it is unclear whether it was originally built as such.

This item is potentially of local significance against *criterion f.*

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The dry stone wall at G2B H54 has been constructed using the ‘double dyke’ technique, which is characteristic of the Kiama and Foxground walls. It is locally important as the only known example demonstrating a construction technique that is locally characteristic.

This item is assessed as being of local significance against *criterion g*.

Statement of heritage significance:

The dry stone wall at G2B H54 is of local significance in terms of its aesthetic values, research potential, and its rarity as a fence type and regional outlier.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

This shed was not notable in the course or pattern of local cultural history. The item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

Based on currently available information, the shed G2B H60, does not have strong or special association with the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The shed G2B H60, is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the shed G2B H60. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The shed G2B H60, appears to have been constructed using materials and methods that are typical and conventional for its time. However, the design of the skids, towing attachments, and their method of attachment to the floor of the shed may not be represented or easily found in contemporary documentation. This component of the structure may have potential to contribute to an understanding of the economic, technical and social dynamics of works sites from the early to mid twentieth century. This item is assessed as having local significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The construction of sheds on skids is a common solution to the requirement for a periodically portable shed. The G2B H60 example, based on its design is suggestive of a shed used on a construction or similar work site where security and robustness was required. Owing to the lack of a suitable reference database, it has not been possible to determine if work-site sheds of this type, mounted on skids, and dating from around the middle of the twentieth century are rare. Certainly it is a reasonable proposition to consider that sheds of this type due to their function and context would have been subject to considerable use-wear, deterioration, and attrition/replacement. It is also likely that, as a category, they are absent or poorly represented in museum collections or reserves. With this background in mind, and taking a precautionary approach, this item is assessed as having local significance against this criterion.

Criterion (g):	*important in demonstrating the principal characteristics of a class of cultural place*	
	The G2B H60 shed is a relatively well preserved example of its type and is representative of the design and functional requirements of such a building.	
	This item is assessed as having local significance against this criterion.	

Statement of heritage significance:

The G2B H60 work-site shed on skids is a relatively well preserved and representative example of its type and demonstrates the design and functional requirements of such a structure. It is likely to be a rare example of this shed type, which is unlikely to be well documented, or represented in collections, museums or reserves. It is considered to have local significance under criteria e, f and g.

Recording ID: G2B H61 **Name/*Description*: Quarried Rock Outcrop, Broughton**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

This item is not notable in the course or pattern of local cultural history; it is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

There is no evidence for a strong or special association between this item and the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The quarried rock outcrop at Broughton is not notable in terms of aesthetic characteristics nor does this item demonstrate a high degree of technological or creative achievement. This item is assessed as not having significance against this criterion.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the quarried rock at Broughton. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The rock outcrop does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Sandstone rock quarries such as this are not uncommon or rare sites. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The quarried rock outcrop at Broughton is a well preserved and representative example of a local quarry for stone, probably used for early road construction.

This item is assessed as having local significance against *criterion g*.

Statement of heritage significance:

Quarried rock at Broughton (G2B H61) is a locally representative example of a small sandstone quarry for rock, probably used in early road construction.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

This item is not notable in the course or pattern of local cultural history; it is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

There is no evidence for a strong or special association between this item and the life or works of a person, or persons of local importance. This item is assessed as not having significance against this criterion.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The Poplar trees planted at Woodhill Mountain Road are important in demonstrating the aesthetic characteristics of a planned avenue of trees. This recording has landmark values in a local context.

The recording G2B H62 is assessed as being of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Poplar trees at G2B H62. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The trees at G2B H62 do not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The trees at G2B H62 are not rare or uncommon. There are numerous local examples of similar tree plantings. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The Poplar trees at G2B H62 are not important in demonstrating the principal characteristics of a tree planting; only six of the original nine trees are alive. This item is assessed as not having significance against this criterion.

Statement of heritage significance:

The Poplar trees planted at G2B H62 are a locally significant landmark and aesthetic landscape component.

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

Mark Radium Park is not notable in the course or pattern of local cultural history. This item is assessed as not having significance against this criterion.

Criterion (b): *strong or special association with the life or works of a person, or persons*

Mark Radium Park is named in commemoration of Jack McGee's show ring pony (Mark Radium), that held high jump records at Adelaide, Albury and Melbourne (1938). Between 1947 and 1955 Mark Radium was defeated only once in competition. Jack McGee and his pony are of sufficient local importance to have a park named after the pony, and as such, this item is assessed to be of local importance against *criterion b*.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

Mark Radium Park has landmark qualities as a local picnic area with native plantings, ornamental pond and associated landscaping.

This item is assessed as being of local significance against *criterion c*.

Criterion (d): *strong or special association with a particular community or cultural group*

There are no known strong or special community or cultural associations for the Mark Radium Park. This item is assessed as not having significance against this criterion.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

Mark Radium Park does not have the potential to yield information that is not readily available from other sources. This item is assessed as not having significance against this criterion.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

Recreation areas such as Mark Radium Park are a relatively common site type. This item is assessed as not having significance against this criterion.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

Mark Radium Park is not particularly notable as an example of a modern recreation area. This item is assessed as not having significance against this criterion.

Statement of heritage significance:

Mark Radium Park is listed on the Shoalhaven LEP heritage schedule as a place of local importance due to its aesthetic qualities and historical association with Jack McGee and his pony Mark Radium.

H.7 Cultural landscapes

Recording ID: SICPH CL **Name/*Description*: Southern Illawarra Coastal Plain and Hinterland Cultural Landscape**

Analysis against significance criteria

Criterion (a): *important in the course, or pattern, of cultural history*

The SICPH CL is of importance in the course of local history as an artefact of over 150 years of pastoral activity.

The cultural landscape contains readily identifiable evidence for a variety of historically significant themes including general land clearance and alienation, establishment and operation of the Berry Estate, development of nineteenth and twentieth century homesteads and development of the transport network that interlinked these places and joined them to places across the broader landscape of NSW.

The SICPH CL is assessed as being of local significance against *criterion a*.

Criterion (b): *strong or special association with the life or works of a person, or persons*

Creation of the SICPH CL has direct links to Alexander and David Berry through their roles in the establishment and operation of the Berry Estate. The evolution of this landscape can also be linked to important groups of people such as other early land grantees, tenant farmers and Robertson Land Act selectors, all of whom were important in local history.

The SICPH CL is assessed as being of local significance against *criterion b*; this is primarily due to the readily identifiable physical evidence of private towns, in particular Berry, and tenant farms created as components of the Berry Estate.

Criterion (c): *important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

One of the most significant aspects of the SICPH CL is the aesthetic value of the cleared pastoral landscape nestled at the base of the wooded Illawarra Escarpment. This striking contrast in natural landforms and differing extent of human impact creates a unique landscape quality. There is no comparable landscape displaying this aesthetic characteristic within NSW.

The SICPH CL is assessed as being of State significance against *criterion* c.

Criterion (d): *strong or special association with a particular community or cultural group*

The area encompassed by the SICPH CL has a strong and special association with the local Aboriginal community in terms of places with cosmological, ceremonial, traditional and historical importance. It includes elements such as Coolangatta Mountain and Toolijooa Ridge that are examples of places of particular significance to the local Aboriginal community. The SICPH CL also includes Aboriginal pathways, historical encampments and Aboriginal reserves.

The SICPH CL is assessed as being of local significance against *criterion d*.

Criterion (e): *potential to yield information that would contribute to an understanding of cultural history*

The SICPH CL contains evidence for a variety of phases of human occupation, including evidence of a variety of activities and historical themes. Given that this southern portion of the Illawarra coastal plain hinterland has been subject to relatively limited impacts from twentieth century urban development, there is enormous potential for archaeological and historical research into this landscape at micro and macro levels. Such research would have the potential to contribute significantly to an understanding of settlement history within the Berry Estate, the Illawarra as a whole and the history of land use across NSW as a whole.

The SICPH CL is assessed as being of local importance in particular, and to a lesser extent State significance, against *criterion e*.

Criterion (f): *possesses uncommon, rare or endangered aspects of cultural history*

The combination of nineteenth century landscape structure with the aesthetics of the landforms present in the SICPH CL makes this cultural landscape unique within NSW. The juxtaposition between the Illawarra Escarpment and the coastal plain is of itself unique within the State. Moreover, the Southern Illawarra component is the only portion of this landscape that has not been significantly impacted by urban infill over the past 50-100 years. As such, the SICPH CL is a rare and endangered landscape at local and State levels.

The SICPH CL is assessed as being of local and State significance against *criterion f*.

Criterion (g): *important in demonstrating the principal characteristics of a class of cultural place*

The SICPH CL is important at local and State levels as a landscape that demonstrates readily identifiable and interpretable examples of nineteenth century private towns, tenant farms, private road transport corridors and the influence of these features on the modern landscape (eg the way in which the alignment of the current highway relates to homesteads and roads established by David and Alexander Berry). This item is an excellent example of a cultural landscape with multifaceted layers that are quite easily discerned by the viewer. It is also an excellent example of the relationship between European pastoral practices and broader topographic landforms.

Statement of heritage significance:

The Southern SICPH CL is of local significance in terms of its historical associations and importance in the pattern of local history. It is also locally significant in terms of its strong and special association with the local Aboriginal community.

More notably, it is of local and State significance in terms of its aesthetic qualities, which relate in part to the unique natural character of the junction of the coastal plain with the Illawarra escarpment, and in part from the striking contrast between the culturally modified elements of the landscape and the more natural elements. The clearly identifiable nineteenth century structure of the landscape also contributes to the aesthetic value of the SICPH CL.

The SICPH CL is a rare landscape type, both in terms of its natural features and also the retention of such clear examples of the late nineteenth and early twentieth century pastoral landscape and associated private towns. It is the only remaining such portion of the broader Illawarra cultural landscape that has not been substantially impacted by urban infill. As such it is also representative of its type and displays considerable research potential in terms of historical themes at local and State levels.

Appendix I

Statements of heritage impact

Statements of heritage impact

I.1 Introduction

Statements of Heritage Impact are provided in this section for all field recordings subject to direct impact (18), or indirect impact only, such as to their visual and landscape context (13 recordings).

The following items, not subject to direct or indirect impacts, are not covered in this section (G2B H20, 26, 27, 51, 52, 57 and 60).

I.2 Nineteenth century road remnants

Recording ID: G2B H19 **Name/*Description*: Remnant of Berry Estate road (west of Gembrook lane)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

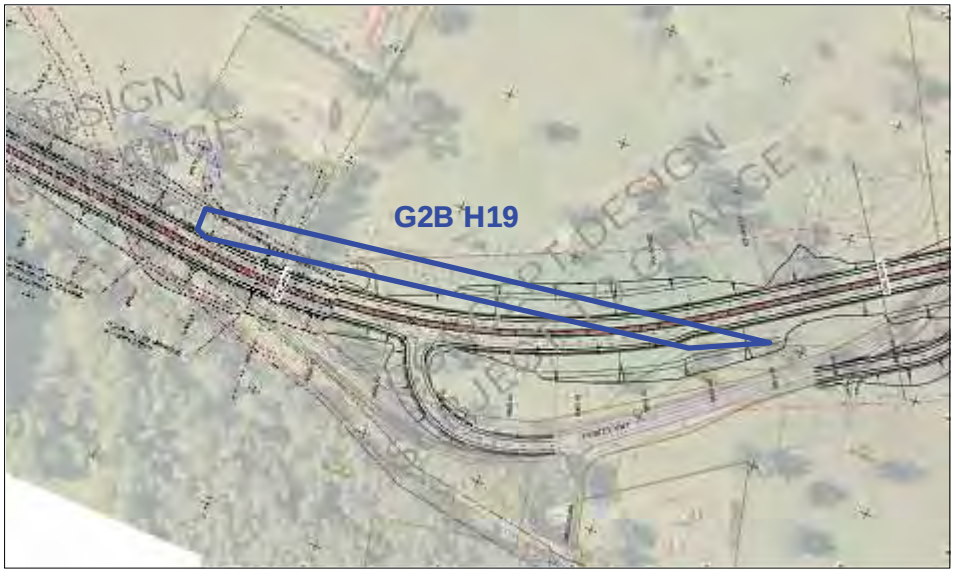


Figure I.1 Location of G2B H19 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, f & g.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.

- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and a section of raised carriageway. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

Recording ID: G2B H22 **Name/*Description*: Remnant of Berry Estate road (south of *Glenvale* homestead)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

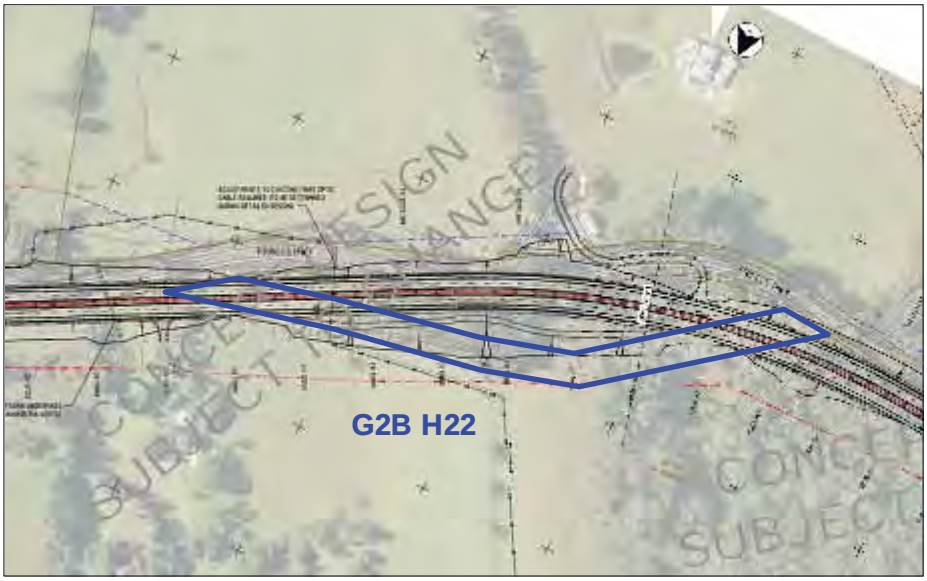


Figure I.2 Location of G2B H22 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, & f.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.
- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and a section of raised carriageway. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

Recording ID: G2B H23 **Name/*Description*: Remnant of Berry Estate road (east of *Glenvale* homestead)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass would result in the loss of the whole of the known extent of the item.

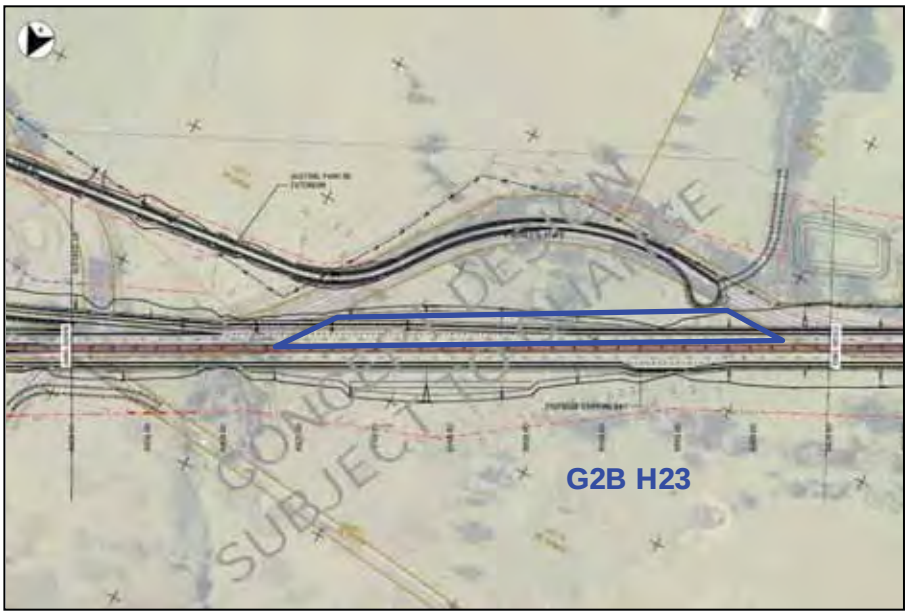


Figure I.3 Location of G2B H23 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, & f.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.
- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and a section of raised carriageway. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

Recording ID: G2B H30 **Name/*Description*: Remnant of Berry Estate road (eastern spur of Toolijooa Ridge)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass would result in the loss of the whole of the known extent of the item.

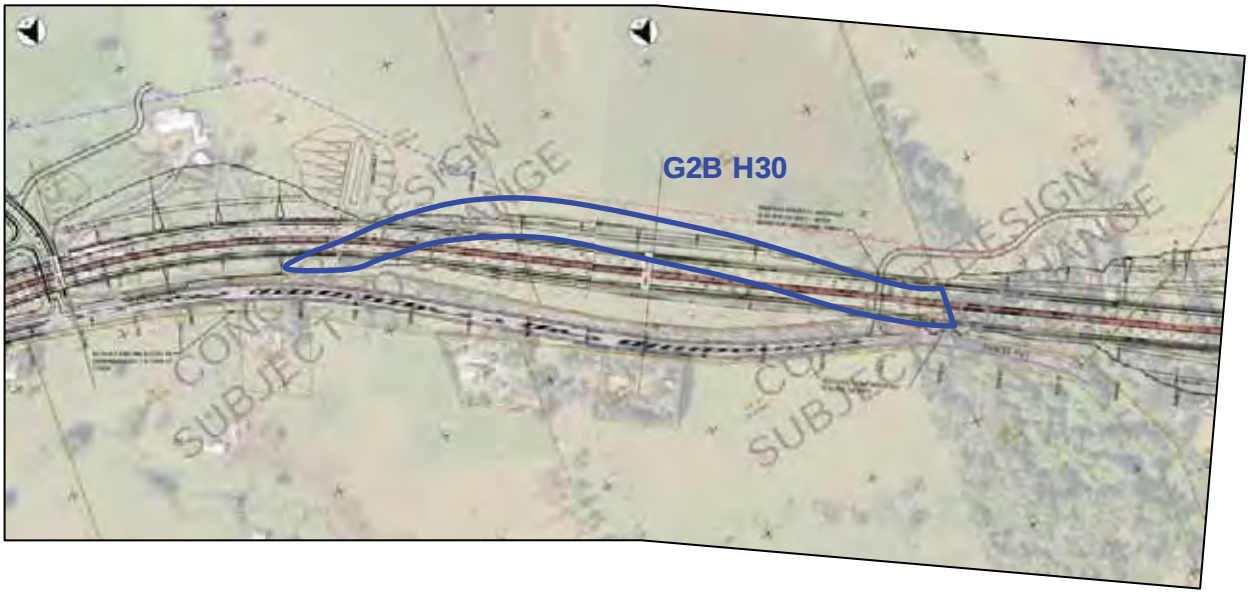


Figure I.4 Location of G2B H30 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, f & g.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.
- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item.

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the spurline to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment either to the north or south, which avoids direct impact to the heritage item. Both alternatives would require construction of major artificial embankments. A northern alternative would prevent the use of the existing highway as a service road.
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maintain the most effective vertical and horizontal carriageway alignment up to, and from, the planned Toolijooa cutting.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass and an associated service road would result in the loss of the whole of the known extent of the item.

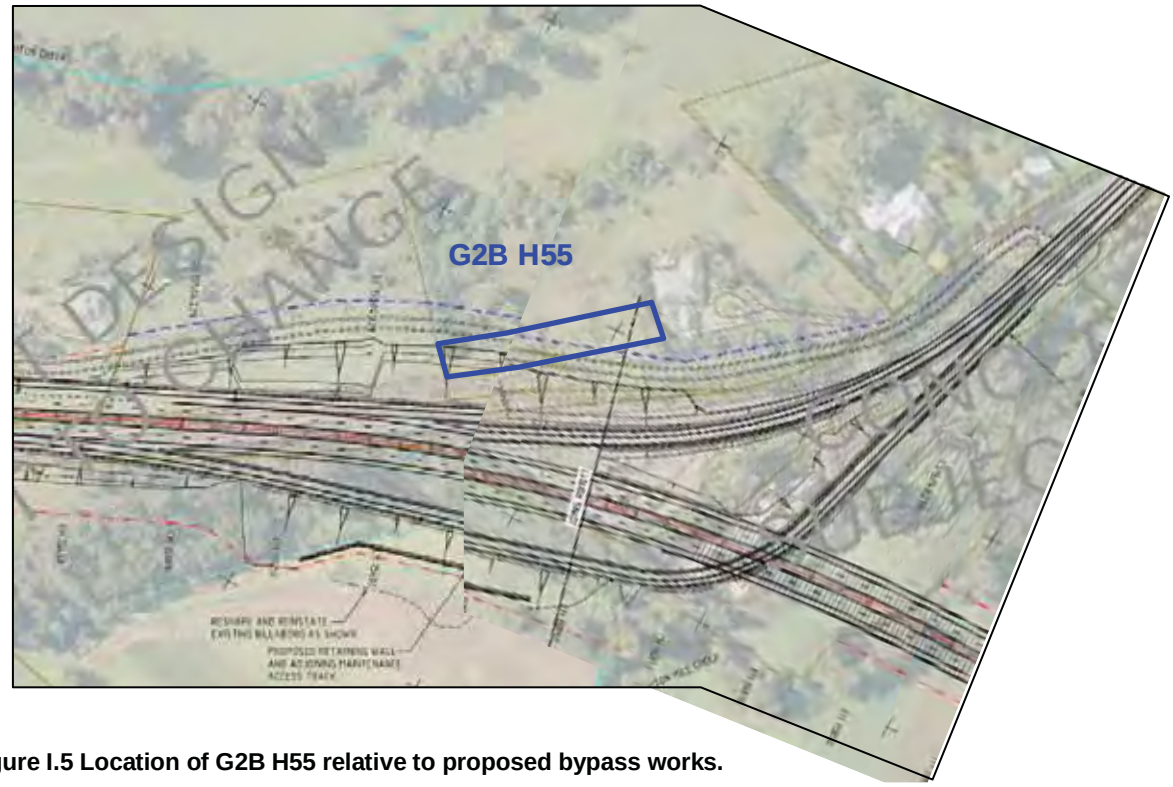


Figure I.5 Location of G2B H55 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, f & g.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.
- It is proposed to conserve and interpret a representative, and high value remnant of the Berry Estate Road at a separate location, Bink's Corner at Broughton Village (G2B H27). The intent of this action is to compensate for the loss associated with the road remnants that would be directly impacted by bypass construction.
- The construction of the bypass in relative proximity to the Bink's corner remnant of the Berry Estate road (G2B H27) enhances the interpretive value of the remnants in this area by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) remnants.
- These impact mitigation strategies would provide a means of promoting and communicating knowledge about the former road. In this way, the representative and historical significance of the impacted road remnants would be recognised and respected. Previously, the physical remains of the road have remained unprotected and largely overlooked. The historical importance of the former road has been acknowledged only by scattered references in local historical publications.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of ground surface relief and possible subsurface traces. There are no existing structures related to this heritage item

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of the road remnant is difficult to determine based on the current data. If the road is only evidenced by ground surface relief, then it may not constitute a relic. If there is a subsurface foundation or constructed road surface, then these may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass and service road across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Provide access to private property independent of the bypass carriageway.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may be associated with the road remnant remains untested. There is potential for subsurface archaeological evidence of the following:
  - Road surface treatment (such as the application of gravels or timbers).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - Drainage features, such as cross drains or minor culvert works.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to development impact, an integrated program of archival recording, including archaeological excavation, would be conducted across all of the known remnants of the Berry Estate Road effected by the project.
- In order to compensate for, and mitigate the loss of heritage values associated with direct impact to Berry Estate road remnants; G2B H19, 22, 23, 30 & 55, it is proposed to conserve and interpret a representative, and high value remnant of the road at 'Binks Corner', Broughton Village. This remnant is recording G2B H27, and consists of a 550 metres portion of the road, including a creek crossing and a highly visible cut and benched section. This remnant occurs in close association with a contemporary homestead site (G2B H52), a subsequent highway alignment, abandoned in the 1930s (G2B H26), and an extant early twentieth century homestead, Sedgeford (G2B H25). The length, inclusion of a creek crossing, the highly visible nature of the cut and benched section, and the interrelation of the associated items, makes this a unique and high value remnant. Of all the known remnants, this example presents the greatest potential for public interpretation.

I.3 Twentieth century highway remnants

Recording ID: G2B H12 **Name/*Description*: Remnant portion of twentieth century highway (Stewarts Hill cutting and wayside stop, northern entry to Berry)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass would result in the loss of the whole of the known extent of the item.

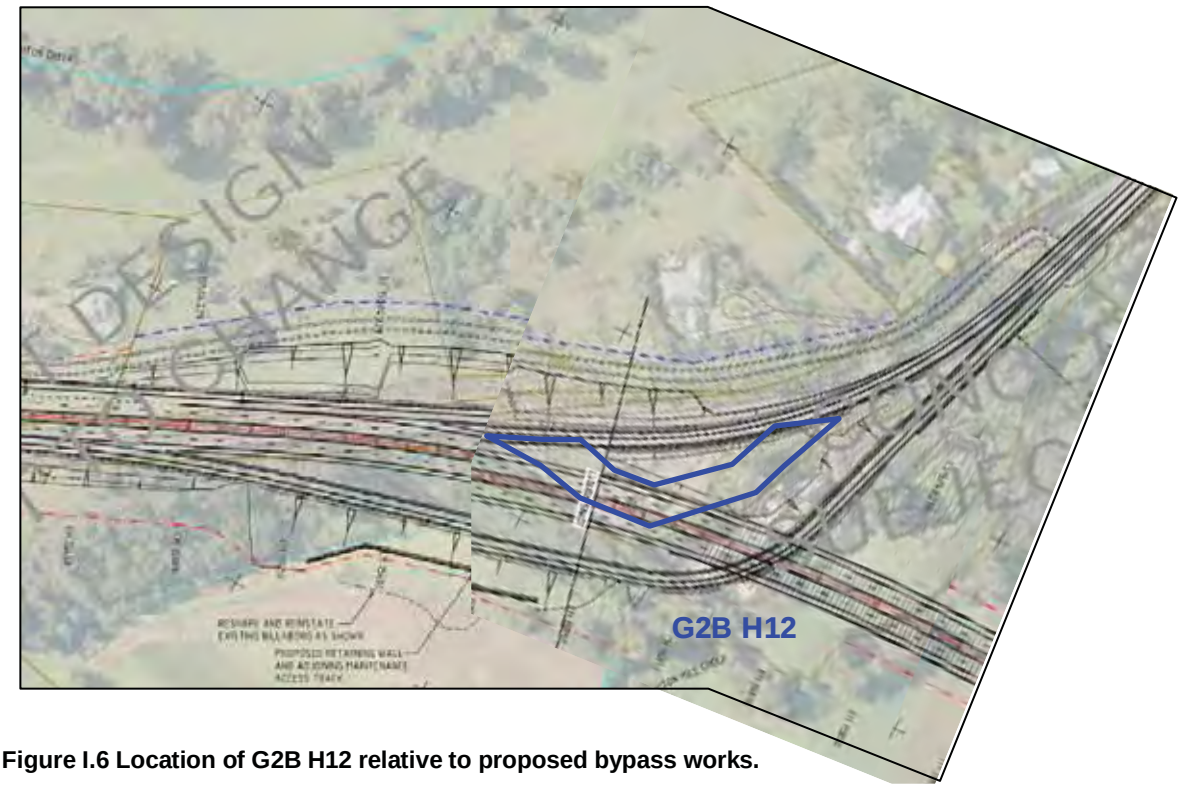


Figure I.6 Location of G2B H12 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.
- There are no aspects of the proposal which respect or enhance the significance of this particular item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass in the area of this road remnant would involve the extension and widening of the existing cutting, and the construction of a north bound on-ramp. This would not only remove the remnant road, but also its immediate landscape setting and visual context.

Impact on existing structures

- This item consists of a remnant bitumised road platform, excavated bench, and boundary fence. Apart from the fence line, there are no existing structures related to this heritage item.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence, however none of these are likely to have significance above the assessment criteria thresholds:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.
- This alternative has been rejected based on the low significance of the item, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the low significance assessment for the item (below the criteria threshold), no further heritage related management action is recommended for this item.

Recording ID: G2B H15 **Name/*Description*: Remnant portion of twentieth century highway (adjacent to *Mananga* Homestead)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This remnant section of highway would continue its current function as a service road but would be directly impacted in two locations, at its northern end by construction of an off-ramp and an additional service road, and towards its southern end by construction of a new intersection with the current highway/new off-ramp. Construction of a south bound off-ramp, along the alignment of the current highway, and an additional service road would result in direct impact to a small proportion of the remnant highway at its far northern end (an interval of up to 30 metres, and north of the driveway to A40A Princes Highway). A new, squared-off intersection with the off-ramp would be constructed near the southern end of the remnant. This would alter the original alignment of the remnant to a certain degree but maintain the integrity of the more significant and better conserved portion in front of the Mananga homestead and gardens. The addition to the remnant of a new service road for nine allotments would mean greater vehicle use of the remnant, and a higher frequency of maintenance and possible upgrading.

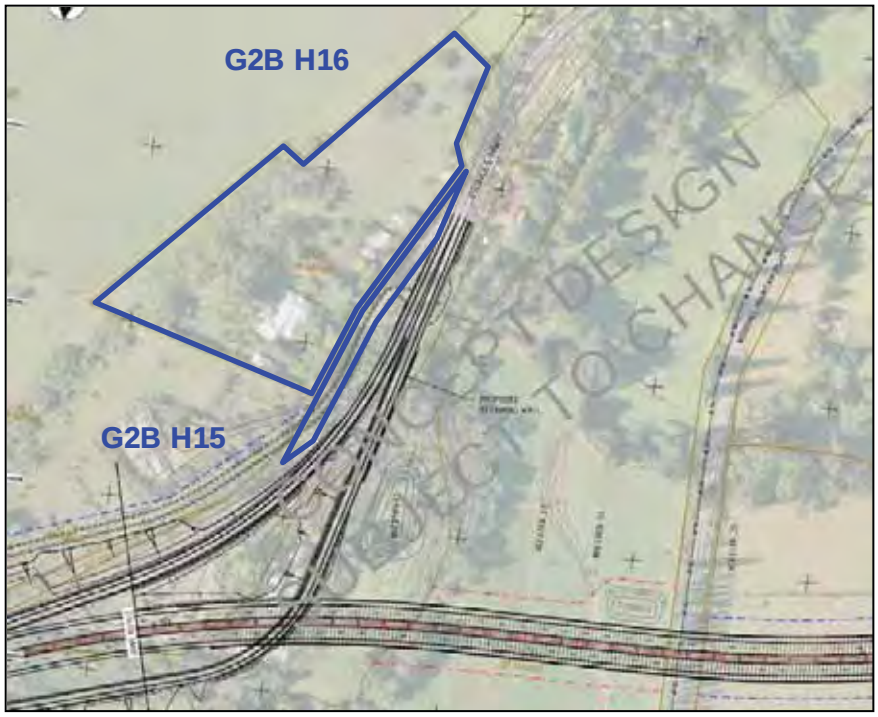


Figure I.7 Location of G2B H15 relative to proposed bypass works and item G2B H16.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria f & g.
- Substantial impact to the better maintained and most significant portion of the road remnant, (which is adjacent to the Mananga homestead and outbuildings), would be avoided. The alignment of the remnant, which remains the same as the original road at the time of the homestead construction, would be maintained as an actively used road. This would maintain the historical context and integrity of the property frontage.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The visual impact of the off-ramp and service road additions would only be marginally greater than the existing situation caused by the current highway carriageway and associated cutting. Although the intrusion of modern infrastructure would be marginally closer to the Mananga property boundary, there would remain an effective spatial margin, and visual barrier provided by existing fences and planted vegetation.

Impact on existing structures

- This item consists of a remnant bitumised road platform. There are no existing structures related directly to this heritage item.

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of this road remnant is difficult to determine. The subsurface foundation of the carriageway and the constructed road surface, may constitute a relic.
- There are known archaeological deposits situated on the western side of this road remnant. These are included in a separate recording G2B H14. Please refer to the Statement of Heritage Impact for that recording for an analysis of construction impacts to these deposits.

Summary

- Construction of the bypass would result in direct impact to a minority proportion of the road remnant, and avoid impact to the most significant portion. Impact to contextual values would be marginal only.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass and service road across this heritage item is required in order to:
  - Avoid direct impact to the Mananga homestead property.
  - Provide access to private property independent of the bypass carriageway.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The only alternative to impacting this recording would be to move the bypass alignment further to the north. This would require either an extensive area of landfill and/or an extensive additional bridge interval. This would also result in additional loss of agricultural land.
- This alternative has been rejected based on the relative significance of the portion of road remnant subject to impact, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Avoid use of bridges where a viable alternative exists.
  - Maximise the use of the existing highway alignment and easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Impact to this road remnant would be limited to essential works within the construction footprint at the northern and southern ends of the remnant.
- Direct impact to the road remnant adjacent to the Mananga property would be minimised.
- It is proposed to conduct an archival recording of the item, (relative in scope to the type and quality of information which can be recovered), prior to construction impact.

Recording ID: G2B H18	Name/*Description*:	Remnant portion of twentieth century highway (close to Tindalls Lane intersection with Highway)

Statement of Heritage Impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

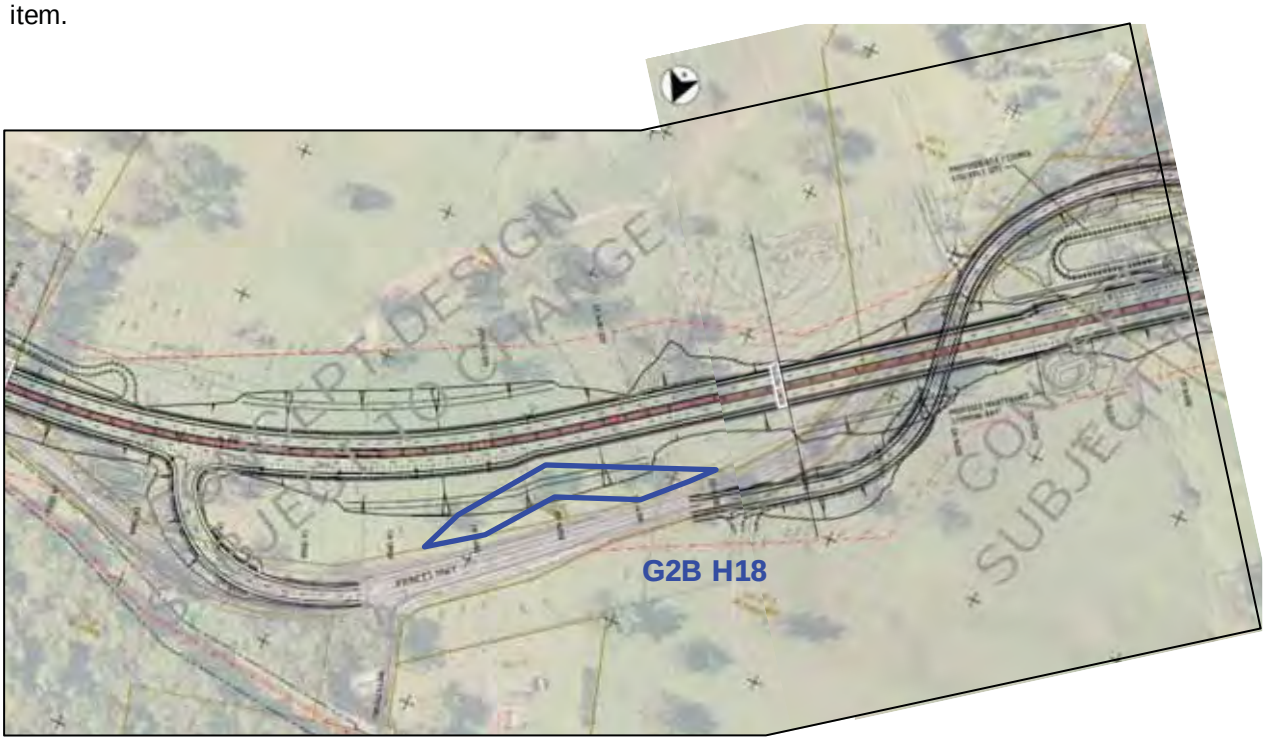


Figure I.8 Location of G2B H18 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and changes to the existing highway carriageway. This would not only remove the remnant road, but also substantially alter the immediate landscape setting and visual context.

Impact on existing structures

- This item consists of a remnant road platform, indicated by eroded low ground relief. There are no existing structures related to this heritage item.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence, however none of these are likely to have significance above the assessment criteria thresholds:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item.

- This alternative has been rejected based on the low significance of the item, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the low significance assessment for the item (below the criteria threshold), no further heritage related management action is recommended for this item.

Recording ID: G2B H21	Name/*Description*:	Remnant portion of twentieth century highway (south of *Glenvale* homestead)

Statement of heritage impact

What is the nature and extent of anticipated development Impact?:

Construction of the bypass would result in the loss of the whole of the known extent of the item.

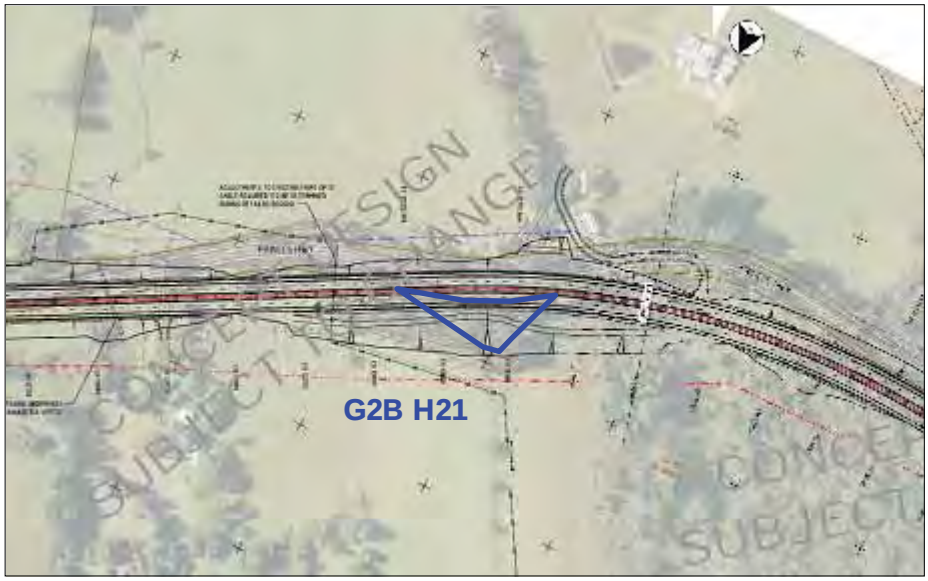


Figure I.9 Location of G2B H21 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion e.
- It is proposed to conduct an archival recording of this item prior to any direct impact. The creation of the record addresses the need to realise the research and information potential upon which the significance assessment is based. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and replacement of the existing highway carriageway. This would not only remove the remnant road, but also the immediate landscape setting and visual context.

Impact on existing structures

- This item consists of a remnant road platform and upslope cutting. There are no existing structures related directly to this heritage item.

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude [earth] 'works' (refer Section 8.1.5 of this report), the 'relic' status of this road remnant is difficult to determine. The subsurface foundation of the carriageway and the constructed road surface may constitute a relic.
- Apart from the road remnant, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise impact to native vegetation.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- Alternatives to impacting this recording would be to move the bypass alignment either further north or south. The northern alternative would cause substantial impact to the contextual values of the Glenvale homestead, impact native vegetation, and require a more extensive cutting. The southern alternative would have high property infrastructure impacts.
- The alternatives have been rejected based on the significance of the item, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise impact to native vegetation.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to conduct an archival recording of the item, (relative in scope to the type and quality of information which can be recovered), prior to construction impact.

Recording ID: G2B H24	Name/*Description*:	Remnant portion of twentieth century highway (west of *Sedgeford* homestead)

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

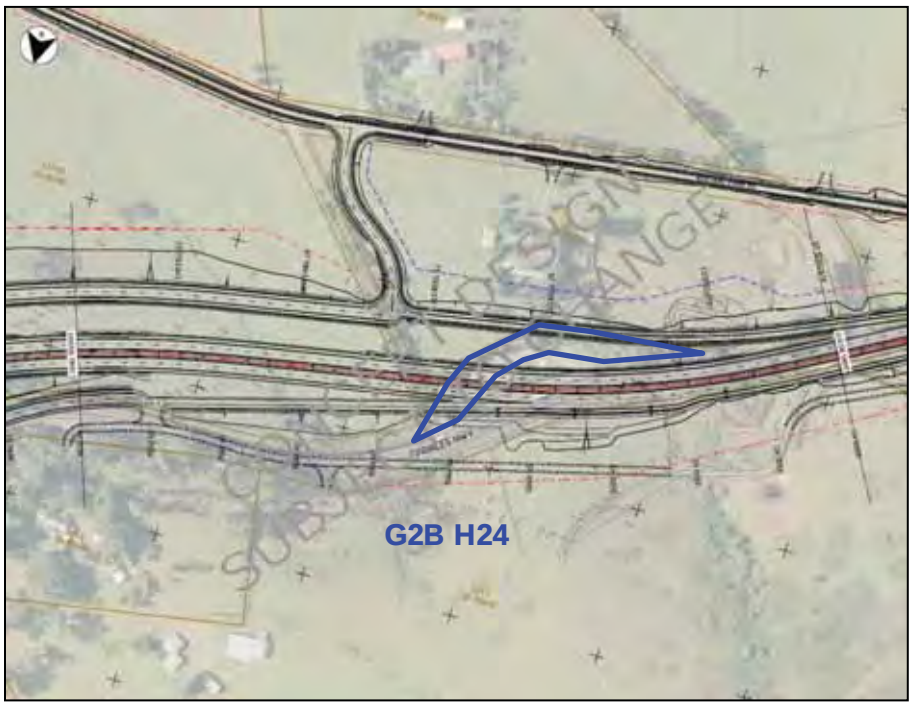


Figure I.10 Location of G2B H24 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.
- There are no aspects of the proposal which respect or enhance the significance of this particular item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass in the area of this road remnant would involve the creation of a substantial cutting and replacement of the existing highway carriageway. This would not only remove the area of the remnant road, but also the immediate landscape setting and visual context.

Impact on existing structures

- There are no existing structures related to this heritage item.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- Construction of the bypass would result in the loss of the whole of the known extent of the item

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Avoid impact to Sedgeford homestead.
  - Maximise the use of the existing highway alignment and easement.
  - Maintain horizontal and vertical design standard.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known former structures or other features associated with this road remnant which may have left archaeological traces.
- The extent to which archaeological deposits may form part of the road remnant is assumed but remains untested. There is potential for the following subsurface archaeological evidence, however none of these are likely to have significance above the assessment criteria thresholds:
  - Road surface treatment (such as the application of gravels).
  - Preparation or maintenance of the road platform (evidenced by transported and compacted materials).
  - Artefacts within infill deposits in side ditches.
  - What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The alternative would be to construct the bypass on an alignment further south, which avoids direct impact to the heritage item and to Sedgeford to the northeast.

- This alternative has been rejected based on the low significance of the item, impact to residential buildings to the south of the item. and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the poor condition and low significance assessment for the item (below the criteria threshold), no further heritage related management action is recommended for this item.

I.4 Standing buildings and structures

Recording ID: G2B H10 **Name/*Description*: Victorian Cottage**
72 North St. Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The footprint of a reinforced soil noise barrier and an adjacent footpath on the south side of the southbound off-ramp for the south Berry interchange, will encroach to within two metres of the existing cottage building. Associated property acquisition would include the whole cottage.

Construction of the bypass would result in direct impact to the whole cottage and the front (northern) half of the urban lot. Removal of the house is required either through demolition or the full or partial salvage of the structure.

Figure I.11 Location of G2B H10 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.
- There are no aspects of the proposal which respect or enhance the significance of this particular item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass would not only remove the cottage, but also the immediate landscape setting and visual context. The noise barrier would obscure existing views to the north across pastoral farmland.

Impact on existing structures

- All structures being part of this item would be directly impacted.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- Construction of the bypass would result in direct impact to the whole of the cottage and associated front grounds.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass close to this heritage item is required in order to:
  - Minimise land take and property severance.
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maximise the use of the existing highway alignment and easement (especially with regard to aligning with the existing carriageway south of Mark Radium Park) .

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.
- What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The alternative would be to construct the bypass on an alignment further to the north and or east.
- This alternative has been rejected based on the low significance of the item, and the poor balance of outcomes which would result relative to the objectives to:

- Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the low significance assessment for the item and the absence of direct impact, no further heritage related recording or documentation is recommended for this item.

Recording ID: G2B H11 **Name/*Description*:** ***GlenDevan***
Federation House
77 North St. Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in direct impact to the whole of the known extent of the house and surrounding lot. Removal of the house and plantings is required either through demolition or the full or partial salvage of the structure (and/or plantings).

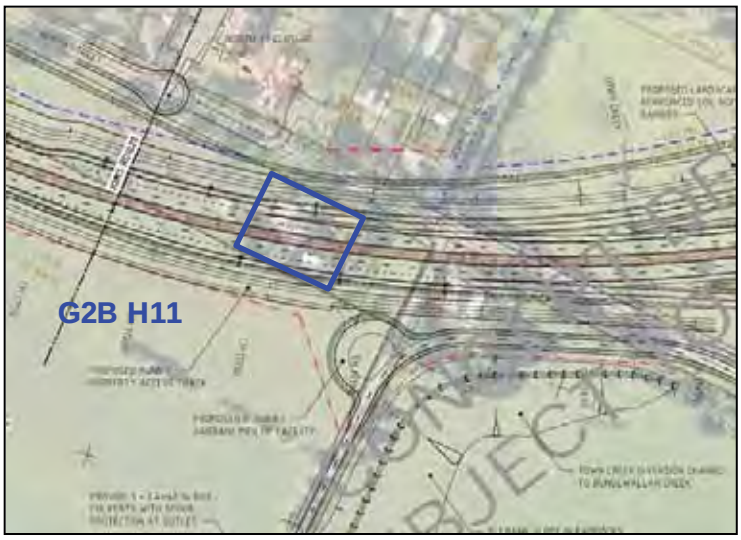


Figure I.12 Location of G2B H11 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion g.
- It is proposed to conduct an archival recording of the house prior to any direct impact. The creation of the record addresses the need to reduce the loss of local representative heritage significance which would result from the demolition of the item. The resulting record would respect those values and provide a degree of mitigation

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Construction of the bypass would remove the house and grounds, as well as its immediate landscape setting and visual context.

Impact on existing structures

- All structures being part of this item would be directly impacted.

Impact on relics

- Based on the local level of assessed significance for this item (criterion g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. All such relics would be directly impacted by the bypass.

Summary

- Construction of the bypass would result in direct impact to the whole of the house and associated grounds.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.
  - Maximise the use of the existing highway alignment and easement (especially with regard to aligning with the existing carriageway south of Mark Radium Park) .

Will any known or potentially significant archaeological deposits be subject to development impact?

- There is potential for archaeological deposits to be associated with this heritage item, notably refuse dumps, under floor deposits, and the remains of former outbuildings. All would be directly impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north and/or east, or to the south. A southern alternative is unviable as it would require the demolition of multiple urban town lots, including St Patrick's former convent and St Patrick's Church (both of which are of local heritage significance). A northern and/or more eastern alternative would exclude the use of the North Street corridor and cause significant property severance.

- The alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to conduct an archival recording of the house and grounds prior to any development impact. Ground disturbance in the area of G2B H11 would be monitored by an archaeologist with the aim of recording any features relevant to the archival recording, and recovering any significant relics.
- It is also recommended that RMS consider providing financial and/or logistical support in the event that an agent proposes to conserve all or part of the G2B H1 structure by moving it to a new location within or near Berry. In the event of simple demolition, suitable materials (such as bricks and stone masonry) would be recovered and reused (with commemorative identification) in appropriate local, infrastructure such as interpretive or entrance features, way-side stop facilities, landscaping or artwork.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The cottage would not be directly impacted. The bypass works would be situated between 90 and 45m of the cottage, and consequently pose a loss of contextual heritage value.

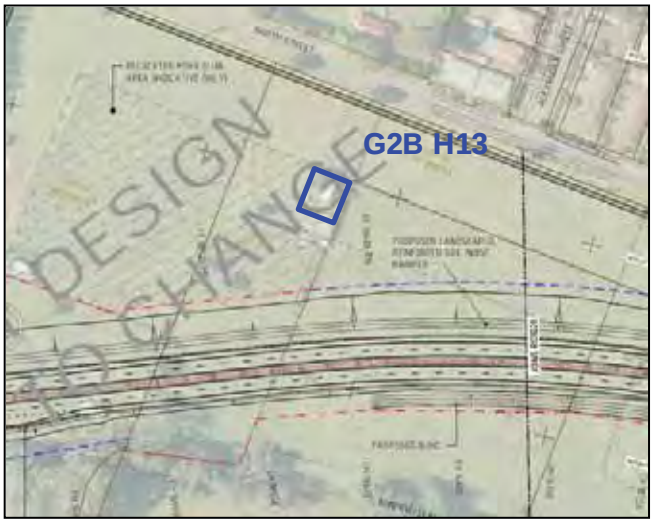


Figure I.13 Location of G2B H13 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion g.
- One of the determining factors for the selection of the bypass alignment was the avoidance of direct or close indirect impact to this Cottage residence. Previously contemplated alignment proposals, would have directly impacted the structure, or traversed the front grounds, resulting in a severe loss of contextual values.
- The visual impact of the bypass, from the south, would be mitigated by the construction of a landscaped barrier on the southern and eastern side of the bypass adjacent to Berry. This would provide a visual barrier that was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. The upper portion of the existing escarpment vista would be unaffected for viewers positioned further away from the barrier.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- The main bypass carriageway would be constructed within 65m of the rear of this cottage. An associated landscaped noise barrier would be positioned on the southern side and extend to within 45 metres of the cottage. This would foreshorten the lower portion of the existing pastoral views to the north and west. Views from the cottage of the upper escarpment slopes would be unaffected by the barrier.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criterion g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would impact upon the visual context of the cottage with foreshortening of the valley floor views to the north and west.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the relative proximity this heritage item is required in order to:
  - Minimise land take and property severance.
  - Minimise impact to the sporting fields to the east, by locating the bypass on the north of Bundewallah Creek and then crossing the creek west of the fields and turning south to run parallel with the North Street corridor.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- The visual impact of the bypass, from the south, would be mitigated by the construction of a landscaped barrier on the southern and eastern side of the bypass adjacent to Berry. This would provide a visual barrier that was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. The upper portion of the existing escarpment vista would be unaffected for viewers positioned further away from the barrier.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The complex (including the associated land holding) would not be directly impacted. Construction of a south bound off-ramp from the bypass would pass within 30 metres of the property boundary and would approximate the alignment of the existing highway. An additional service road would be appended to the northern end of a highway remnant which acts as the current access to the Mananga homestead and adjoining lot. There would a marginal loss of contextual heritage value.

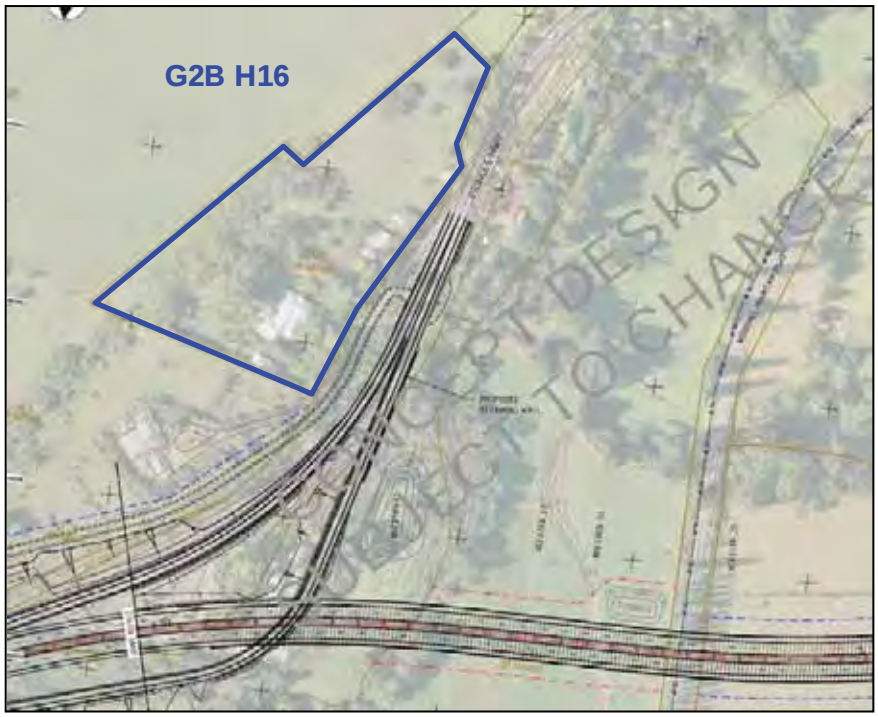


Figure I.14 Location of G2B H16 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, c, e, & g.
- One of the determining factors for the selection of the bypass alignment was the avoidance of direct impact to the Mananga homestead and property, and the minimisation of indirect impacts. A former alignment proposal, would have traversed the rear grounds of the homestead, resulting in a severe loss of contextual values, and impact to archaeological deposits.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The visual impact of the new access road, bypass off-ramp, and carriageway would only be marginally greater than the existing situation created by the current highway carriageway and neighbouring lot driveway. There would remain an effective spatial margin, and visual barrier provided by existing fences and planted vegetation.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria a, b, c, e & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would marginally impact upon the contextual values of the complex.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass works in the relative proximity this heritage item is required in order to:
  - Avoid direct impact to the Mananga homestead property.
  - Provide for car access to nine lots situated further to the northeast.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.
- What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The only alternative to impacting this recording would be to move the bypass alignment further to the north. This would require either an extensive area of landfill and/or an extensive additional bridge interval. This would also result in additional loss of agricultural land.

- This alternative has been rejected based on the relative significance of the portion of the remnant subject to impact, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Avoid use of bridges where a viable alternative exists.
  - Maximise the use of the existing highway alignment and easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H17 **Name/*Description*:** ***Hillview* Homestead**
Former Berry Estate homestead
A111 Princes Highway. Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The homestead would not be directly impacted. The bypass works would be situated approximately 38m from, and upslope of the front of the homestead. A service road would be situated 30 metres away. The boundary of the bypass easement would be approximately 14m from the front of the homestead. This cartilage is a little larger than a former front yard enclosure around the homestead evident in a 1958 aerial photograph (refer Figures 6.115 & 6.116). Some garden plantings at the front of the cottage would be directly impacted. All of these plantings post date 1960. Due to the elevated bypass carriageway and associated embankments, there would be a substantial loss of contextual heritage value on the front (entrance) side of the homestead.

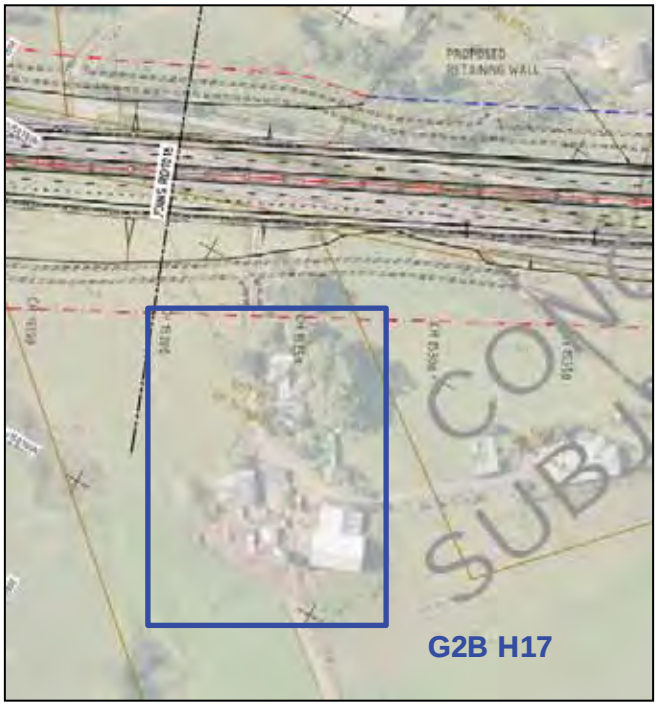


Figure I.15 Location of G2B H17 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e, f & g.
- One of the determining factors for the selection of the bypass alignment was the avoidance of direct impact to the Hillview homestead.
- The original southern entrance to the property will be maintained by the proposed service road access.
- The distance between the bypass easement boundary and the homestead is in excess of the front yard enclosure evident in 1958.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass works would be situated approximately 38m from the homestead, and would include the carriageway on an elevated embankment. The carriageway and embankment would place a visually intrusive landscape element into the front (southern) aspect of the homestead and obscure the original relationship of the building with the highway.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria e, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would substantially impact upon the south facing contextual values of the homestead.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the indirect impact to this recording would be to move the bypass alignment either to the north or south. The southern alternative would involve direct impact to three residences together with extensive landfill and earthworks. The northern alternative would require a major alignment change which would involve direct impact to two farmhouses, significant property severance, and require an alternative crossing of Broughton Mill Creek and Woodhill Mountain Road. .
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.
- It is recommended that, where feasible, the existing front yard plantings which would fall within the bypass easement (and particularly the Oak tree) should be retained. This may require a minor deviation of the proposed service road.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Neither the homestead nor its grounds would be directly impacted. The existing highway carriageway is located along the southern boundary of the homestead grounds, and the bypass works would not encroach further from this alignment. The eastern half of the current highway carriageway would be reused as a service road, the western portion would be modified as upslope end of an off-ramp onto that road. Existing tree plantings provide a visual buffer and barrier between the homestead and grounds, and the highway easement. There would be considerable impact to local landscape context values to the south of the existing highway, where construction of the bypass carriageway would involve a substantial cutting and downslope embankment. The main carriageway would be situated approximately 90 metres to the south of the homestead, and the off-ramp, approximately 70 metres.

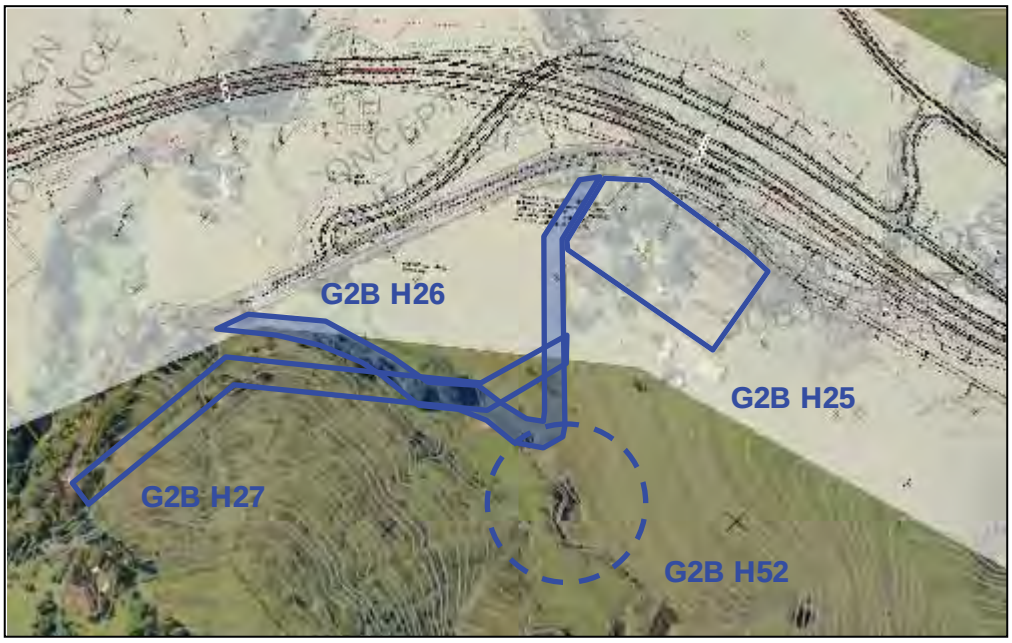


Figure I.16 Location of G2B H25 relative to associated recordings in the 'Bink's Corner' group, and the proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria b & g.
- One of the determining factors for the selection of the bypass alignment was the avoidance of direct impact to the Sedgeford homestead and grounds. A former alignment proposal, which was shorter and therefore cheaper, would have required demolition and removal of both the buildings and grounds.
- The spatial relationship between the homestead, its grounds, and the current and a former highway alignment (G2B H26), is a valuable component of the heritage and interpretive values of the Bink's Corner grouping of heritage items (G2B H25, 26, 27 & 52). The bypass design respects this relationship by allowing for the continued vehicle use of the existing highway as a service road, and avoiding direct impacts on the eastern and northern side of the existing highway.

- The construction of the bypass in relative proximity of the Bink's Corner grouping of heritage items, enhances the interpretive value of the road remnants by providing a twenty first century example of highway construction for contrast and comparison with the 1856-1970s (G2B H27) and 1870s-1830s (G2B H26) examples.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- There would be considerable impact to local landscape context values to the south of the Sedgeford grounds (boundary runs adjacent to the existing highway), where a substantial cutting and downslope embankment would be constructed. The main carriageway would be situated approximately 90 metres to the south of the homestead, and the off-ramp, approximately 70 metres. Existing tree plantings would provide a visual buffer and barrier between the homestead, its grounds, and the highway easement.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria b & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would substantially impact upon the contextual values of the homestead.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Avoid direct impact to the Sedgeford homestead and grounds, and the Brookside homestead, 400 metres to the northeast.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the indirect impact to this recording would be to move the bypass alignment either substantially to the north, or further south. The northern alternative is limited by a major ridge slope, with the consequence that the nineteenth and twentieth century road remnants (G2B H27 and 26) would be directly impacted. The southern alternative would require a major alignment change which would involve direct impact to potentially two farmhouses, and significant property severance.
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H28 **Name/*Description*:** ***Brookside* homestead A540 Princes Highway Broughton Village**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The bypass carriageway, which at this point is a bridge over Broughton Creek, would be situated approximately 75 metres to the southeast (and to the rear) of the *Brookside* homestead building. A separate, recently constructed cottage (incorporating some recycled materials) would be within 45 metres of the carriageway. The bridge is approximately 190 metres in length and would form a dominant visual backdrop in south and east directed views of the homestead. The bridge would cross the Broughton Creek at an oblique angle and would be angled upwards towards a spur in the southwest.

The northern property boundary of the required bypass easement passes through the rear storage shed and associated former dairy platform, and a former building platform on basal slopes on the opposite side of a small tributary southwest of the homestead grouping. The resumed land for the bypass easement would also include the former orchard and pump remains.

Construction of the bypass would require the demolition of the storage shed, possible impact to the former building platforms, and a substantial impact to local landscape context values to the east and south.

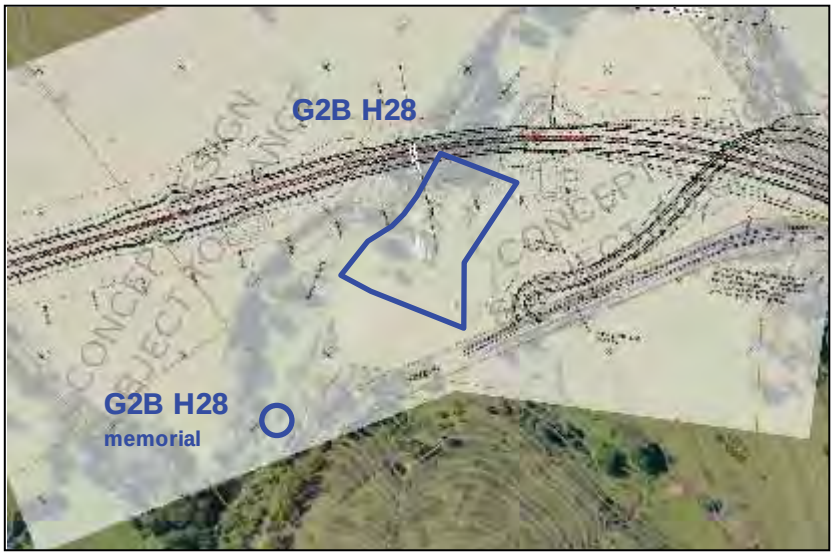


Figure I.17 Location of G2B H28 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e & g.
- One of the determining factors for the selection of the bypass alignment was the minimisation of direct impact to the Brookside homestead. A former alignment proposal, which was shorter and therefore cheaper, would have required demolition of the homestead.

- It is proposed to conduct an archival recording of this item prior to any impact. The creation of the record addresses the need to realise the research and information potential of the item. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- There would be a substantial impact to the landscape context values of this item. The bridge and adjoining carriageway embankments would form an immediate backdrop and a dominant twenty-first century, visually intrusive element to the context of the homestead. This would significantly detract from the current early twentieth century character of the homestead, and dramatically shift the aesthetic values of its context. The maintenance of the creek corridor, and the visual continuity of viewsheds via the under-bridge space, are important moderating elements to this impact. Both the creekline and the bypass present strong directional landscape elements which could be appreciated as complementary and aesthetic landscape elements.

Impact on existing structures

- The bypass would directly impact the storage shed and associated small outbuilding.

Impact on relics

- Based on the local level of assessed significance for this item (criteria b & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. The incorporated elements of a former dairy, now part of the storage shed, would be impacted by the project. In the event that the construction of easement boundary fencing requires levelling and ground preparation, then archaeological deposits associated with former dairy and out-building platforms would be impacted.

Summary

- The bypass would directly impact upon a storage shed, remnants and traces of a former dairy complex, and substantially impact upon the contextual values of the homestead.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass in the proximity of this heritage item is required in order to:
  - Minimise direct impact to the Brookside homestead group and avoid direct impact to the Sedgeford homestead and grounds, 400 metres to the southwest.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There is potential for archaeological deposits to be associated with the platforms for a former dairy complex and former outbuilding, which would be subject to direct impact.
- What alternatives to the anticipated development impact have been considered? Why are they rejected?
- The alternatives to the impact to this recording would be to move the bypass alignment either to the east, or west. The eastern alternative would require a major alignment change involving a substantially longer carriageway and significant land take and property severance issues. The western alternative could not reduce indirect impacts due to limited space imposed by a major ridge slope. A consequence is that the nineteenth and twentieth century road remnants (G2B H27 and 26) would be directly impacted. These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Prior to impact, it is proposed to conduct an archival recording at the Brookside homestead (G2B H28), inclusive of those features subject to direct impact, and the homestead building which incorporates structures previously moved from site G2B H59.
- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.

- The natural character of the Broughton Creek and its banks in the vicinity of the bypass bridge, immediately south of the Brookside homestead, would be maintained and enhanced as much as feasible. The aim of this strategy is to ameliorate impact to the landscape context by maintaining and reinforcing the visual quality of the creek corridor. This can be achieved by maintaining and augmenting native bank side vegetation, and maximising the distance between the banks and bridge abutments.
- Where there is no anticipated direct construction impact to components of this site, it is recommended that measures be instigated, where and as considered warranted, to protect these components from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This heritage listed bridge would not be directly impacted by the project development. A new bypass bridge would be constructed immediately downstream of the existing bridge. The function and integrity of the existing bridge would be maintained through the retention of the existing highway carriageway as part of a local service road between the Toolijooa Rd intersection and *Sedgeford*.

The landscape context of the bridge would be substantially altered by the addition of the new and higher bypass bridge on its downstream side.

Figure I.18 Location of G2B H29 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, c, f & g.
- The existing bridge structure would not be directly impacted by the development.
- The construction of the bypass bridge immediately adjacent to the existing bridge would provide an interpretive opportunity to contrast and compare differences and developments in concrete bridge construction. The continued use of this crossing point continues a practise first established by perhaps the first European pathway along the valley floor, indicated on the 1860s county map (refer Figure 6.216 & 217).
- The reduction in vehicle traffic on the existing highway provides an opportunity to make it easier for visitors to stop and inspect the heritage bridge.

- It is proposed to promote, interpret and present the cultural values of this site to a public audience using formats, locations and strategies defined in a Heritage Interpretation Plan (HIP) to be developed as part of the project. This would recognise and enhance the heritage significance of the site by promoting the largely un-appreciated heritage of concrete structures and the development of highway bridge design. Such a program could potentially integrate interpretation with other related items, such as the 'Bink's Corner' highway remnants (refer Statements of Heritage Impact for G2B H19, 22, 23, 30 and 55).

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- The construction of the new bypass bridge would pose a substantial change to the landscape context of this item. The consequential loss of aesthetic quality is however, compensated by the interpretive opportunity and functional continuity represented by the new bridge. The new bridge

Impact on existing structures

- The bypass would not directly impact the heritage bridge.

Impact on relics

- Based on the local level of assessed significance for this item (criteria b & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. There are no known or suspected relics within the area of the adjacent bypass.

Summary

- The bypass would not directly impact the heritage bridge. The landscape context of the bridge would be substantially altered by the proximity of the new bypass bridge. This indirect impact is however, compensated for by the functional continuity of the new bridge, and the interpretive opportunities.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Minimise disturbance to the ecological values of the Broughton Creek corridor.
  - Minimise the extent of excavation and batter length (and therefore also visual impact) associated with the Toolijooa Ridge cutting.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or suspected archaeological deposits within the area of the adjacent bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the indirect impact to this recording would be to move the bypass alignment further downstream (south). This would involve direct impact to a farmhouse, the creation of a new disturbance corridor across the Broughton Creek riparian vegetation/corridor, and potentially greater excavation along the Toolijooa Ridge cutting in order to accommodate horizontal design (curve) requirements. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise disturbance to the ecological values of the Broughton Creek corridor.
  - Minimise the extent of excavation and batter length (and therefore also visual impact) associated with the Toolijooa Ridge cutting.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to promote, interpret and present the cultural values of this site to a public audience using formats, locations and strategies defined in a Heritage Interpretation Plan (HIP) to be developed as part of the project. This would recognise and enhance the heritage significance of the site by promoting the largely un-appreciated heritage of concrete structures and the development of highway bridge design. Such a program could potentially integrate interpretation with other related items, such as the 'Bink's Corner' highway remnants (refer Statements of Heritage Impact for G2B H19, 22, 23, 30 and 55).
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H45 **Name/*Description*: *Glenvale* homestead**
A371 Princes Highway, Broughton

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Neither the homestead nor its grounds would be directly impacted. The closest sections of the bypass are situated on the same corridor of the existing highway. The construction footprint of the bypass comes within 150 metres of the homestead. Existing tree plantings provide a visual buffer and barrier between the homestead, its grounds, and the bypass easement. There would not be an appreciable impact to landscape context values of the homestead.

The listing of the *Glenvale* homestead on the Shoalhaven Local Environmental Plan Heritage Schedule includes the whole property, and the southern margin of the property would be discontinuously and directly impacted by the bypass development. Included in this category is direct impact to two remnants of the 1856 Berry Estate Road (G2B H22 & 23). These remnants are likely to have been contemporary with the *Glenvale* homestead and their loss would therefore pose an impact to the associative heritage values of the homestead.

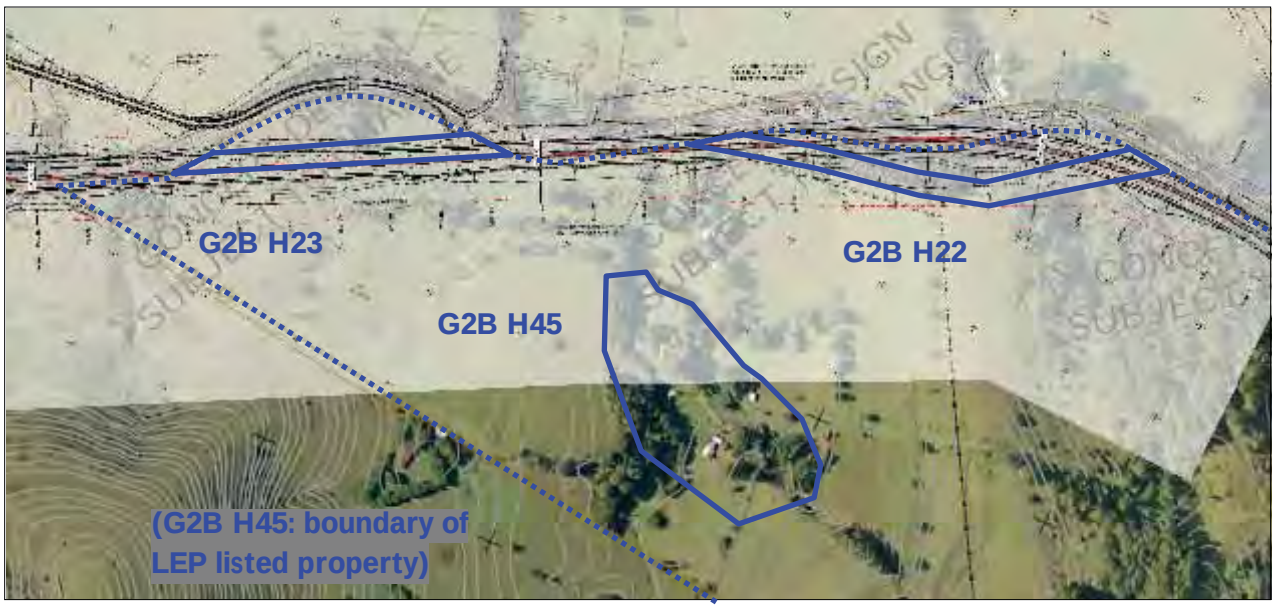


Figure I.19 Location of G2B H45 relative to associated recordings and proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e, f & g.
- The construction of the bypass would not directly impact this item.
- It is proposed to conduct an archival recording of two Berry Estate road remnants prior to any direct impact. The creation of the record respects and addressed the research potential of the spatial relationship between the homestead and early estate roadway. It would also provide a degree of mitigation for the loss of associative and contextual values.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- There would not be any appreciable impact to the contextual landscape values of the homestead. Existing tree plantings would provide a visual buffer and barrier between the homestead, its grounds, and the bypass easement.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria e, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The homestead and grounds would not be directly impacted by the bypass. The indirect impacts of the bypass would not be appreciable given the extent of the visual and spatial buffers around the homestead. Direct impact to two remnants of the Berry Estate road on the same property holding would impact on associative heritage values shared by these items.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with the homestead which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative to the indirect impact to this recording would be to move the bypass alignment further to the north. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards.
  - Minimise impact to native vegetation.
  - Balance cut and fill requirements: and
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H47 **Name/*Description*: Former St Patrick's Convent and St Patrick's Church, *80 North St, Berry***

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The church and former convent and their grounds would not be directly impacted. The grounds of these two associated buildings comprises Lot 1 DP86897, approximately 0.8 hectares. The lot is bounded in the north by North Street, which provides rear access to both buildings. The bypass works in the vicinity of this item would be limited to the North Street easement, and further to the north.

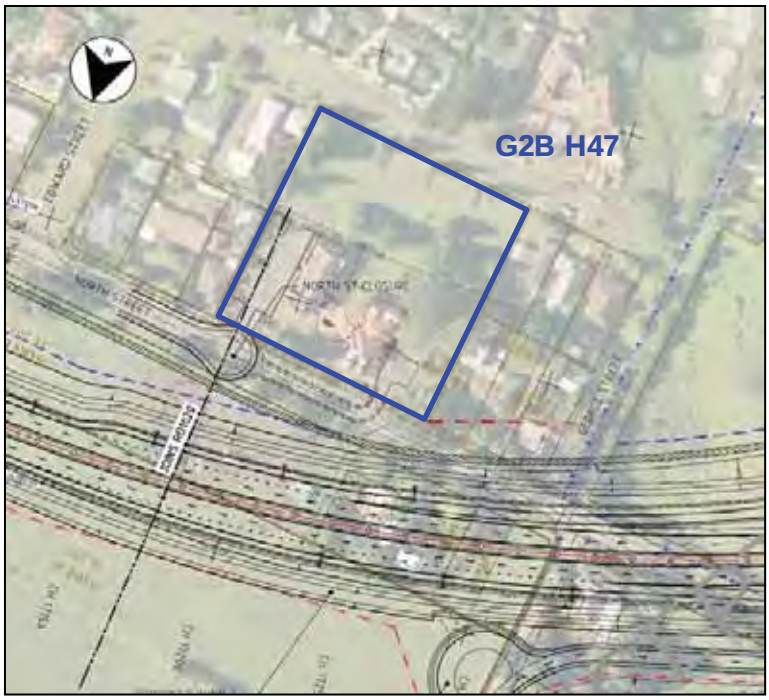


Figure I.20 Location of G2B H47 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- These items have an assessed local level of significance under criteria d, f & g.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- Despite the proximity of the bypass, the integrity of the large town lot on which the church group is situated would not be compromised. The contextual values of these buildings would not be significantly impacted based on the following reasons:
  - The 'front' and entrance aspects of both the church and former convent buildings are to the south and east.
  - An existing high boundary fence and associated border vegetation along the North Street frontage obscures potential short and mid-distance vistas to the north. This indicates that these components of the site's context are not an important part of current usage or appreciation of the site.
  - Relative to the surrounding urban lots, the spatial buffer around each building is already substantial.

Impact on existing structures

- The bypass would not impact existing structures on this lot.

Impact on relics

- Based on the local level of assessed significance for this item (criteria d, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass works would not directly impact this item. The indirect impacts of the bypass would not be appreciable given the southerly aspect of the heritage buildings, the existing spatial buffers and visual barriers.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass close to this heritage item is required in order to:
  - Minimise land take and property severance.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Neither the farmhouse nor its grounds would be directly impacted. The closest section of the bypass carriageway is 100 metres to the south. Existing tree plantings provide a visual buffer and barrier between the homestead, its grounds, and the bypass easement. An open field is situated between the farmhouse grounds and the bypass. There would not be an appreciable impact to the landscape context values of the farmhouse.

Figure I.21 Location of G2B H49 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e & g.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- There would not be any appreciable impact to the contextual landscape values of the farmhouse. Existing tree plantings would provide a visual buffer and barrier between the homestead, its grounds, and the bypass easement. At least 200 metres of an open field system separates the homestead grounds from riparian vegetation situated to the south and west.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criteria e & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The farmhouse and grounds would not be directly impacted by the bypass. The indirect impacts of the bypass would not be appreciable given the extent of the visual and spatial buffers around the homestead.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the proximity of this heritage item is required in order to:
  - Minimise impact to the Berry sporting fields.
  - Minimise land take and property severance.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with the farmhouse which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the indirect impact to this recording would be to move the bypass alignment further to the south. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise impact to the Berry sporting fields.
  - Minimise land take and property severance.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The cottage is located on the northern side of the current highway and would not be directly impacted. The bypass carriageway would be situated on an embankment, on the southern side of the current highway, within 35 metres of the cottage. The current highway would be retained as a service road. The construction of the carriageway on an elevated embankment to the northwestern corner of the cottage would pose an impact to the visual and landscape context of the item.

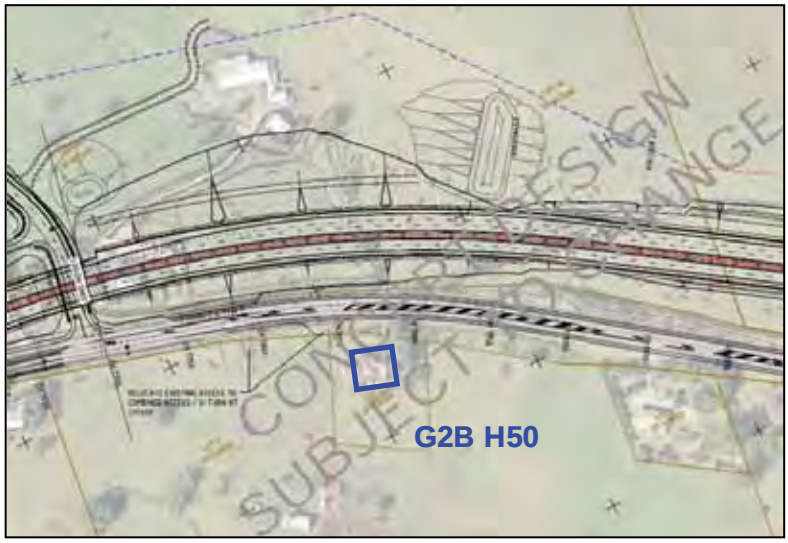


Figure I.22 Location of G2B H50 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- The significance of this item is assessed as falling below the threshold of the assessment criteria.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual Impact

- The construction of the carriageway on an elevated embankment to the northwestern corner of the cottage would pose an impact to the visual and landscape context of the item.

Impact on existing structures

- The bypass would not impact existing structures on this lot.

Impact on relics

- The significance of this item has been assessed as falling below the threshold in the assessment criteria specified by the NSW Heritage Branch. As such this item is not consistent with a definition of a relic, which must be of State or Local significance under these criteria.

Summary

- The bypass would substantially impact upon the contextual values of the cottage.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass close to this heritage item is required in order to:
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the spurline running adjacent to the cottage, to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.
  - Provide for a suitable degree of carriageway elevation to accommodate an underpass for the Toolijooa Road intersection.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the south or north.
- These alternatives have been rejected based on the low significance of the item, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the spurline running adjacent to the cottage, to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.
  - Provide for a suitable degree of carriageway elevation to accommodate an underpass for the Toolijooa Road intersection.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- Based on the low significance assessment for the item and the absence of direct impact, no further heritage related management is recommended for this item.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The concept design allows for the retention of that portion of the existing Schofields Lane which is adjacent to and parallels the eastern boundary of the *Graham Park* property. This section includes the *Graham Park* entrance gates and sculpture which are an important, and publically accessible heritage feature of the former research station. This retention would be possible due the concept design specification for a new highway intersection with Schofields Lane 50 metres to the north.

As a consequence of the retention of the current Park entrance and adjacent portion of Schofields Lane, there would be no direct impact to the significant fabric of the *Graham Park* site.

The edge of construction works for the bypass carriageway would extend to approximately 20 metres of the eastern boundary of Graham Park. This would not pose an appreciable impact to the visual and contextual values of the site.

Figure I.23 Location of G2B H51 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed State level of significance under criteria a, b, c & g, and local significance under criteria a, c, e, f & g.
- The relocation of the bypass intersection with Schofields Lane has the consequence that the existing portion of Schofields Lane which includes the Graham Park entrance can be retained and continue to function. This will maintain the heritage values and integrity of the entrance way. Previously considered options for this intersection would have required a new entrance to the facility, and possibly also repositioning of the entrance feature.

- It is proposed that the design of any access roadworks in the vicinity of the *Graham Park* entrance should not exclude the capacity for visitors to pull over and safely inspect the entrance feature. If necessary, allowance should be made in the design for the potential future installation of interpretive signage.
- The increased proximity of the highway, and the associated vegetation clearance would make the entrance sculpture more visible to bypass users. This could both increase public awareness and curiosity about the site.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Despite the proximity of the bypass, the contextual landscape and visual values of this item would not be appreciably compromised. The contextual values of the former research station would not be significantly impacted based on the following reasons:
  - The bypass at this point simply duplicates the existing carriageway on its northern side.
  - Despite the proximity of the required bypass construction footprint, the area immediately in front of the existing Graham Park already consists of a public road, being an alteration to the Schofields Lane alignment and intersection with the highway, constructed sometime between 1992 and 2006.
  - The existing circular driveway behind the entrance provides an effective open space buffer (17 metres) in front of the former station buildings.

Impact on existing structures

- The bypass would not directly impact any of the significant structures which form part of Graham Park.

Impact on relics

- Based on the State and local level of assessed significance for this item (criteria a, b, c, e, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. There are no known relics which would be directly impacted by the bypass development.

Summary

- The bypass would not directly impact significant items, and would have no appreciable impact on contextual values.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass in the proximity of this heritage item is required in order to:
  - Maximise the use of the existing highway easement.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the close proximity of the bypass to this recording would be to move the bypass alignment to the east. This would directly impact upon a modern farmhouse and native vegetation. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is recommended that the design of any access roadworks in the vicinity of the *Graham Park* entrance should not exclude the capacity for visitors to pull over and safely inspect the entrance feature. If necessary, allowance should be made in the design for the potential future installation of interpretive signage.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.
- During the period of bypass construction, temporary fencing would be erected around the feature to identify a 'no-go' area.

Recording ID: G2B H56 **Name/*Description*:** ***Broughton Mill* (disused) Homestead and Dairy**
117 North St Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This disused homestead and dairy would not be directly impacted. The bypass would be situated approximately 50 metres to the south of the site, and consequently pose a loss of landscape context value.

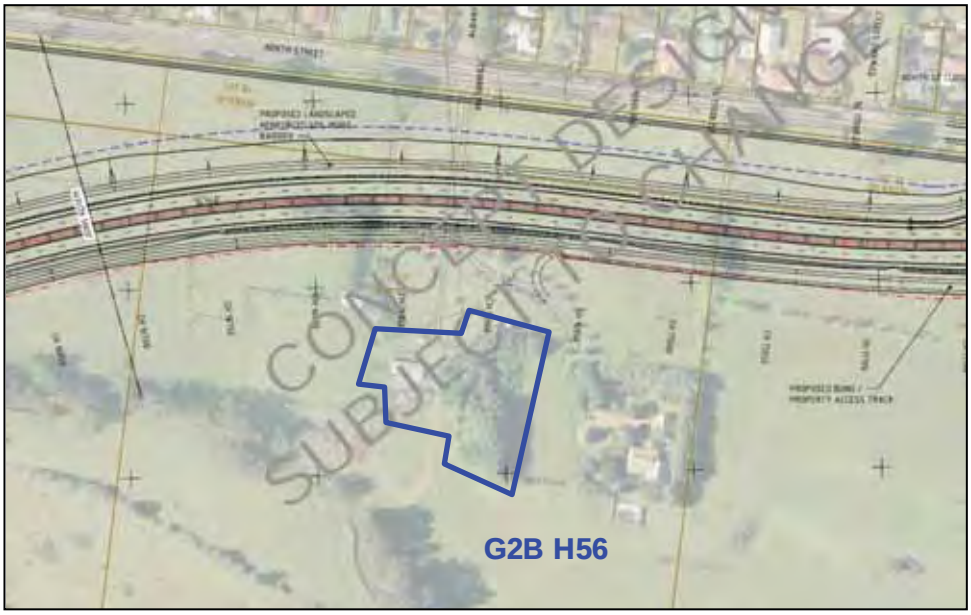


Figure I.24 Location of G2B H56 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria e & g.
- The bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass works would be situated relative closely to the east and south of this item, coming as close as 50 metres to the south. This would place a visually intrusive landscape element into the current pastoral context of the homestead and dairy.
- This impact is substantially lessened by the fact that the homestead is now disused and in a ruinous state. The ruin is obscured by dense vegetation, and there are currently no practical outward looking vistas available from the building. Similarly, views towards the homestead provide no obvious indication of its presence.

Impact on existing structures

- The bypass would not impact existing structures related to this item.

Impact on relics

- Based on the local level of assessed significance for this item (criterion g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- The bypass would impact upon the landscape contextual values of the homestead and dairy to the south and east.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass in the relative proximity this heritage item is required in order to:
  - Minimise land take and property severance.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Minimise impact to the sporting fields to the east, by locating the bypass on the north of Bundewallah Creek and then crossing the creek west of the fields and turning south to run parallel with the North Street corridor.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H58 **Name/*Description*: Uniting Church Hall (former Wesleyan Chapel) 60 Albert St Berry**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This former church building, until recently situated on the south side of North Street, and now re-positioned 50 metres to the south and, facing Albert Street, would not be directly or indirectly impacted. The building entrance now faces south, away from the bypass, and vistas from the building no longer include the pastoral view on the north side of North Street. The bypass would be situated 200 metres away to the northwest. Existing buildings occur between the former chapel and the bypass.

Figure I.25 Location of G2B H58 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, d, f & g.
- The construction of the bypass would not directly or indirectly impact this item.
- One of the determining factors for the selection of the bypass alignment was the avoidance of indirect impact to this building in its former location. Previously contemplated alignment proposals, would have had an indirect impact due to construction in close proximity next to North Street.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The visual and landscape context of this former church building would not be impacted by the bypass. This conclusion is based on the following points:
  - The bypass would be situated 200 metres away, on the opposite side of North Street.
  - The recent re-positioning of this building means that the entrance now faces south, away from the bypass, and the front of the building forms part of the Albert Street frontage.

- Buildings and an avenue of mature tree plantings are situated between the former chapel and North Street, and these provide a considerable visual buffer and boundary.

Impact on existing structures

- The bypass would not impact existing structures on this lot.

Impact on relics

- Based on the local level of assessed significance for this item (criteria a, d, f & g), above ground structures which contribute to this significance, and any related archaeological deposits comply with the definition of a relic. No such relics would be directly impacted by the bypass.

Summary

- This item would not be impacted, either directly or indirectly by the bypass.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass relative to this heritage item is required in order to:
  - Minimise land take and property severance.
  - Utilise the North Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Minimise impact to the sporting fields to the east, by locating the bypass on the north of Bundewallah Creek and then crossing the creek west of the fields and turning south to run parallel with the North Street corridor.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this heritage item which would be impacted by the bypass.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on an alignment further to the north and northwest.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise land take and property severance.
  - Utilise the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- This item would not be impacted, either directly or indirectly by the bypass.

I.5 Known or potential archaeological deposits

Recording ID: G2B H14 **Name/*Description*: Archaeological Deposit Former buildings at northern end of Broughton Creek township, Princes Highway, Berry**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

The north Berry interchange would include a south bound off-ramp positioned along the current highway alignment. Construction of the off-ramp would include widening and other works along the existing carriageway. This would encroach upon the G2B H14 archaeological deposit which extends up to the edge of the existing road shoulder on the eastern side. The degree of encroachment would vary and may extend up to five metres from the current shoulder edge.

An associated northbound on-ramp would be constructed on the western side of the existing highway alignment. This ramp would diverge from the current alignment opposite the *Mananga* homestead and descend to a level below the main bypass carriageway bridge. This alignment probably includes the location of the Berry butter factory building and the original (now filled) steep slope to Broughton Mill Creek. The latter may have been a refuse disposal area for the factory. Construction related excavation in this area may impact archaeological deposits which potentially remain beneath the existing road platform and the adjacent slopes.

The intersection of the new off-ramp with the former 1955 highway remnant (G2B H15), would be moved 100 metres further north, allowing the construction of a safer 90 degree angle of approach. This would involve direct impact to a roughly 190 m^2 (12.5 x 15 metres) portion of the G2B H14 archaeological deposit

Figure I.26 Location of G2B H14 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, e, f & g.
- It is proposed to conduct a program of archaeological salvage excavation within those portions of the G2B H14 deposit subject to direct impact. The archaeological record generated by this action would address the need to realise the research, interpretation and information potential of the deposit. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the interchange and associated on and off-ramps would not impact upon the visual and landscape context of the archaeological deposit to any greater degree than has already occurred since the 1955 upgrade. Existing elements which are important to the landscape and visual context of the deposit are the former 1955 highway alignment (and now service road) G2B H15, and the Mananga homestead and grounds (G2B H16). The Mananga homestead and grounds will not be directly impacted. The significant portion of the remnant highway, that section adjacent to the Mananga homestead, will also remain intact.

Impact on existing structures

- This item does not include above ground structures.

Impact on relics

- Based on the local level of assessed significance for this item (criteria a, e, f & g), the sub-surface artefacts and archaeological deposits which comprise this item comply with the definition of a relic.
- The loss of deposit outlined in the first question corresponds to impact to relics.

Summary

- Construction of the bypass would result in direct impact to two known areas of archaeological deposit (a margin adjacent to the existing highway and 190 m^2 under a new access road intersection), and to potentially occurring deposits underlying the existing highway and adjacent slopes.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass and service road across this heritage item is required in order to:
  - Avoid direct impact to the Mananga homestead property.
  - Provide access to private property independent of the bypass carriageway.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Maximise the use of the existing highway easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- Construction of the bypass would result in direct impact to two known areas of archaeological deposit (a margin adjacent to the existing highway and 190 m^2 under a new access road intersection), and to potentially occurring deposits underlying the existing highway and adjacent slopes.
- Impact to archaeological deposits is outlined in the answer to the first question.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The only alternative to impacting this recording would be to move the bypass alignment further to the north. This would require either an extensive area of landfill and/or an extensive additional bridge interval. This would also result in additional loss of agricultural land.
- This alternative has been rejected based on the relative significance of the portion of the remnant subject to impact, and the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Avoid use of bridges where a viable alternative exists.
  - Maximise the use of the existing highway alignment and easement.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that prior to development impact, a program of archaeological salvage be conducted within those portions of the deposit subject to direct impact.
- For those sections of the deposit not subject to direct impact, it is recommended that measures be instigated, where and as considered warranted, to protect them from accidental or incidental impact during construction, or other form of RMS use.

Recording ID: G2B H48	Name/*Description*:	**Potential Archaeological Deposit Site of former Berry Estate Tenant Farm 161 Princes Highway Broughton Village**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Two mature tree plantings mark the approximate location of this former homestead site. Based on an assessment of the tree locations and locally elevated micro-topography, it is estimated that the potential area in which the homestead was located falls outside of, but immediately adjacent to, the proposed bypass and associated easement.

A modern farmhouse has been constructed on the site of the former G2B H48 homestead. In the event that this building needs to be demolished, there could be an associated risk of impacting archaeological deposits related to the earlier occupation of the former homestead, and to the remnant tree plantings.

The bypass would be situated approximately 50 metres to the southeast of this item, and consequently pose a loss of landscape context value.

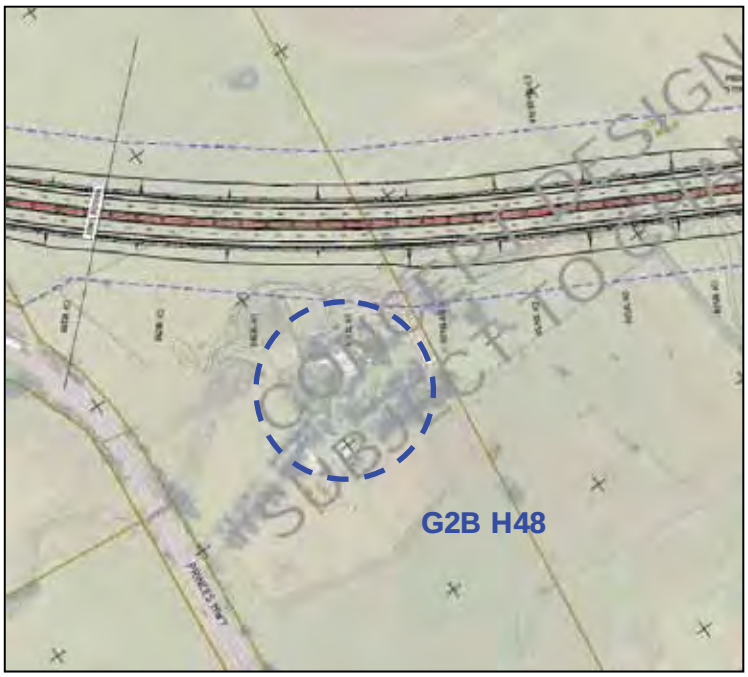


Figure I.27 Location of G2B H48 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion e, subject to confirmation through test excavation.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass works would be situated relatively close to this item, coming as close as 50 metres. This would place a visually intrusive landscape element into the current pastoral context of the site. This impact is substantially lessened however by the fact that the site has already been substantially impacted by the construction of a modern farmhouse and its grounds. The significance of this item is based on its potential research value through archaeological investigation. The impact of the bypass on the landscape context of this item would not have a significant impact on this value.

Impact on existing structures

- This item does not include above ground structures. No structures associated with this recording would be impacted by the bypass.

Impact on relics

- Based on the local level of assessed significance for this item (criterion e), the sub-surface artefacts and archaeological deposits which may comprise this item would comply with the definition of a relic.
- It is considered unlikely that construction of the bypass poses a risk to relics given the distance from the former homestead and the lower ground surface of the construction footprint.
- If, due to constraints on re-sale and re-use, demolition of the current farmhouse becomes necessary, then there would be potential for the demolition to impact remnant archaeological deposits, and the remnant tree plantings.

Summary

- Construction of the bypass would result in the minor loss of contextual values, but is unlikely to result in direct impact to the deposit unless demolition of the modern farmhouse is required to satisfy re-sale constraints.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The close proximity of the bypass to this heritage item is required in order to:
  - Minimise disturbance to the ecological values of the Broughton Creek corridor.
  - Minimise the extent of excavation and batter length (and therefore also visual impact) associated with the Toolijooa Ridge cutting.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Will any known or potentially significant archaeological deposits be subject to development impact?

- It is considered unlikely that construction of the bypass poses a risk to potential archaeological deposits given the distance from the former homestead and the lower ground surface of the construction footprint.
- If, due to constraints on re-sale and re-use, demolition of the current farmhouse becomes necessary, then there would be potential for the demolition to impact remnant potential archaeological deposits.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the close proximity of the bypass to this item would be to move the bypass alignment further south. This would involve a new disturbance corridor across the Broughton Creek riparian vegetation/corridor, and potentially greater excavation along the Toolijooa Ridge cutting in order to accommodate horizontal design (curve) requirements. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise disturbance to the ecological values of the Broughton Creek corridor.
  - Minimise the extent of excavation and batter length (and therefore also visual impact) associated with the Toolijooa Ridge cutting.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that in the event that construction related impacts are to occur at the G2B H48, then an archaeological program of monitoring and/or salvage excavation, as appropriate, be conducted with the aim of recording and recovering any artefacts or other information which relates to the former Berry Estate tenant farm at this location.
- In the event that demolition of the modern farmhouse is required, it is recommended that a program of archaeological monitoring by an archaeologist be conducted with the aim of recording and recovering any artefacts or information which relate to the former Berry Estate tenant farm.
- It is recommended that the remnant tree plantings, which predate the modern farmhouse, be conserved and protected from damage.

Recording ID: G2B H53 **Name/*Description*: Potential Archaeological Deposit Site of former Berry Estate Tenant Farm 403 Princes Highway Broughton Village (Toolijooa Ridge)**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item.

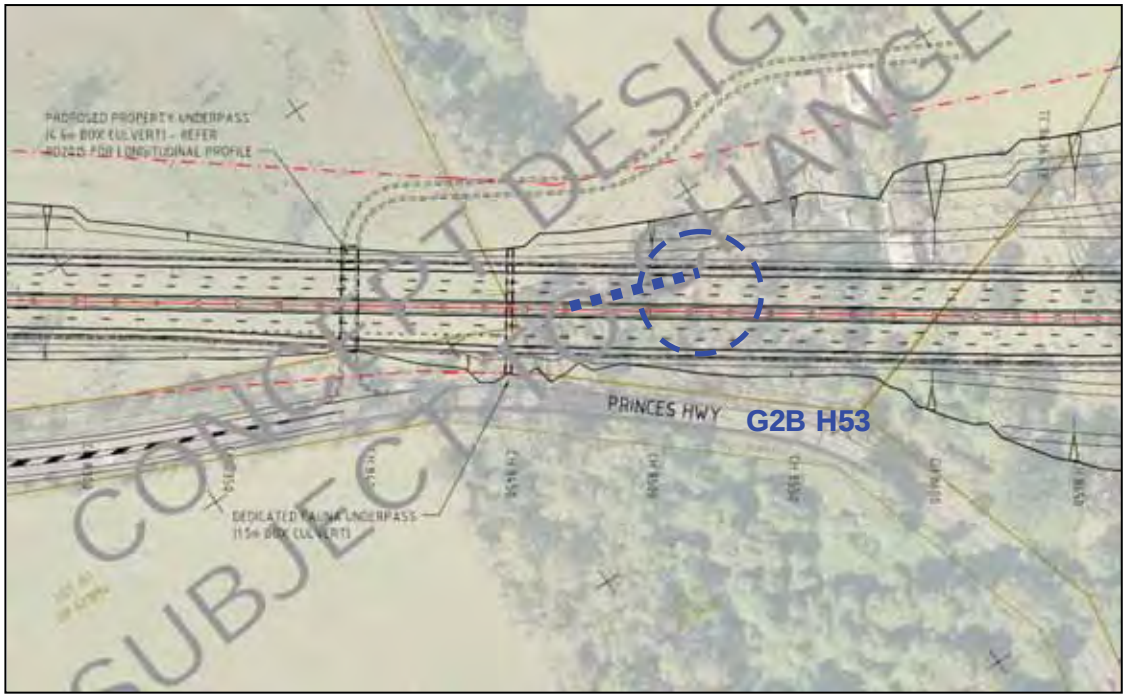


Figure I.28 Location of G2B H53 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion e.
- It is proposed to conduct a program of archival recording and archaeological salvage excavation, as appropriate, at G2B H14. The archaeological record generated by this action would address the research, interpretation and information potential of the deposit. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass would involve the creation of a number of substantial cuttings. These would not only remove the potential archaeological deposit and alignment of stones, but also their immediate landscape setting and visual context.

Impact on existing structures

- This item includes an alignment of stone rubble which may be the eroded or disturbed remnants of a dry stone wall. This feature would be directly impacted by bypass construction.

Impact on relics

- Based on the local level of assessed significance for this item (criterion e), the sub-surface artefacts and archaeological deposits which may potentially be present at this site would comply with the definition of a relic.
- All relics which constitute this item would be directly impacted.

Summary

- Construction of the bypass would result in the complete loss of the potential archaeological deposit and alignment of rock rubble which constitute this item.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the spurline to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- All potential archaeological deposits occurring at this site would be subject to direct impact.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment either to the north or south, which avoids direct impact to the heritage item. Both alternatives would require construction of major artificial embankments. A northern alternative would prevent the use of the existing highway as a service road. A southern alternative would require a much deeper and larger cutting through the upper portion of Toolijooa Ridge.

- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maintain the most effective vertical and horizontal carriageway alignment up to, and from, the planned Toolijooa cutting.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that prior to development impact, a program of archival recording and archaeological salvage excavation be conducted at this site, as appropriate, and as required by the nature and significance of the relics encountered.

Recording ID: G2B H59	Name/*Description*:	**Archaeological Deposit and Remnant Plantings Site of homestead on former Portion 181, Broughton Village**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

This site would not be subject to direct impact from the bypass. The bypass would be situated over 100 metres to the west.

The bypass would be clearly visible from the site, given its lower elevation and the surrounding pasture. The bypass would have an indirect impact on the heritage values of the wider landscape context of the site.

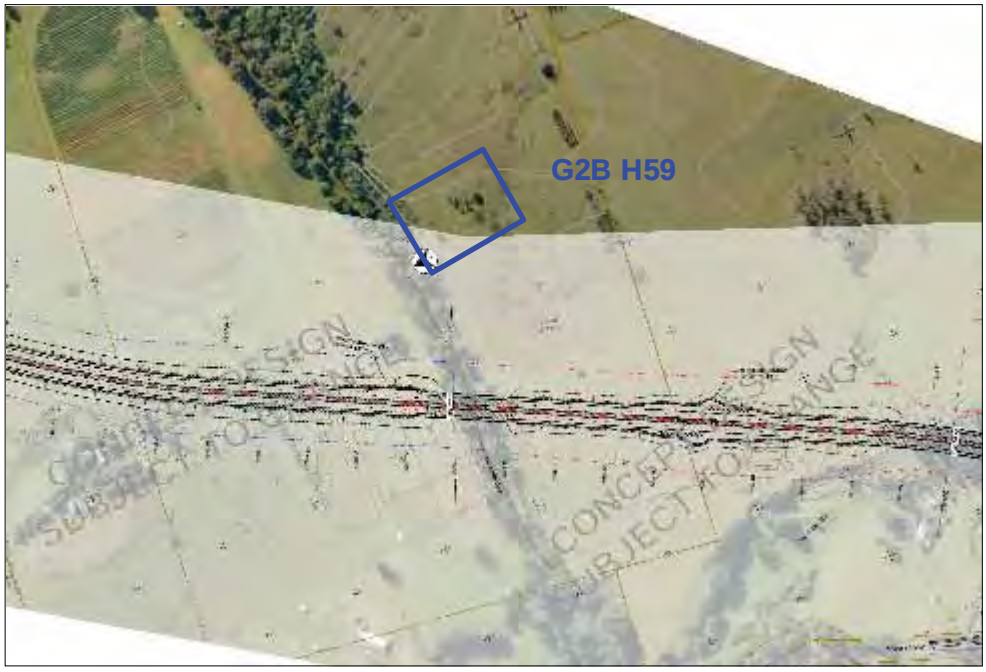


Figure I.29 Location of G2B H59 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria a, b, e, f & g.
- The construction of the bypass would not directly impact this item.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass works would be situated in relative proximity to this item. This would impose a modern and intrusive element into the wider pastoral and largely nineteenth century landscape context of the site.

Impact on existing structures

- No structures associated with this recording would be impacted by the bypass.

Impact on relics

- Based on the local level of assessed significance for this item (criteria a, b, e, f & g), the above and below ground artefacts and archaeological deposits which comprise this item would comply with the definition of a relic. No relics would be directly impacted by the bypass.

Summary

- Construction of the bypass would pose an indirect impact to the heritage values of the wider landscape context of the site.

Why is the bypass required to traverse through/near the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The relative proximity of the bypass to this heritage item is required in order to:
  - Minimise direct impact to the Brookside homestead group and avoid direct impact to the Sedgeford homestead and grounds.
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- No known or potential archaeological deposits associated with this item would be subject to development impact.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternatives to the relative proximity of the bypass to this item would be to move the bypass alignment further to the west. This would require major, if not full direct impact to the Brookside (G2B H28) and Sedgeford (G2B H25) homesteads. This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise direct impact to the Brookside homestead group and avoid direct impact to the Sedgeford homestead and grounds.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that where there are anticipated indirect impacts to the visual and landscape contextual values of heritage item(s), the design, construction and finishing of the bypass in the vicinity of the item(s) would be realised with the aim of minimising the visual impact caused by the road and its infrastructure. Possible means of achieving this aim include: minimising the height of the road platform and associated fencing or noise barriers; and careful selection of appropriate road side plantings and landscaping.
- Where there is no anticipated direct construction impact to heritage items, it is recommended that measures be instigated, where and as considered warranted, to protect these structures from accidental or incidental impact during construction, or other form of RMS use.

I.6 Miscellaneous sites

Recording ID: G2B H61 **Name/*Description*: Quarried rock outcrop**
A350 Princes Highway
Broughton

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would result in the loss of the whole of the known extent of the item. Although the footprint of the bypass carriageway is situated immediately adjacent to this site, it's location on a drainage line which would be directly impacted by culvert works means that full direct impact is most likely.

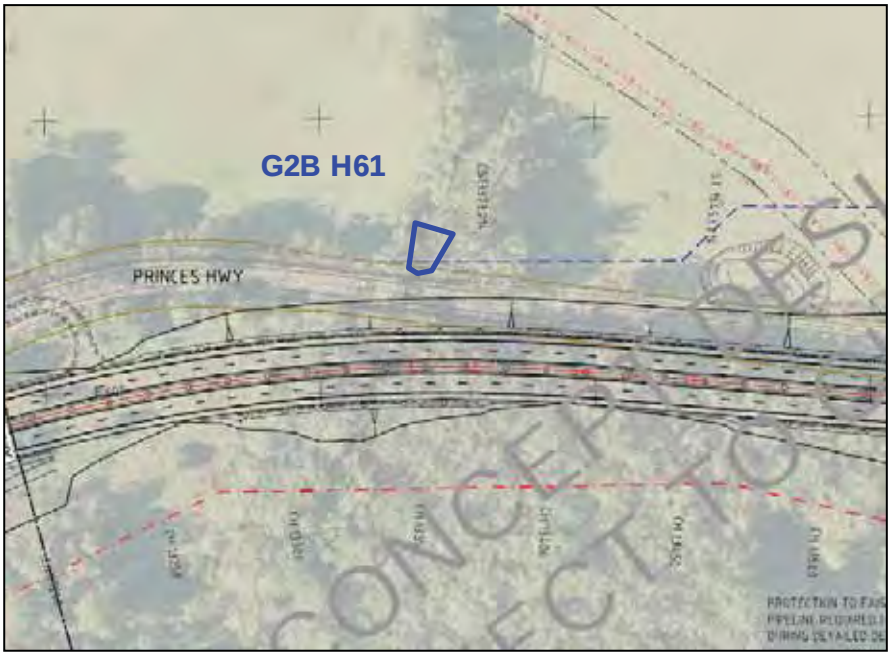


Figure I.30 Location of G2B H61 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criterion g.
- It is proposed to conduct an archival recording of this item prior to construction impact. The archaeological record generated by this action would address the research potential and representative value of the site. The resulting record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass and any associated culvert works would result in both the loss of the site, and its immediate landscape setting and visual context.

Impact on existing structures

- This item does not include above ground structures.

Impact on relics

- Given that the definition of a 'relic' (s.4 Heritage Act 1977), is interpreted by the NSW Heritage Branch to exclude 'works' (refer Section 8.1.5 of this report), the 'relic' status of this quarried rock face is difficult to determine.
- Apart from the quarry and stone extraction marks, there are no other components of this item which may constitute a relic subject to impact.

Summary

- Construction of the bypass would result in the complete loss of the heritage item, and its context.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Maximise the use of the existing highway alignment.
  - Maintain horizontal and vertical design standards
  - Minimise land take and property severance.
  - Minimise impact to native vegetation.

Will any known or potentially significant archaeological deposits be subject to development impact?

- All potential archaeological deposits occurring at this site would be subject to direct impact.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment which avoids direct impact to the heritage item. A more northern alignment would impact native vegetation, both northern and southern alignments would have property severance implications.
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maximise the use of the existing highway alignment.
  - Minimise impact to native vegetation.
  - Maintain horizontal and vertical design standards.
  - Minimise land take and property severance.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed that prior to development impact, an archival recording of the site be conducted.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would not involve direct impact to the remaining six poplar trees in this avenue, (which originally included nine trees). The bypass would be constructed in close proximity to the northern most tree, at right angles to the alignment.

A younger and more densely planted avenue of poplar trees, extends to the north of the northern most recorded tree in the G2B H62 avenue. Some of these trees would be directly impacted by the project. This younger avenue does not form part of the G2B H62 recording.

Figure I.31 Location of G2B H62 relative to proposed bypass works (dead or removed trees are shown by a dashed circle).

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This tree avenue has an assessed local level of significance under criterion c.
- The bypass avoids impact to this avenue
- It is proposed to temporarily fence the northern most tree for the duration of construction works in order to protect the root zone and prevent accidental impacts.
- Any post construction planting of the bypass easement in the area of the tree avenue (Woodhill Mountain Road) would aim to reinforce and replicate the existing landscape character created by the planted avenues of poplar trees.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass would interrupt the intended visual structure and rhythm of the tree avenue, which parallels Woodhill Mountain Road. The visual impact of the avenue is currently reinforced by younger plantings of poplar trees which are situated on both sides of Woodhill Mountain Road and extend to the north of the original avenue. These younger poplars are not included in the Shoalhaven LEP heritage listing upon which the G2B H62 recording is based. The bypass would directly impact an avenue interval of approximately 50 metres (approximately twelve trees along the eastern road side). This, together with the construction of the bridge at right angle to the avenue would pose a substantial visual interruption to the lengthwise appreciation of the whole avenue.
- The current effectiveness of the whole avenue (inclusive of unlisted trees) is lessened by:
  - The truncation of most of the trees on the west side of road to allow for overhead powerline clearance.
  - Gaps in the avenue and variable planting intervals.
  - Varying tree heights due to multiple stages of planting.

Impact on existing structures

- There are no existing structures related to this heritage item.

Impact on relics

- Based on the local level of assessed significance for this item (criterion c), the trees which comprise this item would comply with the definition of a relic. None of the trees in the G2B H62 recording will be directly impacted.

Summary

- Construction of the bypass would not directly impact upon the G2B H62 tree avenue, however there would be impacts to the visual context of the avenue and to the appreciation of the avenue.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.

- The location of the bypass in close proximity to this heritage item is required in order to:
  - Minimise property severance and loss of agricultural land.
  - Minimise visual and noise impacts as identified by Berry Community focus groups
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Minimise impact to the sports fields on the south side of Bundewallah Creek.
  - Maximise the use of the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this item.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass further north of the avenue. This however would involve greater loss of agricultural land due to field severance.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Minimise property severance and loss of agricultural land.
  - Provide elevation for the bridge crossing of Broughton Mill Creek and Woodhill Mountain Road.
  - Minimise impact to the sports fields on the south side of Bundewallah Creek.
  - Maximise the use of the north Street corridor (which is based on a balanced appreciation of town related economic, community and social factors).
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to temporarily fence the northern most tree for the duration of construction works in order to protect the root zone and prevent accidental impacts.
- Any post construction planting of the bypass easement in the area of the tree avenue (Woodhill Mountain Road) would aim to reinforce and replicate the existing landscape character created by the planted avenues of poplar trees.

Recording ID: G2B H63 **Name/*Description*: *Mark Radium Park***
Victoria Street, Berry

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of a southbound on-ramp for the southern Berry interchange would require the loss of a narrow margin of land from the western boundary of the park, adjacent to the current Princes highway. This margin may be as wide as 25 to 30 metres at its southern end, and narrower at its northern end.

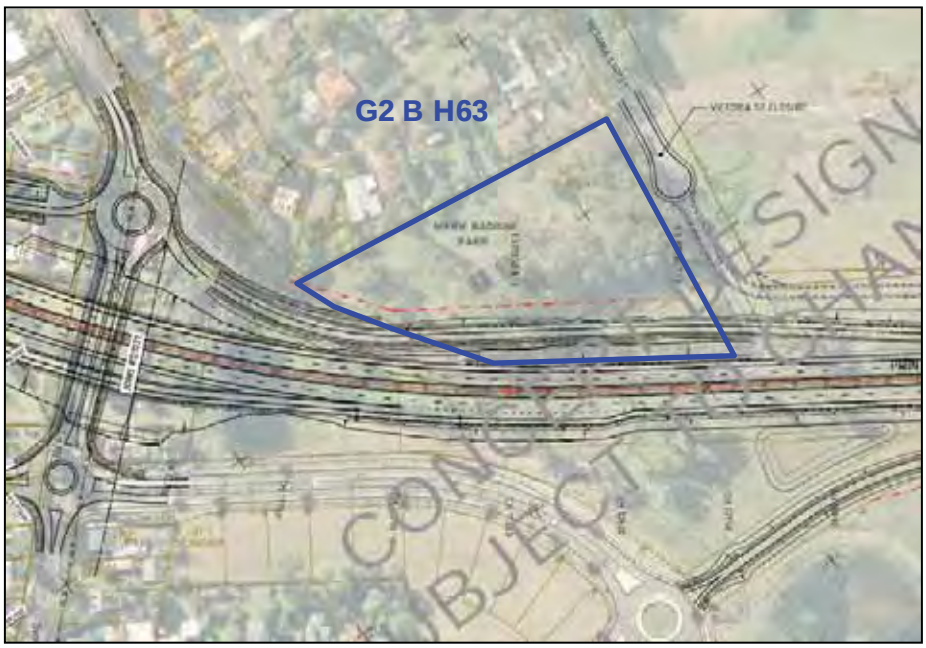


Figure I.32 Location of G2B H63 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This Mark Radium park has an assessed local level of significance under criteria b & c.
- The bypass minimises impact to the park by re-using as much of the original highway carriageway as possible.
- The change in use of the existing highway from main single carriageway to an on-ramp, means that this bordering roadway will undergo a reduction in vehicle traffic with possible positive results for the public amenity and safety of the park.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass development will reduce the width of the park and create a wider corridor of carriageways and ramps along its western boundary.

Impact on existing structures

- The bypass may impact the western abutment of a low wall which impounds an ornamental pond located in the southwestern portion of the park.

Impact on relics

- Based on the local level of assessed significance for this item (criteria b & c), those components of the park which constitute the significant fabric of the item would comply with the definition of a relic. It is debatable if any of the specific park items to be impacted by the bypass - a number of trees, other plantings, footpaths and potentially the ornamental pool wall, could be considered the significant fabric of the park.

Summary

- Construction of the bypass would result in the loss of a margin of land along the western park boundary, and visual impact associated with a wider highway corridor.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Fulfil the requirements of the proposed southern interchange for Berry.
  - Minimise impacts to urban lots.
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.
  - Maximise the use of the existing highway alignment.

Will any known or potentially significant archaeological deposits be subject to development impact?

- There are no known or potential archaeological deposits associated with this item.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The only alternative would be to move the main carriageway further to the west. This would have a substantial impact to the Huntingdale Park Estate.
- This alternative has been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Fulfil the requirements of the proposed southern interchange for Berry.
  - Minimise impacts to urban lots.
  - Maintain horizontal and vertical design standards relative to crossing Kangaroo Valley Road within the most effective and least impactive road interval.
  - Maximise the use of the existing highway alignment.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to minimise construction impact to Mark Radium Park wherever feasible.
- Where there is no anticipated direct impact to Park components, it is recommended that measures be instigated, where and as considered warranted, to protect these components from accidental or incidental impact during construction, or other form of RMS use.

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

Construction of the bypass would probably result in direct impact to at least the southern end of the wall, and possibly a greater portion, depending on the batter and stepping requirements of the northern face of the cutting through Toolijooa Ridge.

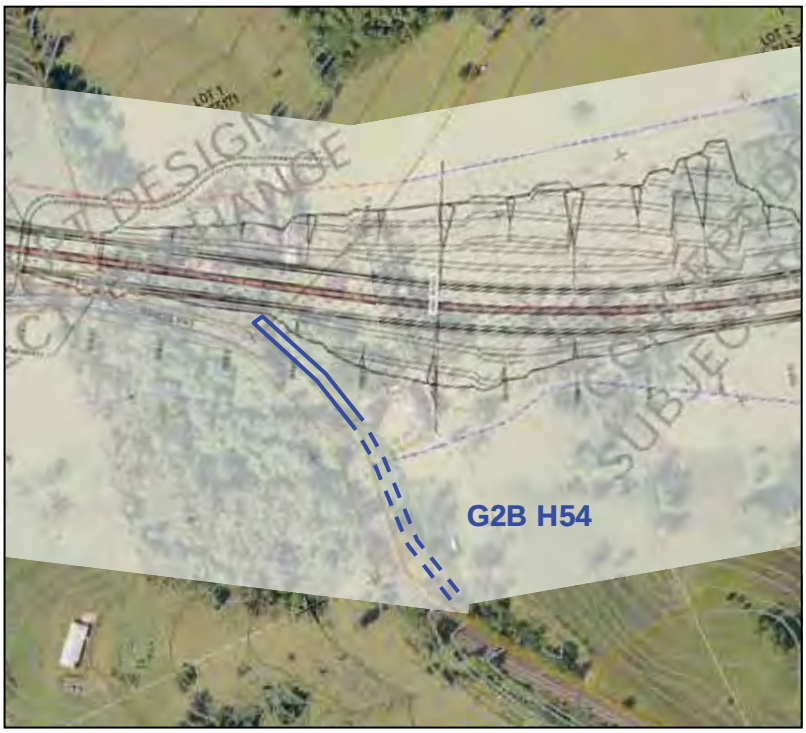


Figure I.33 Location of G2B H54 relative to proposed bypass works.

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under criteria c, f & g.
- It is proposed to avoid direct impact to the wall wherever feasible, and to actively conserve and manage the feature.
- It is proposed to conduct an archival recording of the wall prior to any construction impact. The archaeological record generated by this action would address the research potential and representative values of the site. The record would respect those values and provide a degree of mitigation.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- Construction of the bypass would involve the creation of a large, deep and visually imposing cutting immediately adjacent to the wall. Despite this, the immediate landscape context of the wall would be retained, due to the retention of the existing highway carriageway as a local access and service road. The wall is situated

upslope of this carriageway and probably served as a boundary wall for the original road easement.

Impact on existing structures

- Construction of the bypass would probably result in direct impact to at least the southern end of the wall, and possibly a greater portion, depending on the batter and stepping requirements of the northern face of the cutting through Toolijooa Ridge.

Impact on relics

- Based on the local level of assessed significance for this item (criteria c, f & g), the above and below ground elements of the wall, together with any sub-surface artefacts and archaeological deposits would comply with the definition of a relic.
- Those elements of this site that may be subject to direct impact (a portion of the wall at its southern end, and potentially any archaeological remains within the fill on the upslope side of the wall), would all constitute relics.

Summary

- Construction of the bypass would probably result in direct impact to at least the southern end of the wall, and possibly a greater portion. Despite this, the majority of the immediate context of the wall would probably be retained as part of the continuing function of the current highway as a service road.

Why is the bypass required to traverse through the identified heritage item?

- The project design has been determined following the consideration of multiple environmental, social, economic, design and engineering factors. Many of the constraints and opportunities posed by these factors present conflicting values and objectives. In these cases, project design has been drafted following a comparative assessment of the impacts and relative values. With regard to cultural heritage values, the project alignment was formulated with the following objectives:
  - Avoid impact to cultural heritage values where feasible or where significance values warrant compromise in other factors.
  - Minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - All anticipated impacts can be mitigated to a substantial degree through the conduct of management and salvage actions.
- The location of the bypass across this heritage item is required in order to:
  - Allow the retention of the existing highway as a service road.
  - Take advantage of the elevated topography of the adjacent spurline to construct the most effective vertical and horizontal carriageway alignment on the eastern fall of the Toolijooa Ridge.

Will any known or potentially significant archaeological deposits be subject to development impact?

- The upslope fill behind the wall may include archaeological material, and would be impacted if and where the wall itself was directly impacted.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

- The alternative would be to construct the bypass on a different alignment either to the north or south. Both alternatives would require construction of major artificial embankments downslope of the wall. A northern alternative would prevent the use of the existing highway as a service road. A southern alternative would require a much deeper and larger cutting through the upper portion of Toolijooa Ridge.
- These alternatives have been rejected based on the poor balance of outcomes which would result relative to the objectives to:
  - Avoid or minimise impact to cultural heritage values where feasible and where warranted by significance values.
  - Maintain the most effective vertical and horizontal carriageway alignment up to, and from, the planned Toolijooa cutting.
  - Allow the retention of the existing highway as a service road.
  - Maintain horizontal and vertical design standards.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to avoid direct impact to the wall wherever feasible, and to actively conserve and manage the feature.
- It is proposed to conduct an archival recording of the wall prior to any construction impact.
- Any rock material displaced from the wall as a result of construction works, should be retained for use in the repair and conservation management of the original wall.

I.7 Cultural landscapes

Recording ID: SICPH CL **Name/*Description*: Southern Illawarra Coastal Plain and Hinterland**

Statement of heritage impact

What is the nature and extent of anticipated development Impact?

- The bypass would impose a modern structural component onto the landscape. The formal traits of the bypass would contrast with those of the existing landscape:
  - The horizontal alignment of the bypass would be curvilinear within the constraints of standardised and even radius curves. This would contrast with most of the existing broad scale man made landscape features which are based on grids, right angles, or straight intervals joined by relatively tight curves.
  - The vertical alignment of the bypass would be gradual and incremental, and would include ramps, embankments and cuttings to maintain standard rates of climb or descent. This is in contract to most of the existing broad scale man made landscape features which are more reflective of natural gradients and elevations.
  - The width of the bypass corridor (including the carriageways, ramps and associated easement) would vary from around 100 metres to up to 200 metres. This is in major contrast to existing man made corridors which are nearly all less than 50 metres in width.
  - Unlike the alignment of existing roads which, through their curves, and opportunistic alignments, manifest the natural topography they are traversing, the bypass alignment would create its own topography of cuttings and embankments as required by limited tolerances in vertical and horizontal alignment. As a consequence the bypass may run contrary to the natural flow of ridges, valley orientation, and slope contours.
- Whereas the overwhelming character of property boundaries, field delineation, artificial lowland drainage, and secondary and minor roads is one of a grid and rectangular divisions, the bypass would superimpose this patchwork with a visually dominant and curvilinear corridor, following its own independent directional agenda.
- In the general proximity of Berry, the bypass would:
  - Impact upon the short and mid-distance view-sheds from the town streetscapes.
  - Impose a contrasting and modern road form relative to those parts of the town structured on a grid pattern.
  - Impact upon some remnant pastoral open space situated along the northern margin of the town grid. This margin provides a visually appealing contrast between the urban and rural and contributes towards a general pastoral character for the town.

Visual Boundary of the BTUCA, also boundary of the *Berry District Landscape Conservation Area* and approximate boundary of SICPH CL

Buffer zone of the BTUCA

Sub-division Boundary of the BTUCA

FBB bypass

Figure I.34 Location of proposed bypass works relative to the SICPH CL. (After Figure 13 in Clarke and Duyker 2010; and The boundary of the Berry – Bolong Pastoral Landscapes (Shoalhaven Heritage Inventory) (base image: Google Earth Pro 2009)

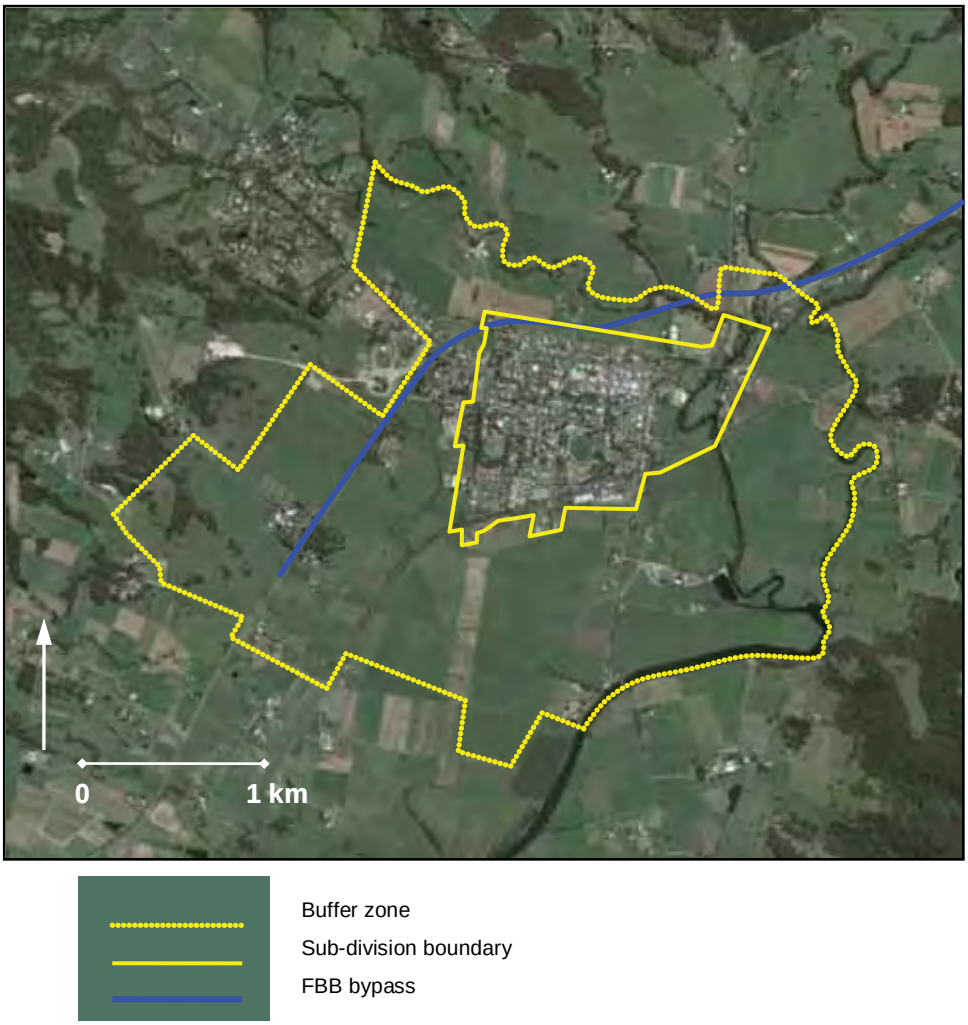


Figure I.35 Location of proposed bypass works relative to the Buffer Zone and Subdivision Boundary of the National Trust defined Berry Township Urban Conservation Area (After Figure 13 in Clarke and Duyker 2010) (Google Earth Pro 2006).

The following aspects of the proposal respect or enhance the heritage significance of the item for the following reasons:

- This item has an assessed local level of significance under all criteria: a, b, c, d, e, f & g.
- Apart from substantial deviations across the Broughton Creek valley and around Berry, the bypass would generally follow the original corridor of the first European road constructed for vehicles between Berry and Gerringong – the 1856 Berry Estate Road. This provides a degree of historical and functional continuity to the bypass. It would remain a modern manifestation of an original mid nineteenth century access and transport corridor.
- The construction of the Berry bypass would avoid the need to widen and transform one of the town grid streets to accommodate the highway traffic. If the latter option was adopted it would irrevocably change the amenity and heritage character of the town, and require the full or partial demolition of many properties with heritage value.
- It is proposed to minimise and ameliorate adverse visual impacts of the bypass, through careful design of the bypass corridor and its infrastructure, minimising cuttings, embankments and carriageway elevation where feasible, and the establishment of vegetation.

- The visual impact of the bypass, from the south, would be mitigated by the construction of a landscaped barrier on the southern and eastern side of the bypass adjacent to Berry. This would provide a visual barrier that was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. The upper portion of the existing escarpment vista would be unaffected for viewers positioned further away from the barrier.

The following aspects of the proposal would detrimentally impact on heritage significance:

Visual impact

- The bypass would impose a visually obtrusive and modern contrasting structural feature across a largely nineteenth century and rectilinear landscape character.
- The soil noise barrier that would be constructed on the southern side of the bypass near Berry would foreshorten views across the valley floor to the north and west.

Impact on existing structures

- A very limited number of structures would be impacted by the bypass. Only one of these, GlenDevan (G2B H11) contributes to the overall visual and heritage character of the landscape and would be subject to full direct impact (demolition).

Impact on relics

- The identification of relics sits uncomfortably with the scale of cultural landscapes. Due to the constraints inherent in its statutory definition and interpretation the identification of relics remains most effective at the smaller scale of sites, structures, objects and deposits. Refer to the individual impact statements for each item for the assessment of relics.

Summary

- The bypass would impose a visually obtrusive and modern contrasting structural feature across a largely nineteenth century and rectilinear landscape character.
- As a consequence of the visual barrier function of the noise barrier that would be constructed adjacent to Berry, views across the valley floor towards the north and west would be foreshortened.

Why is the bypass required to traverse through the identified heritage item?

- The bypass is required to upgrade the safety, functionality and efficiency of the Princes Highway between two key population and economic nodes within the region.

Will any known or potentially significant archaeological deposits be subject to development impact?

- The following items consist of, or include, known or potential archaeological deposits which would be subject to direct impact from bypass construction: G2B H14, 28, 48, 53, and 54.

What alternatives to the anticipated development impact have been considered? Why are they rejected?

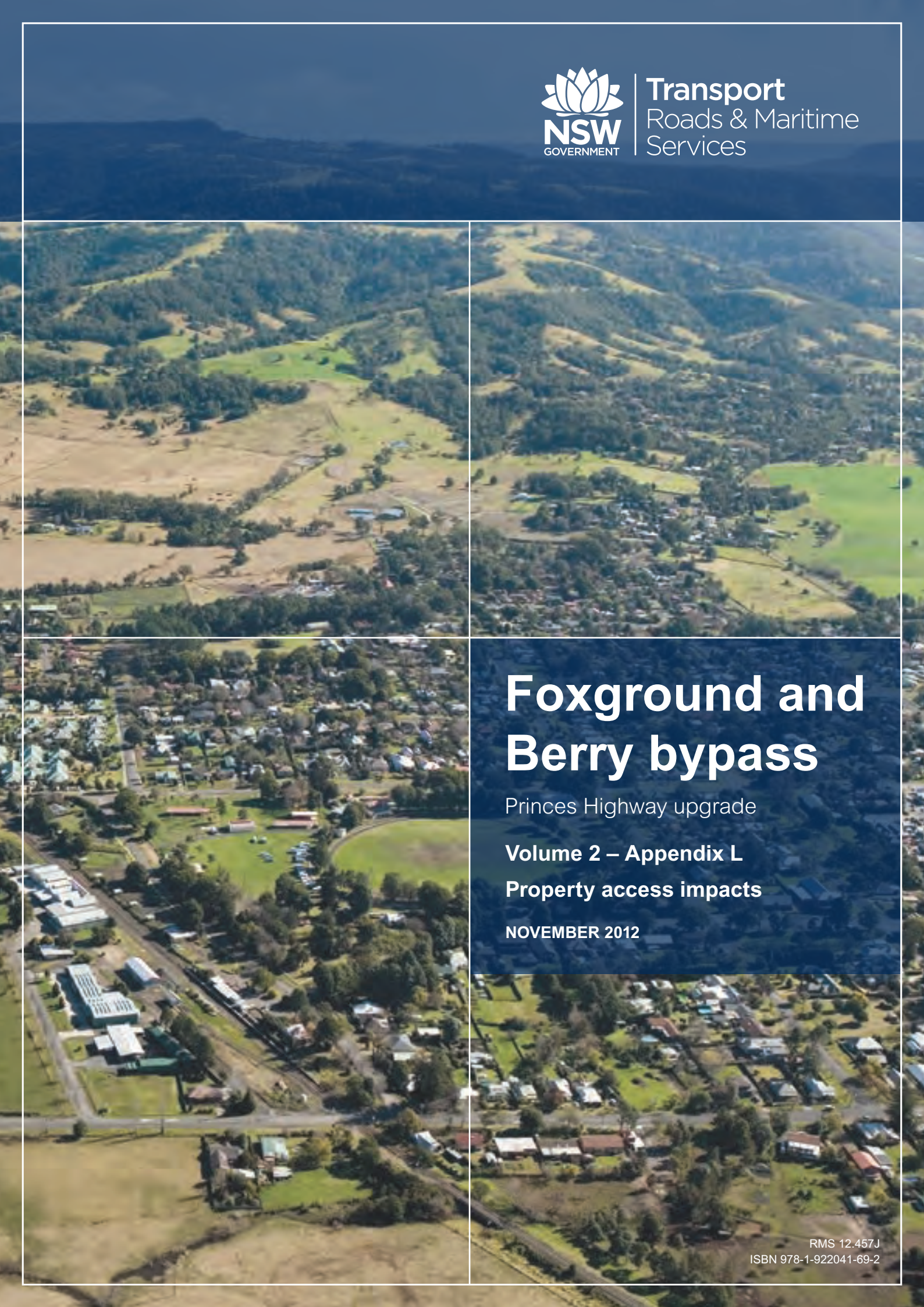
- There are no feasible alternatives to the upgrading of the Princes Highway in such a way that its form and visual impact would not pose a significant impact to the heritage values of the cultural landscape it traverses.
- Amongst a number of alternative upgrade alignments previously considered at a route selection assessment stage of the program, one included the construction of a tunnel through the Toolijooa Ridge (Maunsell Australia 2008). This alternative would have substantially reduced the visual and landscape impact of the bypass but was rejected given the poor balance between cost and other determining factors.

Has the advice of a heritage specialist been sought? Has the consultant's advice been implemented/adopted?

- This assessment constitutes the advice sought and accepted from a heritage specialist (Navin Officer Heritage Consultants Pty Ltd), to the proponent (RMS).
- The advice of the consultant is incorporated as the recommended management strategies in this report.

How is it proposed that development impact be avoided, minimised or mitigated?

- It is proposed to minimise and ameliorate adverse visual impacts where feasible through the appropriate design, construction and finishing of the FBB easements, embankments and cutting faces, and the re-establishment of vegetation.
- The establishment of appropriate forms of vegetation along the bypass easement and adjacent areas would be an important strategy in mitigating the broad scale landscape and visual impacts of the bypass corridor. This would be conducted with an awareness of maintaining important vistas from the road corridor, and the use of vegetation boundaries and alignments which conform to the rectangular patchwork of the surrounding landscape and serve to breakup or scatter the dominant curvilinear of the bypass corridor.
- Where there is an opportunity to incorporate artistic elements in structures adjacent to the carriageway, (such as bridgework, tunnel portals, and retaining and noise abatement walls), it is proposed that designs derived from local cultural heritage themes be considered, especially at locations in close association to places of significance.
- The design, construction and finishing of the bypass in the general vicinity of the Berry Township would be realised with the aim of minimising visual obstruction to views from the streetscape across the surrounding pastoral landscape to the Illawarra Range.
- The visual impact of the bypass, from the south, would be mitigated by the construction of a landscaped barrier on the southern and eastern side of the bypass adjacent to Berry. This would provide a visual barrier that was consistent with the rural setting, and would obscure the main carriageway and its traffic from south side viewers. The upper portion of the existing escarpment vista would be unaffected for viewers positioned further away from the barrier.



Transport
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Foxground and Berry bypass

Princes Highway upgrade

Volume 2 – Appendix L

Property access impacts

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Appendix L – Property access changes

The purpose of this appendix is to provide detail on the internal and external access impacts of the project. This appendix should be read in conjunction with **Figure L-1**, **Figure L-2** and **Section 7.9**. This appendix does not include properties that have no physical access changes or direct impacts to the property as a result of the project. For example, properties located along the existing highway between Toolijooa Road interchange and Austral Park Road interchange would need to travel to these interchanges to access the upgrade. However, no physical change would be undertaken at these individual properties (unless specified in **Table L–1**).

Table L–1 Details of internal and external access impacts of the project

Lot number or property reference*	Internal access impacts	External Access Impacts
1	No impact.	Loss of direct highway access and replaced with a new access onto Toolijooa Road. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound. RMS owned.
A	No impact.	Direct access to existing Princes Highway unchanged without the need to use the u-turn facility provided at chainage 7850 as part of the Gerringong upgrade. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
B	No impact.	Access to existing Princes Highway unchanged with modified driveway provided as part of the Gerringong upgrade. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
C	No impact.	Access to existing Princes Highway unchanged with modified driveway provided as part of the Gerringong upgrade. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
2	No impact.	Access to Millers Lane unchanged. Opportunity for a new access via an underpass to existing Princes Highway at chainage 8400 would be considered during detailed design. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
3	No impact.	Access via new underpass to existing Princes Highway at chainage 8400. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
4	Property severed, no internal access between severed portions provided in design.	Access to existing Princes Highway unchanged for northern portion. No external access to southern portion and would require property amalgamation. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound. RMS owned.
5	No impact.	No impact.
6	No impact.	No impact.
7	Property severed, no internal access between severed portions provided in design.	Access via new underpass to existing Princes Highway at chainage 9470. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound. RMS owned.

Lot number or property reference*	Internal access impacts	External Access Impacts
8	Property severed, no internal access between severed portions provided in design.	Access to existing Princes Highway unchanged for western portion. No external access to eastern portion and would require property amalgamation. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound. RMS owned.
9	Property severed, internal access between severed portions under Broughton Creek bridge number two.	No physical change to external access arrangements with access to existing Princes Highway unchanged. No external access to eastern portion and would require property amalgamation. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound. RMS owned.
10	Property severed, internal access between severed portions under Broughton Creek bridge number two.	No physical change to external access arrangements with access to existing Princes Highway unchanged. Access via right of way maintained through Austral Park Road extension and lot 11 (common owner). Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
11	Property severed, internal access between severed portions under Broughton Creek bridge number three. Extended cattle pass.	No physical change to external access arrangements with access to existing Princes Highway unchanged. Access via right of way maintained through Austral Park Road extension. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
D	No impact.	Modified driveway access to existing Princes Highway. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
12	No impact.	Loss of direct highway access. Replaced with modified driveway access to via a service road to existing Princes Highway. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
13	No impact.	Loss of direct highway access via private road passing through property E (common owner). Replaced with modified driveway and access via a right of way and Austral Park Road extension to Austral Park Road interchange. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
E	No impact.	Loss of direct highway access via private road passing through lot 13 (common owner). Replaced with modified driveway and access via a right of way and Austral Park Road extension to Austral Park Road interchange. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.

Lot number or property reference*	Internal access impacts	External Access Impacts
14	No impact.	Loss of direct highway access via private road which also has right of way provisions for several nearby properties. Replaced with access via Austral Park Road extension to Austral Park Road interchange. The current right of way provisions would no longer be required, however, right of way provisions would be required for property 13 and property E. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
15	No impact.	Modified driveway access to Austral Park Road. Access via Austral Park Road extension to Austral Park Road interchange. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound. RMS owned.
16	No impact.	Loss of direct highway access via private road and replaced with access via Austral Park Road extension to Austral Park Road interchange. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
F	No impact.	Modified driveway access to Austral Park Road. Access via Austral Park Road extension to Austral Park Road interchange. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
17	No impact.	Modified driveway and access to the project via Austral Park Road extension to Austral Park Road interchange. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound. RMS owned.
18	No impact.	Loss of direct highway access with modified driveway and access to the project via Austral Park Road extension to Austral Park Road interchange. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
19	No impact.	Loss of direct highway access. Modified driveway access to via a service road to existing Princes Highway. Access to project via Toolijooa Road interchange northbound and Austral Park Road interchange southbound.
20	No impact.	Modified driveway access with left in / left out direct access to the project northbound. Southbound access via the Austral Park Road interchange.
21	No impact.	Modified driveway access with left in / left out direct access to the project southbound. Northbound access via the Austral Park Road interchange. RMS owned.

Lot number or property reference*	Internal access impacts	External Access Impacts
G	No impact.	Existing access to Gembrook Lane unchanged. Gembrook Lane extended and intersection with project restricted to left in / left out access to the project southbound. Northbound access via the Austral Park Road interchange.
H	No impact.	Existing access to Gembrook Lane unchanged. Gembrook Lane extended and intersection with project restricted to left in / left out access to the project southbound. Northbound access via the Austral Park Road interchange.
I	No impact.	Existing access to Gembrook Lane unchanged. Gembrook Lane extended and intersection with project restricted to left in / left out access to the project southbound. Northbound access via the Austral Park Road interchange.
22	No impact.	Loss of direct highway access with modified driveway access to Tindalls Lane interchange (via the existing right of way through property 24). The opportunity to provide access via the Gembrook Lane extension, which would be explored during detailed design. Access to project northbound and southbound via Tindalls Lane interchange.
23	100 per cent impact to lot by project.	The property is 100 per cent impacted by the project and would become part of the road reserve.
24	No impact.	Loss of direct highway access with modified driveway access to Tindalls Lane interchange. Access to project northbound and southbound via Tindalls Lane interchange. RMS owned.
25	No impact.	Primary access on the eastern side of the property is not impacted by the project. For the quarry, modified driveway access at new location and access to project northbound and southbound via Tindalls Lane interchange. On the western boundary, loss of direct highway access for secondary access. Replaced with modified driveway and new access road connecting to the northern interchange for Berry.
26	No impact.	Loss of direct highway access with modified driveway access to Tindalls Lane interchange. Access to project northbound and southbound via Tindalls Lane interchange.

Lot number or property reference*	Internal access impacts	External Access Impacts
27	No impact.	Modified driveway access with left in / left out direct access to the project northbound. Access to the project southbound via Tindalls Lane interchange. Southbound access to the property from the project via northern interchange for Berry and u-turn at the roundabout at the junction of the existing Princes Highway and Woodhill Mountain Road. RMS owned.
J	No impact.	Modified driveway access with left in / left out direct access to the project northbound. Southbound access to the property from the project via northern interchange for Berry and u-turn at the roundabout at the junction of the existing Princes Highway and Woodhill Mountain Road.
28	No impact.	Loss of direct highway access and replaced with modified driveway, new access road and underpass at chainage 15100 connecting to the existing highway near 'Mananga'. Northbound access to and from the project via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry.
29	No impact.	Loss of direct highway access and replaced with modified driveway, new access road and underpass at chainage 15100 connecting to the existing highway near 'Mananga'. Northbound access to and from the project via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry.
30	No impact.	Loss of direct highway access and replaced with modified driveway, new access road and underpass at chainage 15100 connecting to the existing highway near 'Mananga'. Northbound access to and from the project via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry.
31	Lot severed. Internal access between severed portions provided under the bridge at Berry.	No impact to the primary access to the lot via Woodhill Mountain Road. Loss of direct highway for secondary access on the eastern edge of the property. Replaced with modified driveway, new access road and underpass at chainage15100 connecting to the existing highway near 'Mananga'. Access to and from the project for the main access via the northern and southern interchanges for Berry. Northbound access to and from the project for the secondary access via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry
32	No impact.	Loss of direct highway access. Replaced with modified driveway and new access road connecting to the northern interchange for Berry. Northbound access to and from the project via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry.

Lot number or property reference*	Internal access impacts	External Access Impacts
33	No impact.	Loss of direct highway access. Replaced with modified driveway and new access road connecting to the northern interchange for Berry. Northbound access to and from the project via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry.
34	No impact.	Loss of direct highway access. Replaced with modified driveway and new access road connecting to the northern interchange for Berry. Northbound access to and from the project via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry.
35	No impact.	Loss of direct highway access. Replaced with modified driveway and new access road connecting to the northern interchange for Berry. Northbound access to and from the project via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry.
36	No impact.	Loss of direct highway access. Replaced with modified driveway and new access road connecting to the northern interchange for Berry. Northbound access to and from the project via the northern interchange for Berry and southbound access through Berry via the southern interchange for Berry.
37	100 per cent impact to lot by project	Existing road reserve lot and is 100 per cent impacted by the project. RMS owned.
38	100 per cent impact to lot by project	The lot is 100 per cent impacted by the project and would become part of the road reserve. RMS owned.
39	Property severed, no internal access between severed portions provided in design.	No impact.
K	No impact	Slightly modified intersection of access road and existing highway, but existing access provisions unchanged.
40	Lot severed, no internal access between severed portions provided in design..	No impact.
41	Lot severed. Internal access between severed portions provided under the bridge at Berry.	No impact. RMS owned.

Lot number or property reference*	Internal access impacts	External Access Impacts
42	Lot severed, no internal access between severed portions provided in design.	No impact. RMS would acquire directly impacted land, and would investigate potential to acquire the entire lot.
43, 46 and 47	No impact.	Loss of access to North Street and replaced with modified driveway access to Rawlings Lane. Rawlings Lane modified to connect to North Street and southern interchange for Berry.
K	No impact.	Modified driveway access to be provided to connect to the North Street cul-de-sac.
44	No impact.	Access to lot via North Street lost and not replaced in design.
45 and 48	No impact.	Modified driveway access to be provided to connect to the North Street cul-de-sac.
49, 50 and 51	100 per cent impact to lot by project.	Each lot is 100 per cent impacted by the project. All are RMS owned.
52	No impact.	Existing access to Rawlings Lane unchanged. Rawlings Lane modified to connect to North Street and southern interchange for Berry.
53	Residual land is not viable.	No longer a viable lot and requires amalgamation. RMS owned.
54, 55 56	Residual land is not viable.	No longer a viable lot (lot 55 and 56 are 100 per cent impacted). RMS owned.
57	No impact.	No impact.
58	Residual land is not viable.	Residual land is not viable. Would be subject to acquisition.
59	100 per cent impact to lots by project.	Each lot is 100 per cent impacted by the project and would become part of the road reserve.. Both lots are RMS owned.
60	Residual land is not viable.	No longer a viable lot. RMS owned.
61, 62 and 63	100 per cent impact to lot by project.	Each lot is 100 per cent impacted by the project and would become part of the road reserve. Both lots are RMS owned.
64 and 65	100 per cent impact to lot by project.	Each lot is 100 per cent impacted by the project and would become part of the road reserve. Both lots are RMS owned.

Lot number or property reference*	Internal access impacts	External Access Impacts
66	100 per cent impact to lot by project.	The lot is 100 per cent impact by the project and would become part of the road reserve. Would be subject to acquisition.
67 and 68	Residual land is not viable.	Each lot is no longer a viable lot and would require amalgamation. RMS owned.
69, 70, 71, 72, 73 and 74	100 per cent impact to lot by project.	Each lot is 100 per cent impacted by the project and would become part of the road reserve. All are RMS owned.
75	100 per cent impact to lot by project.	The lot is 100 per cent impact by the project and would become part of the road reserve. Would be subject to acquisition.
76 and 78	100 per cent impact to lot by project.	Each lot is 100 per cent impacted by the project and would become part of the road reserve. All are RMS owned.
77	No impact.	Loss of direct access to highway via Hitchcocks Lane, and replaced with modified Hitchcocks Lane connecting to Huntingdale Park Road. Northbound and southbound access to the project via southern interchange for Berry.
L	No impact.	Loss of direct access to highway via Hitchcocks Lane, and replaced with modified Hitchcocks Lane connecting to Huntingdale Park Road. Northbound and southbound access to the project via southern interchange for Berry.
79	No impact.	Loss of access to the highway via Victoria St. Replaced with access via Victoria, George and Queen streets. Northbound and southbound access to the project via southern interchange for Berry.
80	No impact.	Loss of direct access to highway via Hitchcocks Lane, and replaced with modified Hitchcocks Lane connecting to Huntingdale Park Road. Northbound and southbound access to the project via southern interchange for Berry.
81	No impact.	Loss of direct access to highway via Hitchcocks Lane, and replaced with modified Hitchcocks Lane connecting to Huntingdale Park Road. Northbound and southbound access to the project via southern interchange for Berry.
82	100 per cent impact to property by project	The lot is 100 per cent impact by the project and would become part of the road reserve. Would be subject to acquisition.
83	No impact (road corridor).	Owned by Shoalhaven City Council (road corridor for Schofields Lane). The potential for full acquisition would be investigated.

Lot number or property reference*	Internal access impacts	External Access Impacts
84	No impact.	Left in / left out northbound access to and from the project via the modified Schofields Lane junction. Southbound access to the project via the southern interchange for Berry. Southbound access from the project via the Mullers Lane u-turn facility.
M	No impact.	Left in / left out northbound access to and from the project via the modified Schofields Lane junction. Southbound access to the project via the southern interchange for Berry. Southbound access from the project via the Mullers Lane u-turn facility.
85	No impact.	Left in / left out northbound access to and from the project via the modified Schofields Lane junction. Southbound access to the project via the southern interchange for Berry. Southbound access from the project via the Mullers Lane u-turn facility.
86	No impact.	No impact.
87	No impact.	Modified driveway access with left in / left out direct access to and from the project. Northbound access to the project via the Mullers Lane u-turn facility. Northbound access from the project to the property via the southern interchange for Berry.
88	No impact	Modified driveway access (requiring a deep cutting to connect to internal driveway) with left in / left out direct access to and from the project. Northbound access to the project via the Mullers Lane u-turn facility. Northbound access from the project to the property via the southern interchange for Berry.
89	No impact.	No impact with existing access via George Street, Berry.
90	No impact.	Loss of direct access to highway and replaced with new access road connecting to the cul-de-sac at the western end of Victoria Street. Northbound and southbound access to the project via the southern interchange for Berry.

** Property numbers are assigned to properties directly impacted by the project and are consistent with the lot references in Section 7.9. References A ,B and so on have used for additional properties.*

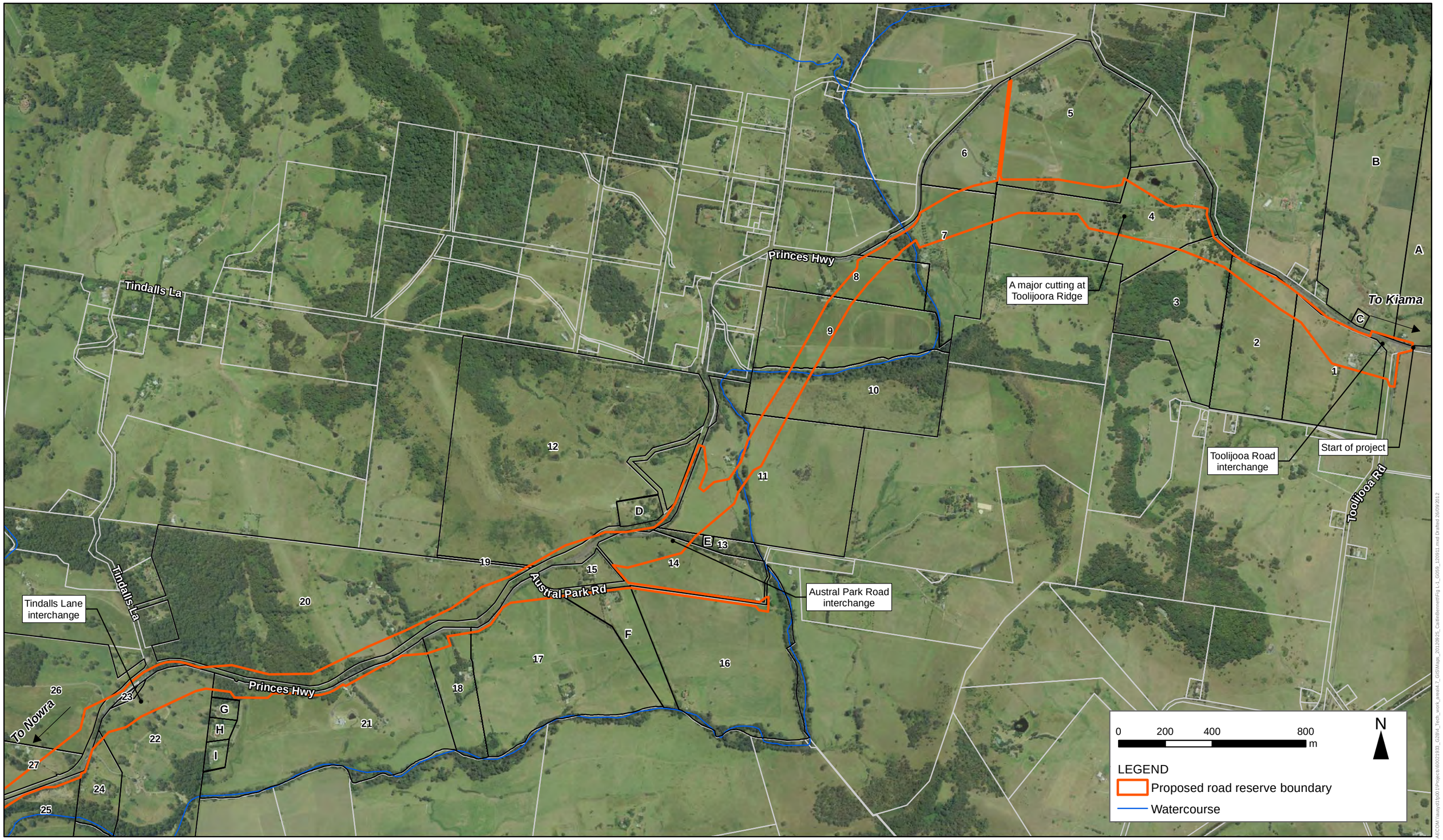


Figure L-1 Properties impacted by internal or external property access changes (Toolijooa Road interchange to Tindalls Lane interchange)

Note: Lot numbers refer to Table L - 1

Source: AECOM (2012)

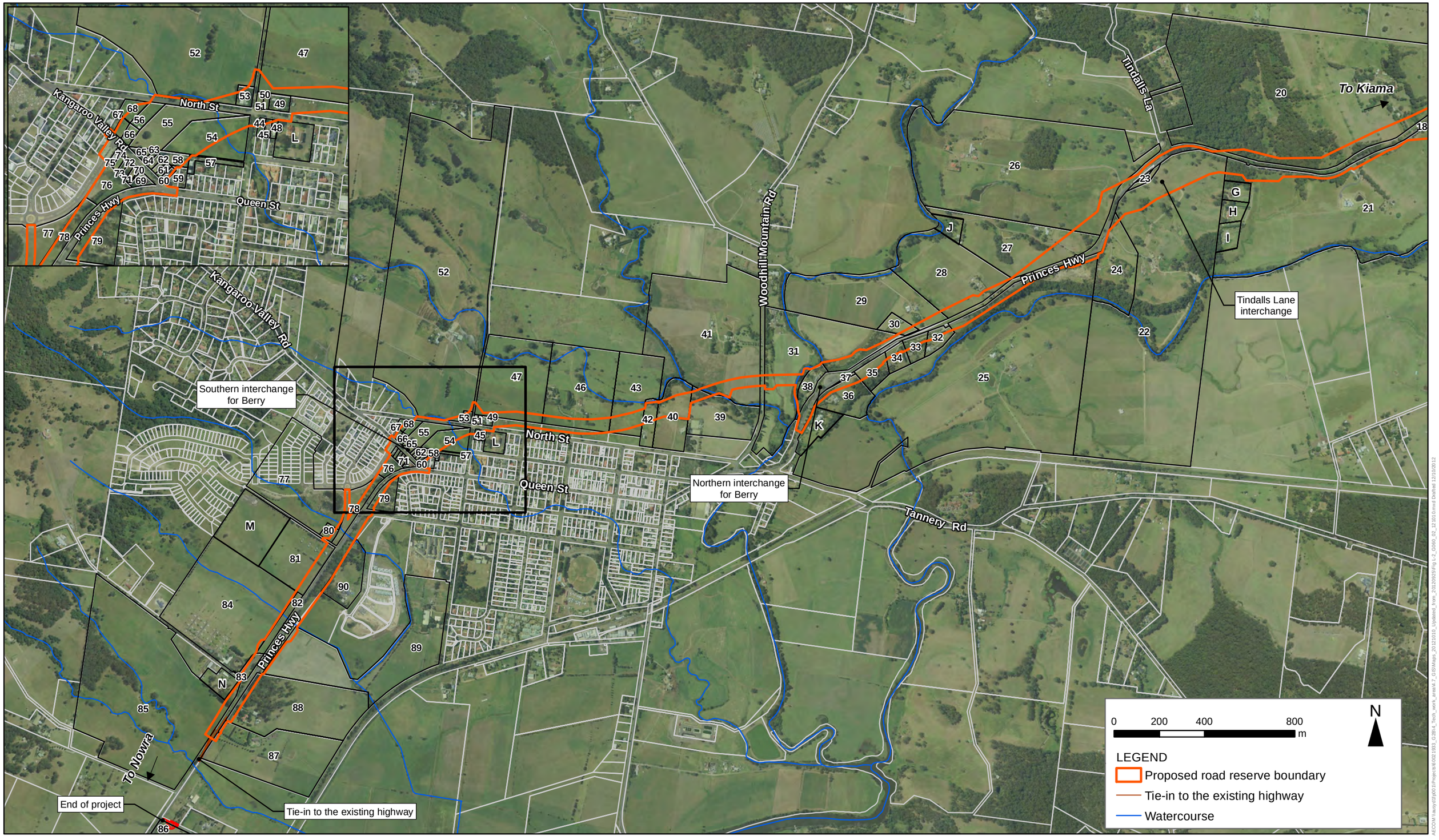
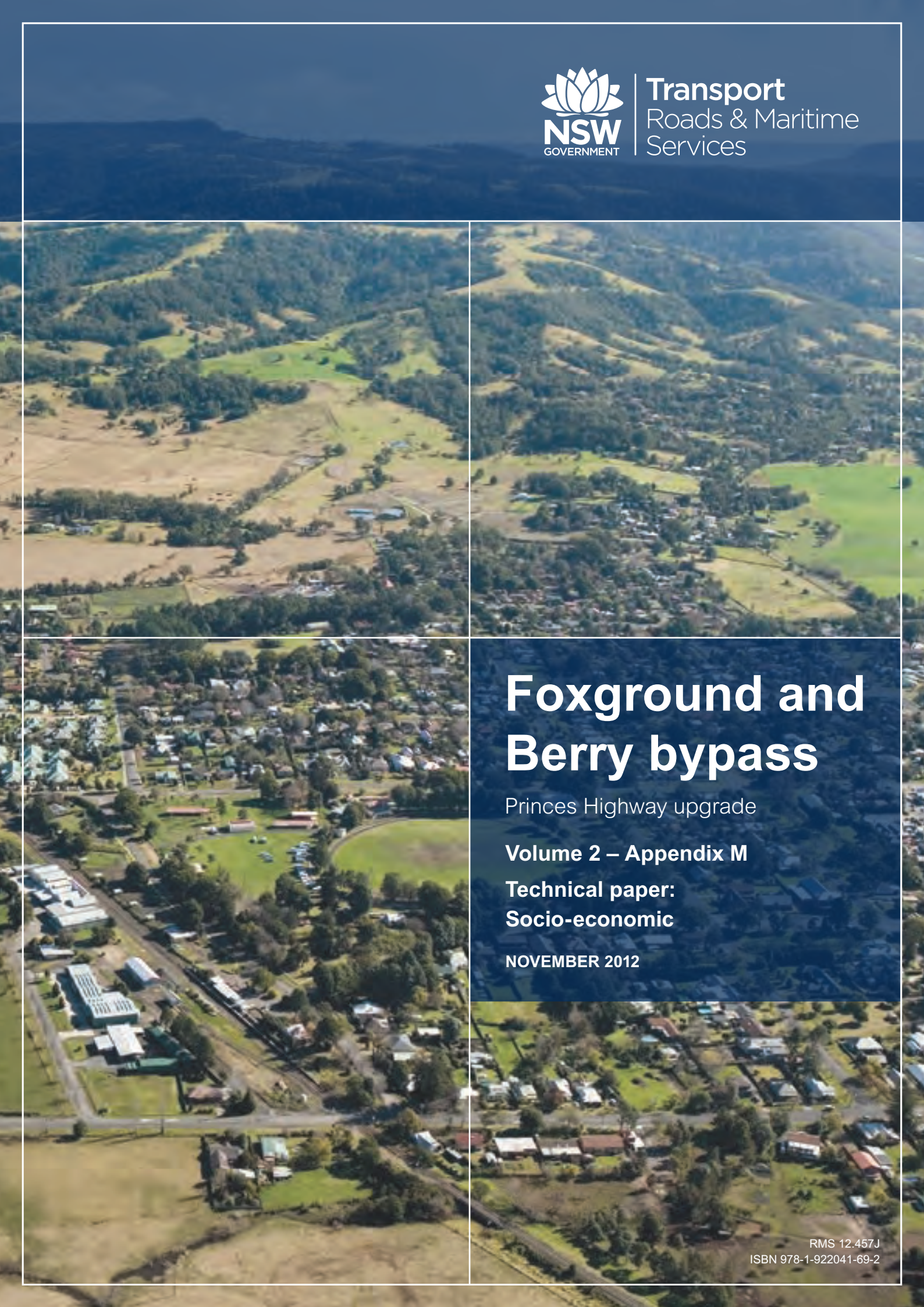


Figure L-2 Properties impacted by internal or external property access changes (Tindalls Lane interchange to Schofields Road junction)

Note: Lot numbers refer to Table L - 1

Source: AECOM (2012)



Transport
Roads & Maritime
Services

NSW GOVERNMENT

Foxground and Berry bypass

Princes Highway upgrade

Volume 2 – Appendix M

Technical paper:
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Foxground and Berry bypass

Prepared for

Roads and Maritime Services

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November 2012

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Executive summary

Roads and Maritime Services (RMS) propose to upgrade 11.6 kilometres of the Princes Highway between Toolijooa Road north of Foxground and Schofields Lane south of Berry, in New South Wales (NSW) (the project), to achieve a four lane divided highway (two lanes in each direction) with median separation. The project includes bypasses of Foxground and Berry and would provide increased road safety and traffic efficiency in the south coast region.

The project objectives are to:

- Improve road safety.
- Improve efficiency of the Princes Highway between Toolijooa Road (north of Foxground) and Schofields Lane (south of Berry).
- Support regional and local economic development.
- Provide value for money.
- Enhance potential beneficial environmental effects and manage potential adverse environmental impacts.
- Optimise the benefits and minimise adverse impacts on the local social environment.

The purpose of this report is to assess the socio-economic impacts of the project. This study has been undertaken by AECOM in association with RM Planning.

The Director-General of the NSW Department of Planning and Infrastructure required that the study address a number of matters relating to affected properties; agricultural sector impacts; local community socio-economic impacts relating to access, land use, property and amenity related changes; impacts on businesses in Berry; and impacts on recreational fishing. The report has addressed these and other relevant socio-economic issues.

The study area for the purpose of this report includes the road corridor as well as the land immediately adjacent, and the wider catchment as it relates to current usage of the Princes Highway.

The methodology for this study relies on the description of the existing context, analysis of key stakeholder issues, review of case studies on the impacts of bypassed towns, and assessment of impacts and mitigation measures. The methodology uses quantitative as well as qualitative data.

The region is defined both by its agricultural history and a more recent focus on tourism. Since the 1970s, the town of Berry has assumed increasing importance as a tourist destination as well as a location for ‘tree changers’, or people choosing to move from the city for a rural lifestyle.

The population in the region is stable, with only modest growth expected between 2011 and 2036. Some new development is occurring in Berry, but nothing is planned for other villages in the study area. An ageing population is manifest in the region, and particularly in the town of Berry. The decline of agriculture as an employment sector has been accompanied by a rise in employment in service sector industries that target both resident and visitor populations, in particular, in retail, health care, accommodation and food service.

In community consultation undertaken as part of the project, the local community has indicated that it values the high quality and intrinsic beauty of the surrounding rural environment and considers it an economic asset, being a draw for tourists as well as being productive agricultural land. Significant value is also placed on the existing community, recreation and open space facilities in Berry. Accessibility is a key driver of the community cohesion that currently exists in Berry. These elements contribute to the lifestyle qualities that have attracted people to the region in the first instance.

Key stakeholder issues to emerge during consultation for the project included access arrangements, agricultural land and farming activities, business and the local Berry economy, impacts on commercial operations, properties, amenity and heritage, uncertainty, and community impacts. These issues, including the project design response, are discussed at Chapter 3 of the report.

A review of case studies of town bypasses was conducted to ascertain relevance for the project. A number of key issues were identified as influencers of post bypass socio-economic conditions, including distance of the bypass from a town; town size; extent of reliance of businesses on highway trade; length of impact; and the role and characteristics of the town. This discussion is at Chapter 4 of the report.

Assessment of impacts has taken into account both construction phase and operational impacts. The nature of anticipated impacts is discussed in detail at Chapter 5 of this report.

The project would be likely to create both positive and negative impacts on the region and its community.

The project would result in improved amenity for the greater part of Berry. Amenity impacts on residents of Huntingdale Park and North Street include increased noise and loss of views. These impacts have been mitigated by moving the highway further away from the Berry urban area and through the provision of noise barriers and visual treatment.

Social interaction and identity may be strengthened as a result of the project. Uncertainty is an impact that would be felt mostly before and during the construction stage but can be managed through continuing consultation. Community severance may be experienced by a small number of residents in the vicinity of North Street, Berry.

The project would impact the economic contribution of the agriculture sector in the study area, although with resale of productive land to neighbouring properties, there would be opportunities to minimise this impact. The project would not be expected to affect the viability of the dairy industry.

Although some highway-reliant businesses in Berry may experience a decrease in turnover as a result of the bypass, the town as a whole would be expected to benefit from an improvement to amenity within the main commercial area of Queen Street and Alexandra Street.

Access to recreational fishing sites is not expected to be significantly affected as a result of the project, since existing access to the Broughton Creek bridge would be unaffected by the construction works. Opportunities for fishing in the local area would increase as access would be available at four new bridge crossings provided as part of the project. Parking bays for bridge maintenance workers would be provided where possible along the project and these would be available for use by fishers wishing to access the river bank in the vicinity of the bridge.

The study recommends a number of mitigation measures that are intended to minimise any impacts that would be associated with the construction and operation of the project. These are detailed at Chapter 5 of this report.

On balance, it is considered that the overall impact of the project would be positive for the region.

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1 Introduction

The Roads and Maritime Services (RMS) is seeking approval under Part 3A of the *Environmental Planning and Assessment Act 1979* for the upgrade of 11.6 kilometres of the Princes Highway, to achieve a four lane divided highway (two lanes in each direction) highway with median separation between Toolijooa Road north of Foxground and Schofields Lane, south of Berry (the project). The project would include bypasses of Foxground and Berry.

The project objectives are to:

- Improve road safety.
- Improve efficiency of the Princes Highway between Toolijooa Road (north of Foxground) and Schofields Lane (south of Berry).
- Support regional and local economic development.
- Provide value for money.
- Enhance potential beneficial environmental effects and manage potential adverse environmental impacts.
- Optimise the benefits and minimise adverse impacts on the local social environment.

The purpose of this report is to assess the socio-economic impacts of the project. The study has been undertaken by AECOM in association with RM Planning.

The Director-General of the NSW Department of Planning and Infrastructure required that the socio-economic impact assessment address a number of matters. These are outlined in **Table 1-1** and cross referenced to the relevant sections in the report. Impact on land use and future development are considered in Section 7.9 of the environmental assessment.

Table 1-1: Director-General's requirements

DGR reference	Report section
Directly affected properties and land uses adjacent to the project including: impacts to land use viability and future development potential; and property allotment, land sterilisation and severance impacts.	Sections 5.2.2, 5.2.5 Section 7.9.2 of the environmental assessment
Agricultural sector, taking into account the fragmentation and potential loss of agricultural and farm viability, including internal and external farm access arrangements during construction and operation.	Sections 5.1.5, 5.2.3
Local community socio-economic impacts associated with access, land use, property and amenity related changes.	Sections 5.1.1, 5.1.2, 5.1.3, 5.2.1, 5.2.2, 5.2.4
Business impacts including the overall viability, profitability, productivity and sustainability of businesses in the Berry township associated with the changes to the route alignment in Berry.	Sections 5.1.4, 5.2.5
Recreational fishing impacts on access and opportunities in Broughton Creek, Broughton Mill Creek and Bundewallah Creek.	Sections 5.1.6, 5.2.6

Sections 5.1.9 and 5.2.8 address mitigation measures for construction and operational impacts respectively across the above areas of consideration.

1.1 Overview of the proposed works

The project is one of a series of upgrades to sections of the Princes Highway which aims to provide a four lane divided highway between Waterfall and Jervis Bay Road, Falls Creek. This would improve road safety and traffic efficiency, including for freight, on the NSW south coast.

The project comprises the following key features:

- Construction of a four lane divided highway (two lanes in each direction) with median separation (wire rope barriers or concrete barriers where space is constrained, such as at bridge locations).
- Bypasses of the Foxground bends and the Berry township.
- Construction of around 6.6 kilometres of new highway where the project deviates from the existing highway alignment at Toolijooa Ridge, the Foxground bends and the Berry township.
- Provision for the possible widening of the highway (if required in the future) to six lanes within the road corridor and, in some areas, construction of the road formation to accommodate future additional lanes where safety considerations, traffic disruption and sub-optimal construction practices are to be avoided.
- Grade-separated interchanges at:
  - Toolijooa Road.
  - Austral Park Road.
  - Tindalls Lane.
  - East of Berry at the existing Princes Highway, referred to as the northern interchange for Berry.
  - West of Berry at Kangaroo Valley Road, referred to as the southern interchange for Berry.
- A major cutting at Toolijooa Ridge (around 900 metres long and up to 26 metres deep).
- Six lanes (two lanes plus a climbing lane in each direction) through the cutting at Toolijooa Ridge for a distance of 1.5 kilometres.
- Four new highway bridges:
  - Broughton Creek bridge 1, a four span concrete structure around 170 metres in length and nine metres in height.
  - Broughton Creek bridge 2, a three span concrete structure around 75 metres in length and eight metres in height.
  - Broughton Creek bridge 3, a six span concrete structure around190 metres long and 13 metres in height.
  - A bridge at Berry, an 18 span concrete structure around 600 metres long and up to 12 metres in height.
- Three highway overbridges:
  - Austral Park Road interchange, providing southbound access to the highway.
  - Tindalls Lane interchange, providing southbound access to and from the highway.
  - Southern interchange for Berry, providing connectivity over the highway for Kangaroo Valley Road along its existing alignment.

Eight underpasses including roads, drainage structures and fauna underpasses:

  - Toolijooa Road interchange, linking Toolijooa Road to the existing highway and providing northbound access to the upgrade.
  - Property access and fauna underpass in the vicinity of Toolijooa Ridge at chainage 8400.
  - Dedicated fauna underpass in the vicinity of Toolijooa Ridge at chainage 8450.
  - Property access underpass between Toolijooa Ridge and Broughton Creek at chainage 9475.
  - Combined drainage and fauna underpass in the vicinity of Austral Park Road at chainage 12770.
  - Combined drainage and fauna underpass in the vicinity of Tindalls Lane at chainage 13320.
  - Dedicated fauna underpass in the vicinity of Tindalls Lane at chainage 13700.
  - Property access underpass between the Tindalls Lane interchange and the northern interchange for Berry in the vicinity of at chainage 15100.
- Modifications to local roads, including Toolijooa Road, Austral Park Road, Gembrook Road, Tindalls Lane, North Street, Queen Street, Kangaroo Valley Road, Hitchcocks Lane and Schofields Lane.
- Diversion of Town Creek into Bundewallah Creek upstream of its confluence with Connollys Creek and to the north of the project at Berry.
- Modification to about 47 existing property accesses.
- Provision of a bus stop at Toolijooa Road and retention of the existing bus stop at Tindalls Lane.
- Dedicated u-turn facilities at Mullers Lane, the existing highway at the Austral Park Road interchange, the extension to Austral Park Road and Rawlings Lane.
- Roundabouts at the southern interchange for Berry and the Woodhill Mountain Road junction with the exiting Princes Highway.
- Two culs-de-sac on North Street and the western end of Victoria Street in Berry.
- Tie-in with the existing highway about 75 metres north of Toolijooa Road and about 440 metres south of Schofields Lane.
- Left in/left out only provisions for direct property accesses to the upgraded highway.
- Dedicated public space with shared pedestrian/cycle facilities along the southern side of the upgraded highway from the playing fields on North Street to Kangaroo Valley Road.
- Ancillary operational facilities, including permanent detention basins, stormwater treatment facilities and a permanent ancillary facility site for general road maintenance.

Modifications to local roads include:

- Relocation of the entrance to Toolijooa Road.
- Addition of two roundabouts to Kangaroo Valley Road, of which one forms the intersection with Queen Street, the other with Huntingdale Park Road.
- Realignment and extension of Austral Park Road.
- Severance of North Street.
- Closure of Victoria Street.
- Connection of Hitchcocks Lane to Huntingdale Park Road.

The project and the key features of the project are shown in **Figure 1-1**.

1.2 Definition of study area

The study area includes the road corridor itself, as well as those lands immediately adjacent to it, and the wider catchment as it relates to current usage of the Princes Highway. Most of the study area lies within the Shoalhaven Local Government Area (LGA). Around one third of the study area between Toolijooa Road and Broughton Creek bridge 3 is in the Kiama LGA.

The regional context of the project is shown in **Figure 1-2**.

1.3 Methodology

The methodology for this study has been developed to address the Director-General's requirements for the environmental assessment. It relies on the description of the existing social and economic context, analysis of key stakeholder issues, review of case studies on the impacts of bypassed towns, and assessment of impacts and mitigation measures.

The methodology relies on quantitative as well as qualitative data. The analysis of key stakeholder issues and community values identified during project consultation also draws on recent data from interviews with property owners and a survey of local businesses.

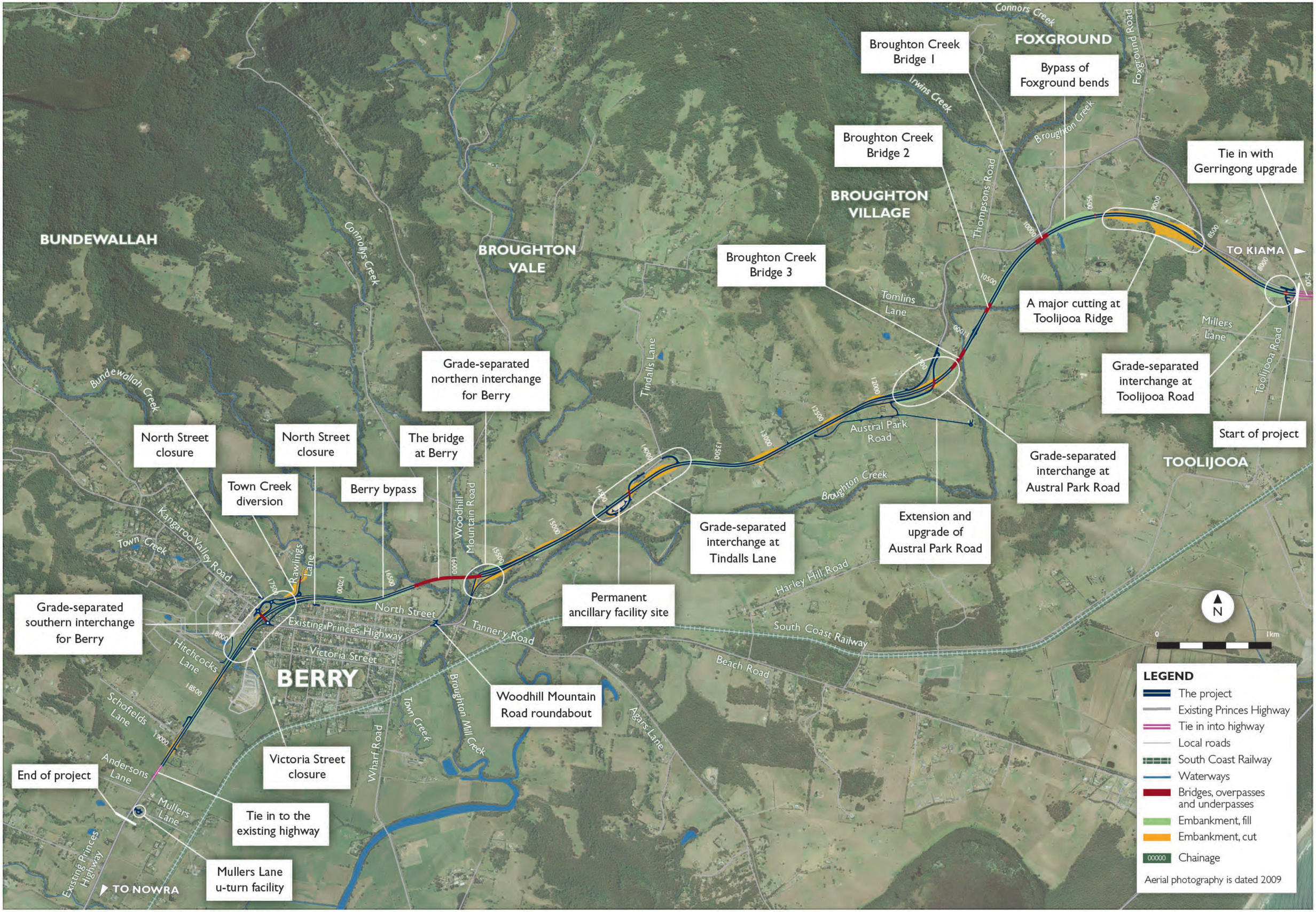

Figure 1-1: Foxground and Berry bypass project area

Figure 1-2 Regional context of the project

2 Context

2.1 Historical background

The study area was largely owned by the Berry family from around the 1820s, with dairying being the primary purpose for the original land acquisition. For the next 100 years, land was subdivided for small scale dairy farming. The consolidation of the dairy industry into larger, more mechanised businesses, coming at a time when non-manual labour was becoming more attractive, resulted in a decline in the number of dairy farms in the region. Where once there may have been several hundred farms, by 2009 there were only around 12 (*Non-Aboriginal (Historic) Heritage technical paper*, Navin Officer, 2009, Appendix K of the environmental assessment).

Timber harvesting and sawmilling flourished from the early nineteenth century and persisted through the housing boom of the mid 1900s. This industry has now disappeared.

In the early and middle part of the twentieth century, Foxground and Broughton Village were small but active communities, including community facilities such as schools, churches and community halls and milk co-operatives. Berry was also a small settlement during this period.

From the 1970s, Berry started to become attractive as a tourist destination as well as a location for city residents seeking alternative lifestyles. These two factors contributed to Berry's increased dominance in the region. As Berry continued to grow and flourish, villages such as Foxground and Broughton Village entered a period of decline as people moved away. This decline saw the closure of community facilities, churches and schools, for which there was no longer sufficient demand. The Toolijooa community has become stronger in recent years but is still a minor settlement.

Berry has become the dominant urban centre in the study area. While some connections remain in the rural villages, these are no longer identifiable as urban communities (Navin Officer, 2009).

2.2 Existing context

2.2.1 Socio demographic indicators

Data for socio-demographic indicators is from the 2006 Census[1], unless otherwise stated. Demographic tables are provided at Appendix A.

The study area has been profiled by examining the data for the Census Collection Districts (CCDs) of Broughton Vale, Broughton Village, Jaspers Brush and Rose Valley. The CCDs which comprise the study area are 1180508, 1180504, 1180812, 1180306, 1180314, 1180801[2], 1180502, 1180503 and 1180506. The geographical areas of comparison are therefore NSW, Shoalhaven LGA, the study area and Berry urban centre. As only a very small section of the study area is contained within the Kiama LGA, no reference is made to Census data for this LGA.

Berry is in the Shoalhaven LGA and is defined for the purposes of statistical profiling as the Berry urban centre, as illustrated in **Figure 2-1**.

[1] *A complete set of Census 2011 data was not available at the time this report was prepared.*

[2] *There was a boundary adjustment to this CCD at the 2006 Census which reduced its size. As much of what was previously included is forest area, this adjustment is unlikely to have had a significant effect on data comparison between the 2001 and 2006 Census.*

Figure 2-1: Berry Urban Centre

Source: ABS (2006), RTA (2011), LPMA (2011)

Key socio-demographic characteristics are as follows:

- Population growth: The population of the study area, as well as that of Berry, declined between 2001 and 2006, whereas there was a marginal increase in the Shoalhaven LGA. Population forecasts for the Shoalhaven LGA show modest growth between 2011 and 2036 (NSW Department of Planning and Infrastructure, 2010).
- Median age: The median age of Berry's population was 49 in 2006, whereas it ranged between 45 and 51 in the rest of the study area. The median age was 44 in the Shoalhaven LGA and 37 in NSW. Median age increased in the study area, Berry and Shoalhaven between 2001 and 2006.
- Population aged 65 and over: Both the study area and Berry had a high proportion of population in this category (29.2 per cent and 28.3 per cent respectively), compared with Shoalhaven LGA (21.2 per cent), and 13.8 per cent in NSW.
- Indigenous population: Indigenous population in the study area is comparatively low in 2006 (0.7 per cent) and declining since 2001. This trend is similar for Berry which has a low percentage of indigenous population in 2006 (0.8 per cent) compared with Shoalhaven LGA (3.7 per cent) and NSW (2.1 per cent).
- Ethnicity: The study area, Berry, and the Shoalhaven region are largely homogeneous with more than 90 per cent of the population speaking English at home, compared to 74 per cent in NSW.
- Employment status: 49 per cent of the study area's workforce was employed in full time occupations in 2006, compared to 53 per cent of the Berry workforce, 51 per cent in Shoalhaven LGA and 61 per cent in NSW. Over a third (35 per cent) of the study area's workforce was employed in part time occupations, compared to 38 per cent in Berry. These proportions are higher compared to Shoalhaven LGA (34 per cent) and NSW (27 per cent). The study area's unemployment rate was four per cent compared to five per cent in Berry. This is low when compared to the rate of nine per cent in Shoalhaven LGA and six per cent in NSW.
- Employment by industry sector: 40 per cent of Berry's jobs are concentrated in the retail, health care, accommodation and food services sectors. Comparable figures for the study area, Shoalhaven LGA and NSW are 32 per cent, 35 per cent and 28 per cent respectively. Employment in the study area is not concentrated in any one or group of sectors. The most common industry of employment is the retail and health care sectors, each of which employs 12 per cent of the workforce.
- Employment: 628 persons were employed within the Berry urban area at the 2006 Census, of whom 398 persons were employed in the retail, healthcare, accommodation and food services, education, construction and manufacturing sectors. This represents 63 per cent of the Berry workforce and 43 per cent of the study area workforce respectively. Much of this employment is related to servicing the tourist sector, while the prominence of the healthcare and social assistance services sector, coupled with an ageing population, suggests a link to the retiree market.
- Median weekly household income in Berry was $789 compared to $659 in Shoalhaven LGA and $1036 in NSW. The study area range is $700 to $1266.
- Journey to work: The vast majority of the study area's population uses a car to go to work, as is the case with residents of Shoalhaven LGA. For example, of those persons using one method of travelling to work, 86 per cent of the study area population uses a car, compared to 85 per cent of Berry residents, with comparable figures for Shoalhaven and NSW residents being 88 per cent and 78 per cent respectively.

Some expansion of the Berry urban area has recently occurred around the southern part of Kangaroo Valley Road (west Berry) and in Victoria Street. The area around Huntingdale Park continues to develop for the family housing market, whereas the following two retirement villages in Victoria Street will add significantly to the amount of available housing stock for the retiree market:

- The Arbour, comprising 52 self-care dwellings and housing for the aged, adjacent to the Princes Highway but accessed from Victoria Street. More than 50 per cent of the dwellings have been constructed, with the remainder expected to be completed mid 2013 subject to demand (Michael Sullivan, The Arbour, personal communication 5 October 2011).
- 'The Grange', comprising 37 self-care dwellings, a community centre and recreational facilities accessed from Victoria Street. This development has been operational for a few years, with 14 villas still to be constructed.

In summary, the study area has a homogenous and ageing population. Recent development of almost 100 aged persons housing units has responded to a significant proportion of population in the over 65 age group. The study area enjoys a lower than average unemployment rate, with the most common industry of employment in the retail and health care sectors and the bulk of jobs located in Berry. The study area population is heavily dependent on motor vehicles for transport.

2.2.2 Community character

The study area is predominantly rural in character, consisting mainly of large lot agricultural holdings. Agriculture has traditionally been dominated by the dairy industry, but more recently wineries and equestrian activities have become more prominent in the sector.

The historically active towns of Broughton Village and Foxground are today an agglomeration of rural residential allotments.

Berry is the first non-coastal country town located along the Princes Highway when heading south from Sydney. It is located around 130 kilometres, or two hours drive time, from Sydney.

The northern and southern boundaries to the Berry urban area are North Street and the South Coast railway, respectively. Within Berry, the Princes Highway is known as Queen Street, and is the main street of the town.

Berry's physical qualities are defined by both the built and the natural environment. The town contains a number of historic buildings, well established gardens and vegetation, and is set against the dramatic scenic backdrop of the Cambewarra range located to the north and west.

Berry's community infrastructure consists of several educational facilities, health services, places of worship, community centres, arts and entertainment facilities, emergency services, open space, sporting and recreation facilities, and clubs. An inventory of facilities associated with these land uses is provided at Appendix B. These facilities are important not only in servicing the needs of the town and its hinterland, but also in creating a sense of community cohesion and wellbeing. See also Section 2.2.6.

Community values

In community consultation undertaken over the past five years during the route selection process and planning for the project, the local community has indicated that it values the high quality and intrinsic beauty of the surrounding rural environment and considers it an economic asset, as it is a draw for tourists as well as being productive agricultural land. The community also highly values the existing community, recreation and open space facilities in the town. These elements make up the lifestyle qualities that have attracted people to the region.

Existing physical connections and linkages between the different parts of Berry are instrumental in shaping current community cohesion. Existing paths of travel by vehicle, bicycle and on foot are seen as critical to maintaining this current community cohesion. This also contributes to the community character of the town.

These community values are summarised in **Table 2-1** (AECOM, 2008).

Table 2-1: Community values

Category	What the community value about living in the area
Functional	• Location – business and transport links to Sydney. • Location – easy drive to and from Sydney, the coast and surrounding districts for locals and tourists. • Safety for cyclists, pedestrians and vehicles.
Environment	• Climate and rainfall provides highly productive agricultural land. • Quiet, pristine rural and natural environment (flora and fauna). • Long agricultural history still alive in working farms. • Connection of European and Indigenous heritage with the environment.
Economic	• Productive land of national significance. • Tourist destination, not just a thoroughfare. • Market, employment and business opportunities. • Potential for economic and population growth.
Social	• Strength of enduring sense of belonging and networks of support and cohesion. • Family, generational and emotional connection to the landscape, environment and the region. • Aesthetic appeal – unique combination of hills and escarpment, rainforest, agricultural land and the coast. • Lifestyle and associated emotional and health benefits – small, safe town and rural communities with access to facilities and services, and the countryside eg scenic vistas, cycling, slow roads. • Active community with strong social and interest group networks.

2.2.3 Economic/business environment

The economy of the study area is based on rural as well as urban activities.

Agricultural businesses

Agricultural land within the study area is used for dairy and beef production, viticulture, goat rearing, livestock feed (grasses) and agistment, with the largest economic contributions being from the dairy and beef industries. Dairy farms within the study area supply the Berry Rural Cooperative, which employs a total of 28 people across the organisation[3].

[3] *Number of employees sourced from the Berry Rural Co-operative Society website. www.southcoastdairy.com.au, viewed October 2011.*

The dairy industry is one of Australia's major rural industries, third most important in terms of the value of production, behind the beef and wheat industries (Dairy Australia, 2011). The dairy industry in Australia is concentrated in the south east of the country where the conditions are favourable and eight per cent of Australia's milk production comes from NSW (Dairy Australia, 2011).

The majority of the land in the study area is classified as high value in terms of land capability. The project area is largely made up of land classified as Class 2 as classified by the former Soil Conservation Service of NSW. This classification refers to land that is suitable for regular cultivation and a wide variety of agricultural uses. In particular this land has a high potential for production of crops. The NSW Department of Primary Industries Agricultural Land Classification indicates this land as Agricultural Class 2 or 3. The department describes Class 2 Agricultural land as arable land suitable for regular cultivation for crops but not suited to continuous cultivation and Class 3 Agricultural land is identified as grazing land or land well suited to pasture improvement. **Figure 2-2** and **Figure 2-3** illustrate land classifications in the study area.

Around Broughton Village the study area includes land of lower Agricultural Classes 4 and 5. This land is classified as suitable for grazing but not for cultivation or as land unsuitable for agriculture or best suited only to light grazing.

Of the 58 potentially directly affected rural properties, 24 are classified as having agricultural uses. These involve dairy (including Berry Rural Cooperative suppliers) and beef cattle farming, as well as horse agistment, goat rearing, turf production and silage.

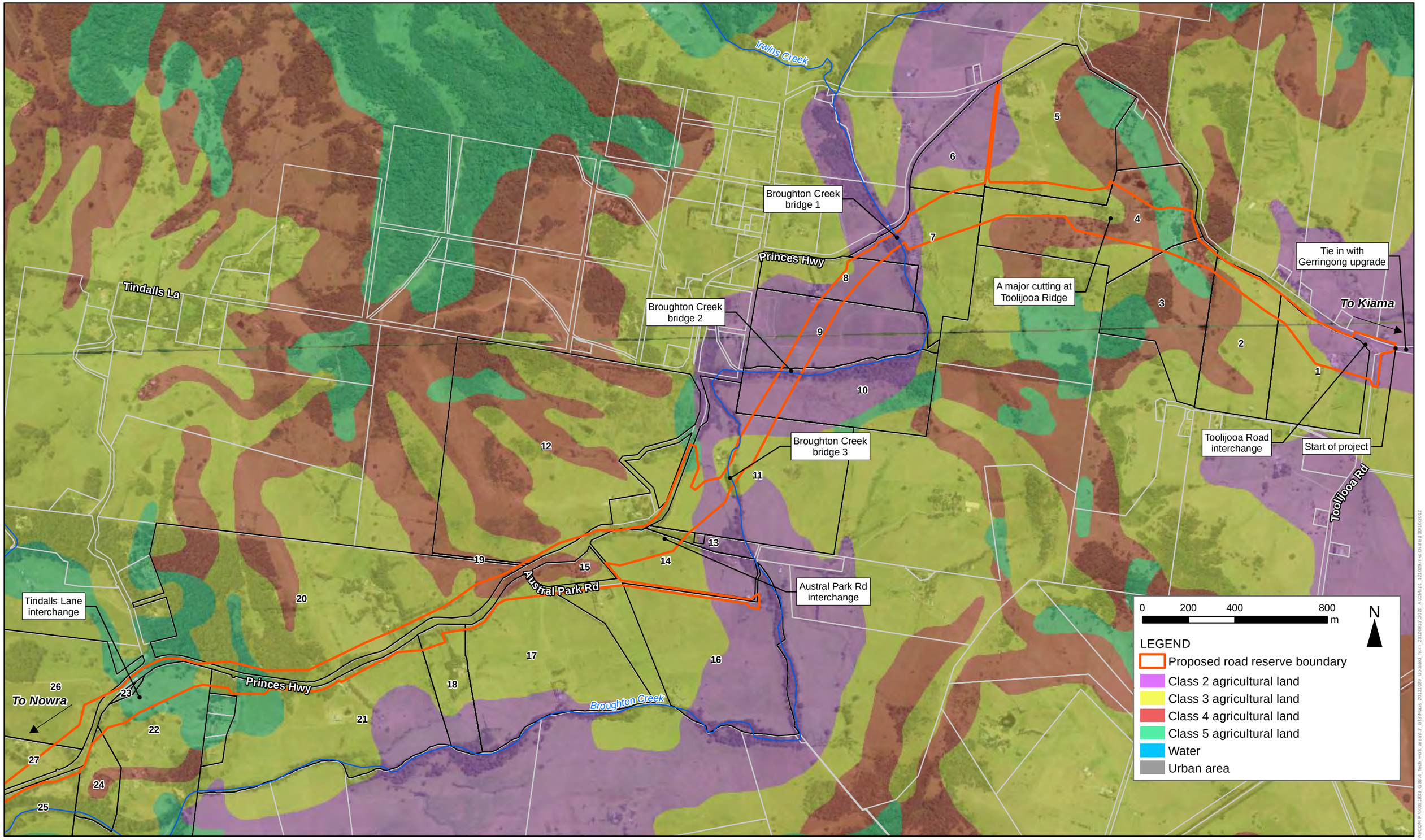

Figure 2-2 Land capability within study area (AECOM, 2011)

Source: DPI (2012)

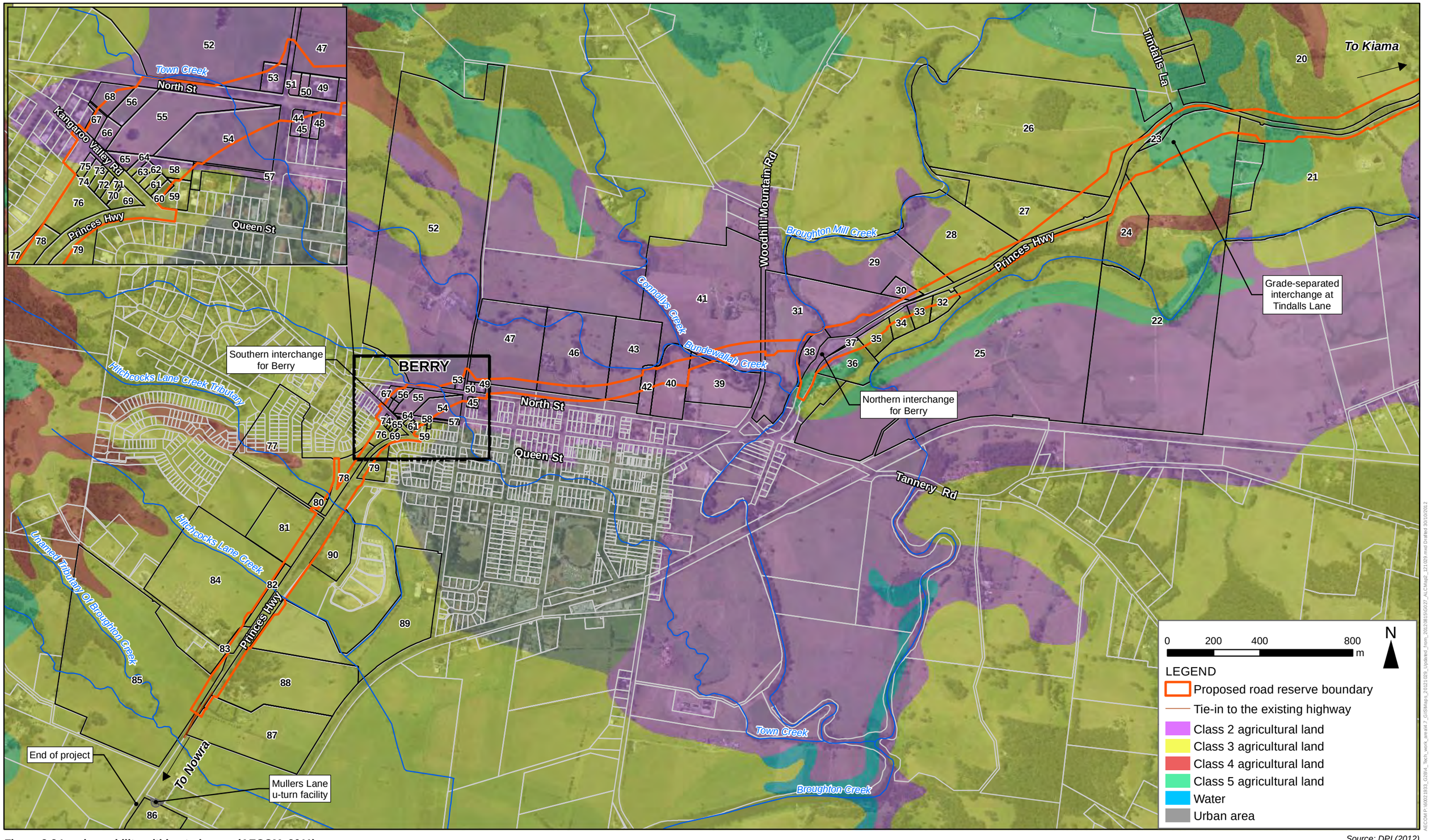

Figure 2-3 Land capability within study area (AECOM, 2011)

Source: DPI (2012)

Berry businesses

Berry is within an easy days drive or train ride from Sydney[4] and, coupled with its natural and built form attractions, the town represents an ideal stopping point for through traffic as well as being a destination in itself. It attracts a significant number of day trippers who visit the town for its amenity.

A survey in 2008 of 15 food outlets, gift stores and clothes shops in Berry revealed that business from outside the town was generated by:

- People driving through the town and stopping for a short period.
- Tourists staying in the town and surrounding area.
- People travelling to the town as a destination.

In particular:

- Gift shops such as home wares, jewellery, china and furniture had a high level of trade from outside the local area, generally around 70-90 per cent.
- Cafés and food shops also had a high level of external trade, generally around 70-90 per cent.
- Clothes shops had around 50-60 per cent of external trade and specialised shops (ie antique shops) also had a high turnover from external trade (up to 90 per cent).

In general:

- Customers came primarily from the north (Wollongong and Sydney) but some shops reported a smaller number of customers coming from the south.
- Berry is a destination town and many people travel there for shopping, food and browsing.
- People who come to Berry as a destination tend to stay longer in the town, often on a day trip, and spend more than people who stop briefly on their way through the town.
- More people visit and pass through Berry on weekends than weekdays.
- 'Long haul' highway travellers were not often mentioned, indicating that the bulk of trade was from people with a destination in the region (SGS Economics and Planning, 2008).

Business activity in Berry is mainly concentrated along Queen Street, between Albert and Alexandra Streets, as depicted in **Figure 2-4**.

[4] *And about an hour from Wollongong.*

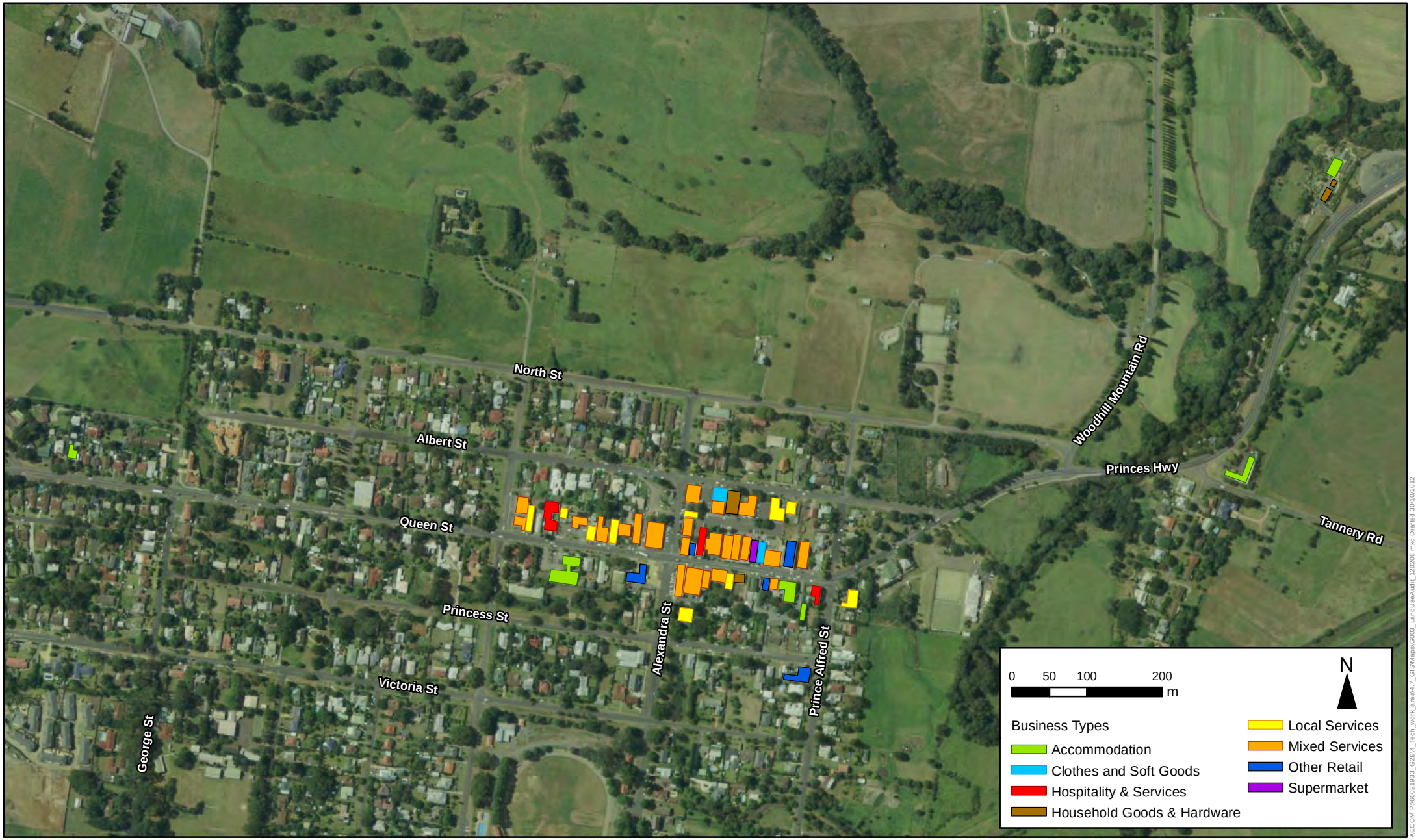

Figure 2-4: Business types within Berry (SGS Economics and Planning, 2008)

Source: SGS Economics and Planning, 2008

Berry has a number of businesses that cater both to the tourist and local markets. The SGS report (2008) identified 105 businesses in Berry of which 34 (32 per cent) were likely to cater to locals only and the remaining 71 businesses (68 per cent) were those that would serve both locals, as well as tourists and motorists passing through the town. Further surveys by AECOM in 2008 and 2011 of businesses catering to passing motorists, tourists and locals, confirmed these proportions. The AECOM survey (2008)[5] showed that retail businesses, representing the majority of Berry businesses, considered that less than 15 per cent of their turnover resulted from through traffic. Businesses most reliant on this form of trade were petrol stations, with 70 to 75 per cent of their turnover earned from this source. Accommodation businesses and food and beverage businesses considered that 24 per cent and 20 per cent respectively of their turnover resulted from through traffic.

2.2.4 Tourism

The study area is a popular tourist destination, with an abundance of natural attractions such as beaches, waterways, national parks and state forests, but also containing more formal attractions such as historic villages and buildings, for example Coolangatta historic village, and recreation areas and Seven Mile Beach National Park.

The significance of tourism to the South Coast Region is reflected in the percentage of businesses that serve this sector; ie 24.2 per cent of all businesses compared to the national benchmark of 20.2 per cent at June 2009. Employing businesses comprise 54.8 per cent of all tourism businesses in the region, compared to the national benchmark of 39.7 per cent.[6]

Despite the global downturn and high value of the Australian dollar, visitation to the South Coast continues to increase. In the year ending 30 September 2011, international visitation to the area increased by 13 per cent, with expenditure in excess of $190 million by foreign visitors. Domestic overnight and day visitors to the area injected $617 million into the local economy, supporting 6000 jobs.[7]

On a national scale, the Shoalhaven area, in which most of the study area is located, ranks as the third most visited LGA behind the Gold Coast and Sunshine Coast.

In the year ending June 2011, the Shoalhaven LGA received 1.2 million domestic visitors and 421,700 visitor nights, an increase of 11 per cent over the previous year. By comparison, the South Coast Region (from Helensburgh to the Victorian border) recorded 2.9 million visitors, while NSW recorded 24.1 million visitors during this period.[8]

Accommodation data[9] is available for hotels and resorts, motels, private hotels and guest houses, and serviced apartments, all of which have 15 or more rooms and where the stay is shorter than two months. Key indicators for the year ending June 2011 for the Kiama and Shoalhaven B Statistical Local Areas, within which the study area is located, are as follows:

- There were 18 establishments in Shoalhaven and nine in Kiama, offering 419 and 328 rooms respectively, and 1440 and 945 bed spaces respectively.
- These establishments employed 233 persons in Shoalhaven and 188 in Kiama.
- Shoalhaven room occupancy rates were 50.6 per cent while those in Kiama were 53.3 per cent.

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[5] *Unpublished background research.*
[6] *Economic Importance of Tourism in Australia's Regions Tourism Research Australia August 2011, p6.*
[7] *Tourism Research Australia data, viewed at www.southcoastregister.com.au/news/...tourist.../2397162.aspx.*
[8] *Shoalhaven Tourism 29 September 2011 www.scpromotions.com.au/shoalhaven-tourism-statistics.*
[9] *ABS Catalogue 8635155001DO001_201106 Tourist Accommodation, Small Area Data, New South Wales, Jun 2011.*

There were 89,281 guest arrivals in Shoalhaven while there were 63,834 in Kiama.

- Average length of stay in Shoalhaven was 1.7 days while this was two days in Kiama.
- Revenue from this form of accommodation was $12.4 million in Shoalhaven and $10.0 million in Kiama.

The tourism sector is therefore significant to the study area both in terms of economic activity and job creation. No tourism statistics are available for Berry but a survey in 2008 identified eight accommodation providers in the town.

2.2.5 Travel patterns

The Princes Highway is the major route for road traffic between Sydney and the South Coast. Since the Highway passes through Berry, all through traffic, including heavy vehicles[10], must pass through this town. This means that between 70-75 per cent of traffic passing through Berry does not stop (AECOM, 2011b).

Private vehicles are the predominant mode of transport in the study area, which is reflected in high levels of household vehicle ownership in the Kiama and Shoalhaven LGAs. The levels are 1.73 and 1.69 respectively, which are higher than the average of 1.47 in the Sydney greater metropolitan area. The 2007 Household Travel Survey Summary Report (NSW Department of Transport and Infrastructure, 2009) shows that around 85 per cent of total trips on a typical weekday made in Kiama and Shoalhaven are car-based, compared to an average of 72 per cent in the Sydney Greater Metropolitan Area (AECOM, 2011b).

Local and regional bus and coach services use the Princes Highway in the project area, although the number of routes and frequency of services available to the general public are limited, resulting in fewer buses being used when compared to other forms of travel (AECOM 2011b). School services between Gerringong, Berry and Bomaderry frequent the route during term time.

Rail passengers represent one per cent of average weekday travel mode share in the project area. This is due in part to the South Coast line terminating in Bomaderry and the absence of direct rail services from Berry to Sydney (AECOM 2011b).[11]

There are no formal cycle specific facilities in Berry but Shoalhaven Council does promote various cycle routes to and from Berry utilising the Princes Highway and other local and regional roads (for example Berry to Seven Mile Beach via the Princes Highway, Tannery Road and Beach Road, and Berry to Kangaroo Valley via Berry Mountain) (AECOM 2011b).

A proposed 1400 kilometre coastal cycleway stretching from the Queensland border to the Victorian border includes a section within the study area that follows the route of the 'Sandtrack'. This connects to the Berry to Seven Mile Beach route described above. The purpose of the cycleway program is to deliver more sustainable transport choices, increase tourism, provide better coastal recreation access and grow bicycle-tourism industries. It is largely funded by RMS and implemented by local government, and has already resulted in over 330 kilometres of the route being constructed or committed, in the form of shared pedestrian/cycle paths or on-road cycle lanes along local streets.[12] There are opportunities for Shoalhaven and Kiama Councils to apply for grants to improve the route for cyclists. There is also the opportunity to expand the cycling network beyond the coastal cycleway.

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[10] *There is an alternative route along the 'Sandtrack', but heavy vehicles are not permitted to use this route (AECOM 2011b).*
[11] *There is a train service from Berry to Sydney, but passengers are required to change at Kiama.*
[12] *www.planning.nsw.gov.au viewed on 17 January 2012.*

Other than within Berry, there are limited opportunities for pedestrian movement along the Princes Highway within the project area due to significant travel distances between towns coupled with the high speed limits along the highway.

2.2.6 Recreation/community facilities

Berry has a wide range of community facilities and assets, ranging from places of worship to sporting grounds, recreational, educational and essential facilities and services. Many of these facilities were provided when the town was first established, including the old court house, hospital, post office and police station. An inventory of facilities and services, prepared using maps of the area and supplemented by a site visit, is at Appendix B.

The Berry Community Activities Centre was established in the 1970s and played a pivotal role in reviving the town as a tourist and residential destination. A number of activities are coordinated from this Centre, including the Berry School of Arts, Berry Community Cottage, and the Berry Country Fair.

The Berry Showground is used by Shoalhaven residents and visitors, and has been identified in consultations as a key focal point for community interaction. The showground is the location for local community activities such as the annual Berry Agricultural Show, monthly Berry Country Fair, equestrian events and football.

The Berry Sports and Recreation Centre is a popular and integral part of town life, providing facilities for sporting activities such as swimming, cricket, netball and tennis, on-site accommodation and conference space, picnic and BBQ facilities.

The Berry Riding Club and a number of other equestrian clubs including the Woodhill Mountain Pony Club and the Shoalhaven Show jumping Club operate from a property owned by Shoalhaven City Council on North Street, adjacent to the sportsground.

Local residents enjoy using North Street as a quiet and scenic route for recreational walking, jogging and cycling. It is also a pleasant alternative route to Queen Street for other trips on foot and by bike. Local residents have also cited the importance of North Street as a pedestrian connector with other parts of Berry (see **Figure 2-5**).[13] The study area affords many opportunities for passive recreation, with an abundance of natural features, as well as parks, rest stops and lookouts.

Another recreational pastime in the area is fishing. Fishers at local creeks mostly fish for Australian Bass in the spring and summer months. Broughton Creek has been used as a brood stock location for fish stocking. Feedback from the local fishing community suggests that the number of fishers accessing local creeks is low but those that do mainly visit Broughton Creek, which they access from the road bridge. Fishers also visit Bundewallah, Connelly's and Broughton Mill Creeks, which are also accessed from road bridges. Legal access to the bed and bank of the creek areas is currently only available from existing road crossings of the creeks, unless prior agreed access has been arranged across private lands. RMS has been advised by some landowners that they experience unauthorised access by fishers to their land.

Figure 2-5 illustrates the location of the growth areas described in Section 2.2.1 and shows how the North Street corridor provides an alternative route between the established area of Berry and the growth area at west Berry. It also shows how North Street provides a connection from west Berry to community assets, including the Berry sportsground and the Pullman Street heritage precinct.

[13] *Personal communication, Berry Project Office, 6 December and 12 December 2011.*

Summary

The study area is strongly defined by physical, economic and social characteristics.

The physical qualities of the rural environment derive from their agricultural capability as well as their scenic qualities. These physical qualities have become a draw for tourists as well as an economic asset for the study area, and on which the local community places high value.

The majority of land in the study area has high value land capability, with favourable conditions for dairying. The dairy industry in the study area is the third most important nationally in terms of value of production.

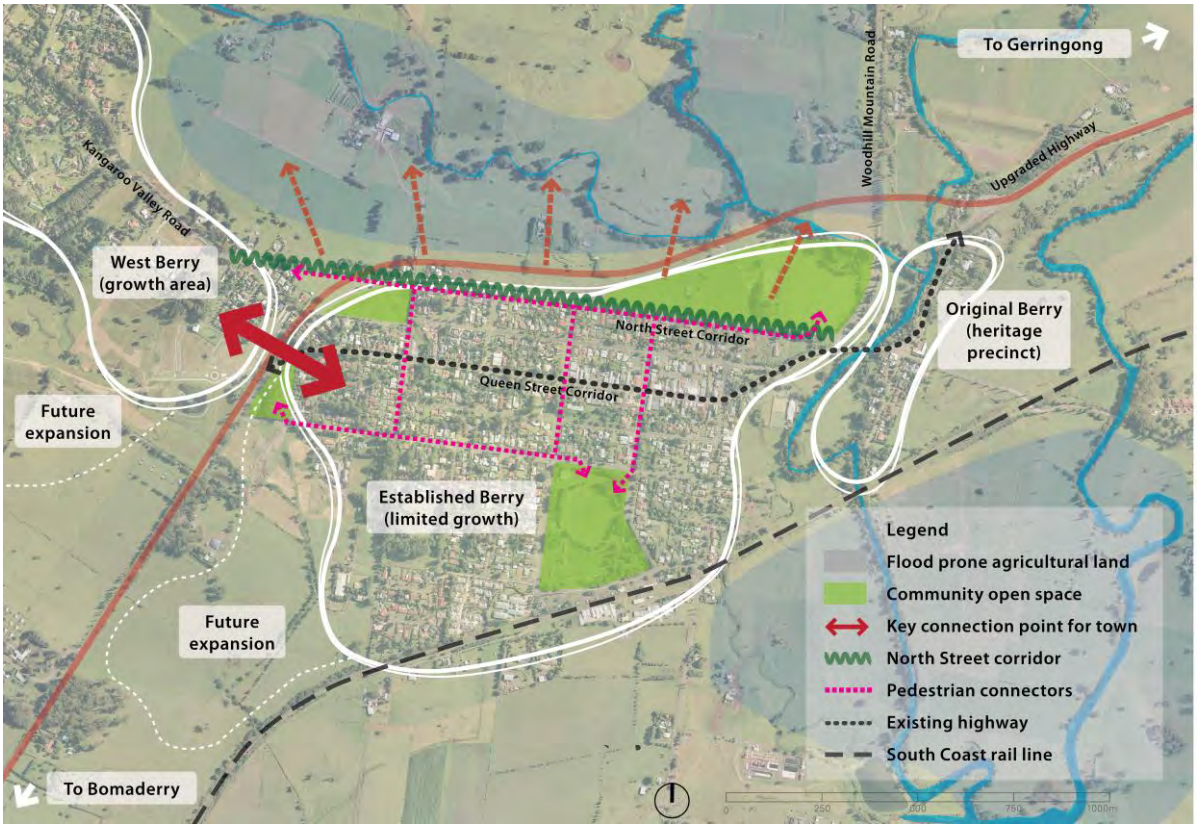

Figure 2-5: Pedestrian routes to key community assets within Berry (Source: AECOM, 2012)

Note: The orange arrows pointing away from North Street represent views from Berry across rural vistas to the escarpment.

Nestling in the escarpment of the Cambewarra range, Berry's historic buildings, well established landscaped areas and community facilities, have forged particular lifestyle qualities that have made it an attractive place in which to live. Berry's proximity to Sydney and Wollongong has also made it an ideal stopping point for through traffic as well as being a destination in itself. Berry attracts a significant number of day trippers who visit the town for its amenity.

While a number of Berry's businesses target the tourist market, they also serve residents' needs. A survey by AECOM in 2008 found that less than 15 per cent of business turnover is considered to be dependent on highway related trade.

Private vehicles are the predominant mode of transport throughout the study area, with higher than average levels of vehicle ownership. There is limited public transport availability, and limited opportunities for cycling and pedestrian movement, other than within Berry.

The study area affords many opportunities for both passive and active recreation, with an abundance of natural features, parks, rest stops and lookouts. Fishing from local creeks is an established pastime. Many of Berry's community and recreational facilities were provided when the town was first established, and together with those that have developed more recently, have become important aspects of residents' lives.

2 Consultation and key stakeholder issues

RMS has undertaken a comprehensive program of community consultation with potentially affected property owners, interest groups, government and private agencies and the broader community since March 2006.

The consultation process has allowed the community to raise issues and themes that have been considered in the project design. The community expressed values about living in the area, which are set out in **Table 2-1** and are summarised as follows (RTA, 2008):

- Economic: productive land of national significance; tourist destination, not just a thoroughfare; market, employment and business opportunities; potential for economic and population growth.
- Social: strength of enduring community spirit and networks of support and cohesion; family, generational, emotional and spiritual connection to the landscape, environment and region; visual beauty; lifestyle and associated emotional and health benefits.

The economic and social issues that emerged during consultation on route options (RTA, 2008) are summarised in **Table 3-1**. The third column to the table identifies where the issue is addressed in this report or in other documents.

Table 3-1: Economic and social issues

Issue	Detail	Report section
Economic issues		
Access arrangements	• The upgrade must ensure that access and connectivity are maintained to protect business viability. • Design of interchanges must provide easy access in/out of Berry.	• 5.1.3 and 5.2.4. • Princes Highway Upgrade – Foxground and Berry Bypass, Traffic and Transport Assessment (AECOM, 2011b).
Agricultural land and farming activities	• The preferred route option should minimise impacts to agricultural land and farming business: impacts include land fragmentation, severance of high value agricultural land, impacts to viability of long established dairy farms. • Prime crop, dairy and agricultural land needs to be preserved and recognised as a valuable resource.	• 5.1.5 and 5.2.3. • Section 7.9 of the environmental assessment.
Business and the local economy	• The preferred route option should minimise impacts to business and local economy, including tourist industry. • Job losses from decrease in passing trade, impacts of delays during construction and flow on effects of reduced visitation to the area, if tourist related businesses close, should be considered. • The proposed upgrade/bypass has potential to have a positive impact on local economy, including tourism.	• 5.1.4 and 5.2.5. • Princes Highway Upgrade: Economic Appraisal of Berry and Gerringong town access arrangement (SGS Economics and Planning, 2008).

Issue	Detail	Report section
	• Options that divert traffic away from Berry, but still maintain a visual link with the town are preferred. • The Berry bypass would improve amenity, improve business and increase tourism potential.	
Impact on commercial operations	• The upgrade may impact on the viability of the Berry Rural Co-operative Society. There may be an impact to individual dairy farms, reduced business from local residents and supply of agistment from local rural land.	• 5.1.5 and 5.2.3.
Impact to properties	• The preferred route option should minimise loss of property.	• 5.2.2. • Section 7.9 of the environmental assessment.
Social issues		
Social amenity	• Potential impacts to village character/heritage qualities, sporting/recreational and other community facilities, tourism potential, severance of significant views, quiet enjoyment of the area. • Benefits of Berry bypass include traffic reduction and noise reduction which would enhance tourist potential and town amenity. • Need to maintain integrity (cohesion) of the area. • The upgrade needs to protect the natural and built amenity of Toolijooa. • The North Street option has potential to impact on noise, air quality, scenic vistas, and to isolate sporting facilities. • The preferred route option should be located parallel to North Street to minimise impacts.	• Table 3-2, 5.1.1, 5.1.6, 5.2.1, 5.2.2 and 5.2.6. • Princes Highway Upgrade – Foxground and Berry Bypass, Noise and Vibration Impact Assessment (AECOM, 2011a). • Air Quality Impact Assessment (PAE Holmes, 2011).
Heritage	• Berry's historic qualities need to be protected. • The North Street option is incompatible with Berry's historic context.	• Table 3-2, 5.2.6.
Uncertainty	• Uncertainty about impacts on property and livelihood is difficult, particularly for the elderly.	• 5.1.2.
Impacts to property	• Social costs associated with property loss include loss of home, lifestyle, sense of belonging, fragmentation of land, devalued property, etc.	• 5.2.2. • Section 7.9 of the environmental assessment.

Issue	Detail	Report section
Impacts to community	• The project needs to consider the community's needs, including impacts on existing community facilities and amenities. • The sporting complex is an important part of (Berry) town life, its facilities are important for maintaining community wellbeing. • The process (of investigations into the highway upgrade) has caused division within the community.	• 5.1.2, 5.1.6 and 5.2.2.

Feedback during the route options phase of the project highlighted the importance to the community of the access arrangements for Berry. As a result, RMS committed to undertaking community consultation on access options for Berry and a value management study to assist the development and selection of the Berry access arrangements.

Ongoing consultation since then has included discussions with residents who would be affected by construction noise and with recreational fishers, who were contacted through local fishing clubs. The community is also kept informed of the project through regular updates and by having weekly access to a project office in Berry. A community review group met seven times between August 2011 and November 2011 to discuss alternative alignment options to the north of North Street.

Members of this group raised the issues that are summarised in **Table 3-2**. The third column to the table outlines the ways in which the design of the project and the planning process has responded to these issues. A public meeting was held in December 2011 to present a new alignment for the Berry bypass.

Table 3-2: Issues raised by members of the Berry bypass community review group

Group	Issue	Design response
North Street residents	• Residents along North Street have expressed concern about impacts on lifestyle quality resulting in particular from the close proximity of the project to residences along North Street and the inclusion of noise attenuation measures up to five metres high along the southern side of the upgrade. • Concerns include security (North St would become a dark dead end street), amenity and loss of rural outlook (noise, visual) and health (perceived loss of sunlight and air quality) impacts. • Residents are also concerned about the effects on property values as a result of these potential impacts.	• The highway has been moved further away from North Street, creating a 40 metre buffer between the highway and North Street between Alexandra and Edward Streets. The highway has been lowered by up to two metres in the vicinity of North Street. Noise barriers have been reduced in height from five to four metres. • The heights of road and noise barriers have been reduced and highway moved further away from North Street. This would reduce noise and visual impacts as well as preserve views to the escarpment. • The design is unable to respond to changes in property values.

Group	Issue	Design response
Dairy farmers north of North Street	• The viability and future plans for expansion of two farms is in question due to further loss of land, Berry Co-op relies on these farms for its viability. • The farms create the pastoral landscape character for which Berry is known. • Retain preferred alignment.	• The revised alignment seeks to minimise impacts on productive agricultural land while addressing the amenity concerns of the community.
Dairy Farmers Co-operative	• Support for current preferred alignment as it minimises land take affecting dairy farms and subsequently its viability and future plans for expansion.	• The revised alignment seeks to minimise impacts on productive agricultural land while addressing the amenity concerns of the community.
Chamber of Commerce	• Support a bypass and accept the preferred route if the design would be appropriate and would not spoil Berry. • Believe that height of the bridge at Berry would create an 'eyesore' and change the existing rural 'feel' of Berry for local residents and visitors. This would discourage visitors and therefore affect business operations.	• The bridge at Berry has been moved 95 metres to the north at Woodhill Mountain Road, and its height over Woodhill Mountain Road has reduced from 13.1 metres to 6.7 metres.
Berry Alliance	• Reduce height of bridge and move away from North Street to reduce the environmental impact of the upgrade, particularly the associated noise and visual impacts of the elevated bridge and embankment to the north of North Street.	• The bridge height has been reduced and the highway moved further away from North Street – see points above.
Residents north of Berry	• Support existing alignment as it reduces the potential impact on rural agricultural land north of Berry, but RMS should seek to reduce potential noise and visual impacts by reducing the height of the bridge and embankment to the north of North Street.	• The bridge height has been reduced from 13.1 metres to 6.7 metres.

3 Review of case studies of town bypasses

This socio-economic impact assessment for the project draws on evidence of reported socio-economic impacts experienced by bypassed towns as follows:

- Bureau of Transport and Communications Economics 1994, Working Paper 11. The Effects on Small Towns of Being Bypassed by a Highway: A Case Study of Berrima and Mittagong.
- Urban Regional Planning Program, University of Sydney 2005, The Karuah Highway Bypass, Economic and Social Impacts: The 1 Year Report.
- Urban Regional Planning Program, University of Sydney 2009, The Karuah Highway Bypass, Economic and Social Impacts: The 5 Year Report.
- NSW RTA and University of Sydney, 1996, Evaluation of the Economic Impacts of Bypass Roads on Country Towns: Final Report.
- NSW RTA and University of NSW 2011, Economic Evaluation of Town Bypasses: Review of Literature.

This chapter summarises the findings of this review.

4.1 What were key issues affecting these towns?

The *Economic Evaluation of Town Bypasses study* (RTA and UNSW 2011) identified the following key indicators of change post bypass:

- Small towns (less than 2500 in size) are generally at more risk of adverse economic impacts from a highway bypass, yet they continue to survive.
- Towns with a higher level of dependence on highway trade may experience greater economic impact than towns with a lower level of such dependence.
- Highway dependent businesses seen as vulnerable to impacts from a bypass included service stations and restaurants. Studies of highway bypass impacts in NSW show similar findings, with service stations, food and beverage outlets being the most affected businesses, with accommodation establishments being less affected.
- In some cases, being close to a large centre was seen to be detrimental to post bypass recovery as motorists could use the bypass to quickly access the larger centre for highway related services.
- Distance to the town from the bypass was seen to have some bearing on impacts, for example, the greater the distance from the bypass, the less likely traffic would be to stop in the town.
- The social impacts of a highway bypass on towns are generally very positive, with the perception of improved quality of life and environmental amenity. Residents benefit from significant reductions in traffic flows through their main streets and town centres, with access and parking becoming easier, more pleasant and safer.

Before being bypassed, each of the towns described below was defined by a certain set of characteristics which influenced the extent to which impacts were felt after the bypass had been constructed. For example:

- Berrima: The main industry in this historic village was tourism and retailing, with Berrima's heritage character being a prime reason to visit, notwithstanding the amenity impacts caused by the Highway bisecting the town.
- Mittagong: While this town also had a tourism and retailing base, its appeal as a tourist destination was less important compared to Berrima. It also served as a convenient stopping place for long distance and regional traffic of which a number of businesses were associated.
- Karuah: This small town had few major linkages to industries in the area, limited amenity, a population with a high level of disadvantage, and a large proportion of businesses that were either totally or partially reliant on highway trade. Forty one per cent of businesses in the food, petrol, restaurant/takeaway and accommodation sectors were identified as being dependent on business from highway traffic (University of Sydney, 2005).
- Goulburn: This established regional town serviced the needs of a large resident population as well as its rural hinterland; a proportion of businesses were, however, reliant on highway trade. The town contains a number of heritage precincts and buildings of heritage significance.
- Yass: Part of Canberra's dormitory zone, Yass was an important centre servicing motorists' needs, and the most important truck stop between Melbourne and Sydney. The town's amenity was significantly impacted by the highway.
- Studies of highway bypass impacts in NSW have shown that the most affected businesses are those directly serving the needs of the motorist: motor vehicle services, particularly service stations, food and beverage outlets and, to a lesser extent, accommodation establishments.

Goulburn, Mittagong and Yass all had populations of more than 2500 prior to being bypassed, while Berrima and Karuah had fewer than this number. Berry had a population of 1484 at the 2006 Census.

In each case, the bypass was some distance from the affected town. Impacts of the respective bypasses varied as follows:

- Berrima: The resulting reduction in traffic and elimination of heavy vehicles from the main street improved the town's amenity and increased Berrima's tourist appeal. There were medium term benefits for tourism and retailing businesses and employment. The bypass resulted in an increase in the number of tourism related businesses.
- Mittagong: There were short term adverse impacts on tourist and retail sales and employment, with take away food shops, service stations, budget priced motels being the most seriously affected.
- Karuah: The town's economy was adversely affected with 48 job losses in one year after the bypass opened, reducing to 35 job losses at the five year mark. Businesses most seriously affected were service stations, takeaway food outlets/cafes/restaurants. By contrast, there was an improvement to Karuah's amenity, quality of life and safety. There was also a feeling that the bypass had indirectly assisted in forging community cohesion, by removing the barrier that had previously split the town in half. In the medium term, some businesses had repositioned themselves, including a service station, and businesses were reporting less of an impact than was felt immediately after the bypass had opened (University of Sydney, 2005; 2009).

- Goulburn: Economic impacts were not significant, with job losses corresponding to less than one per cent of total employment. There were significant improvements to main street amenity through the removal of heavy vehicles and reduction in traffic, coupled with a main street improvement program promoted by Goulburn City Council (RTA and University of Sydney, 1996).
- Yass: This town experienced a significant reduction in employment attributable to the bypass (93 jobs at 18 businesses), but significant benefits to main street amenity through the removal of heavy vehicles and reduction in traffic. The subsequent development of highway service centres close to the Yass turn-off compensated in considerable part for job losses sustained by businesses dependent on highway related trade (RTA and University of Sydney, 1996).

4.2 Relevance for Berry and other settlements that would be bypassed

The primary interest for this assessment is in how the project would affect Berry. While there are other settlements along the route, including Foxground and Broughton Village, the project is not anticipated to generate adverse impacts for those communities. If anything, it is likely to enhance their amenity and reinforce the sense of community cohesion by moving the highway further away, with the exception of the Toolijooa community which would still be in relative proximity to the highway. In addition, these settlements support little to no business activity, thus impacts from loss of highway related trade would not arise. Some individual residences would be closer to the highway as a result of the project.

The following key issues emerge from the case studies on bypassed towns:

- Being able to see the town from the bypass is not necessarily a critical factor in determining the ongoing viability of the bypassed town. For example, Berrima and Goulburn have flourished post bypass.
- Town size alone does not predispose a locality to adverse impacts eg. Berrima's population at the 2006 Census was 868 persons.
- Towns whose businesses relied heavily on highway trade were more affected by the bypass. Service stations, some retailing, takeaway food and restaurants were most affected.
- Businesses that serviced a resident community and hinterland were not adversely affected.
- A number of vulnerable businesses such as service stations, over time, repositioned themselves to survive the post bypass environment.
- While economic impacts can be severe in the short term, this severity appeared to become less marked in the medium term.
- Towns that were destinations in themselves eg Berrima, performed better post bypass than those whose role in the region was less well defined eg Mittagong.
- There was a universal improvement in amenity and lifestyle quality as a result of removing heavy traffic from the towns' main streets.

This experience appears to suggest that the economic impacts on Berry would be restricted to those businesses that are extremely dependent on highway trade (see also discussion at 5.2.5), but that Queen Street and the streets adjoining it would benefit significantly from improved amenity.

Most of the case studies analysed during the literature review do not discuss mitigation measures in any great detail.

Mitigation measures implemented to minimise and manage the impacts of these bypasses range from signage, upgrading of tourist and recreation facilities, conversion of redundant land uses for community use, and main street improvements.

In the case of Karuah, Port Stephens Council took a proactive role in trying to promote improvements to the town's facilities and services. The then Department of Planning required, as a condition of approval, that an economic recovery plan be funded by RMS and monitoring of impacts be made at 12 months and five years after the bypass had been built. Features of the plan included marketing of the town, increasing local community social infrastructure, main street improvements and enhancement of tourism potential through facility upgrades (RTA and UNSW 2011). A project co-ordinator was appointed to oversee implementation of the mitigation measures. These initiatives have had mixed outcomes.

Goulburn City Council implemented a Main Street Program that reduced the two lanes in each direction through the town, to one lane in each direction. This allowed for increased parking capacity and improvements to main street amenity.

5 Assessment of impact

5.1 Construction phase impacts

5.1.1 Amenity impacts

Amenity refers to the quality of a place, its appearance, feel and sound, and the way its community experiences the place. Aesthetic qualities are an important part of amenity, but the broader concept of amenity is determined also by the physical design of a place and the human activity that takes place within it. A place that has 'amenity' is regarded as pleasant and attractive, as well as convenient and comfortable.[14]

Amenity impacts include any factors that affect the ability of a resident, visitor or business owner to enjoy their home and daily activities, for example, noise, vibration, detrimental changes to views or changes to air quality. A project could improve amenity in some locations while being reduced in others. Residents or road users could experience construction fatigue during a lengthy construction phase.

Amenity impacts during construction of the project are discussed in detail in Sections 7.2 (noise and vibration), 7.6 (landscape character and visual amenity) and 8.2 (air quality) of the environmental assessment.

Most of the construction activities would take place from 7am-6pm, Monday to Friday and 8am-1pm Saturday, with no work on Sunday or public holidays. However, certain activities would need to take place outside of these hours due to technical considerations, such as the need to meet particular quality specifications for placement of concrete pavement; safety and traffic management considerations; and/or due to climatic factors (cold winters and hot summers)[15]. Construction hours are further detailed in the *Foxground and Berry Bypass, Noise and Vibration Impact Assessment* (AECOM, 2011a) which is provided at Appendix E of the environmental assessment.

A noise and vibration assessment of construction activities, based on a worst case 15 minute period[16], found that noise management levels would be exceeded if no mitigation measures were put in place. Some residents would be 'highly noise affected' by some activities, including earthworks and impact piling. Those residents affected would be notified before particularly noisy activities were to take place and activities would be organised so that there are respite periods from high levels of noise.

Blasting would be required along the Toolijooa Ridge to produce a cutting to accommodate the project. Appropriate blasting criteria in accordance with the relevant guidelines have been recommended. Higher limits have also been proposed contingent on the approval of the affected residents, and the employment of safe work practices. The aim of the higher blasting limits is to reduce the number of blasts and the overall construction timeframe and consequent impacts on the community.

[14] *Handy, S Amenity and Severance 2002.*
[15] *This occurred on the Hume Highway Duplication Project during hot weather periods.*
[16] *Which is not representative of the entire construction period.*

An extension to working hours has been proposed as part of the project. To date, a proposal to extend working hours by one hour at the start and end of the working day during the period of daylight saving, for activities between Toolijooa Road and Tindalls Lane has been discussed with directly affected residents. These activities would be limited to the following times and locations:

- Between 6am and 7pm Monday to Friday for the Toolijooa cut, Broughton Creek floodplain and major bridge works (outside Berry township).
- Between 7am and 4pm on Saturdays for the Toolijooa cut, Broughton Creek floodplain and major bridge works (outside Berry township).
- Outside of known likely major traffic peaks (such as the Friday evening prior to a public holiday long weekend).

No consultation has been undertaken with residents in Berry as only standard working hours would be apply to the town precinct.

Generally, affected residents support extended working hours since they could mean that the overall construction period is shorter. Mitigation measures would reduce the impacts of extended working hours (refer to **Table 5-1**).

The temporary partial or full closure of Kangaroo Valley Road to enable construction of the overbridge would increase local traffic along North Street which would increase traffic noise. However the duration of the closure and whether it would be a full or partial closure of Kangaroo Valley Road, would depend on the detailed design and construction methodology.

Dust would be generated from earthworks associated with the construction of the project and the total amount of dust would depend on the silt and moisture content in the soil and the types of activities being carried out. The main sources of dust would be from blasting and crushing, the use of excavators, front-end loaders and dump trucks as well as wind erosion from exposed areas (PAE Holmes, 2011). This would be addressed by mitigation measures as described in **Table 5-2**.

The construction phase would also create visual impacts to road users and to residents of rural properties in the vicinity and in Berry, from not only road works but associated materials stockpiles adjacent to the corridor.

In summary, the main amenity impacts during construction are expected to arise from noise, dust and visual effects.

5.1.2 Community cohesion and severance

There is no agreed definition of community or social cohesion, with most of the discussion around intangible concepts such as a sense of belonging, attachment to a group, willingness to participate in activities and to share in outcomes.

A recent report into the mapping of social cohesion found three common elements to the concept:

- Shared vision: Social cohesion requires a set of universal values, mutual respect and common aspirations or identity shared by their members.
- A property or group or community: Social cohesion describes a well-functioning core group or community in which there are shared goals and responsibilities and a readiness to work with other members.
- Process: Social cohesion is generally not seen as an outcome, but as a continuous and ongoing process of achieving social harmony.[17]

Another view suggests that community cohesion is a 'state of togetherness and unity across diverse people in the community with social engagement, participation and shared values. A cohesive and integrated community is characterised by equality of opportunity, citizen awareness of rights and responsibilities, and high levels of trust in each other and local institutions.' Social connectedness is an indicator of community cohesion. It comprises 'the social interactions, relationships and networks that people have with others and the benefits that these relationships can bring to the individual as well as to society.'[18]

In a cohesive community, residents have a sense of belonging and feel a strong attachment to the community and their neighbours. The physical environment, including transport infrastructure, plays an important role in fostering or obstructing community cohesion by either creating borders that help to define the community, barriers that divide a community, or by creating gathering spots that foster community interaction. Streets within the community are important public spaces and can provide areas for residents to gather and interact. This is the traditional role of the main street in an urban setting. Bicycle and pedestrian facilities can also foster interaction. The degree to which transport infrastructure would serve as borders, barriers or gathering places would depend in part on how residents perceive and react to this infrastructure.[19]

Community severance occurs when people are separated from the facilities, services and social networks they wish to use within their community. This can be due to modified travel patterns or psychological barriers created by transport infrastructure eg highways or bridges, and can manifest in outcomes such as trip delays, diversions and traffic noise. Severance also arises where there are changes in the comfort and the attractiveness of areas.[20]

While much of the literature focuses on the negative consequences of road infrastructure on community cohesion, the potential for changed transport arrangements to have a beneficial impact on community cohesion should not be overlooked. This is particularly the case where existing traffic conditions may be dividing the community for example, congested or heavily trafficked main roads.

Existing physical connections and linkages in the study area, and particularly within Berry, are instrumental in shaping current community cohesion. Existing paths of travel by vehicle, bicycle and foot are seen by the local community as critical to maintaining this current community cohesion, which also contributes to the community character of the town. There are currently two road accesses from west Berry to Berry: via North Street and via the Kangaroo Valley Road/Queen Street intersection. Access to existing community infrastructure (educational facilities, health services, places of worship, etc) is also seen as fundamental to creating and maintaining a sense of community cohesion and wellbeing.

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[17] *Mapping Social Inclusion, 2011. Scanlon Foundation Surveys Summary Report, Monash University*
[18] *Quigley and Watts, 2011 Ltd Literature Review on Community Cohesion and Community Severance: definitions and indicators for transport planning and monitoring.*
[19] *Handy, S Amenity and Severance 2002*
[20] *Quigley and Watts, 2011*

The ongoing impact of the proposed upgrade on community cohesion is discussed in detail at Section 5.2.2.

Construction of the project has the potential to impact on community cohesion if it results in physically alienating sections of the community, even on a temporary basis, and particularly in the case of Berry. Consultation activities to date, including community information sessions, forums and workshops have allowed participants to express diverse opinions within a supportive environment.

Early consultation with those people who might be affected by change has reduced uncertainty by providing them with relevant information and an opportunity to become aware of, suggest improvements to, and adjust to the changes.

Construction of the project does not include any major works within the centre of Berry. The most significant modification to the town's road network would occur at the new Kangaroo Valley Road interchange, which would require a temporary road closure. The alternative route between Berry and west Berry would be via North Street. The majority of works in the vicinity of Berry would be constructed offline and although it is likely that there would be some adverse effects where the offline sections connect with the active road network, these occurrences would only last for short periods of time (AECOM, 2011b).

5.1.3 Traffic and access arrangements

Due to the off-line construction of the Berry bypass, the local road network and Berry intersections would still perform adequately during the construction period. During construction, temporary accesses to some properties may be required but there are not expected to be significantly different impacts to the operations phase. As described in Section 5.1.2, a temporary road closure of Kangaroo Valley Road would be required and access between west Berry and Berry would be via North Street.

The traffic and transport impact assessment prepared for the project describes in detail potential changes to conditions for road users as a result of project construction. Although RMS is aiming to maintain an 80 kilometres per hour construction speed zone, construction activities would inevitably impact traffic efficiency (in order to maintain road and workplace safety) for both local and regional commuters due to a short term reduction in travel speeds through construction zones and potential delays caused by temporary road closures/detours. In the unlikely event that the average speed along the whole route were to fall from 80 kilometres per hour to 50 kilometres per hour, a driver travelling the entire 11.6 kilometre distance may experience a delay of around six minutes. A detailed Traffic Management Plan (TMP) would be prepared as part of the Construction Environmental Management Plan (CEMP) (refer to **Table 3-2**).

5.1.4 Business impacts

The project, including the northern and southern interchanges for Berry, would be constructed in a way that would allow existing traffic arrangements to continue until the new interchanges are operational. Access to businesses and therefore highway trade would not be directly affected during construction.

In the order of 500 direct jobs would be created during the construction phase assuming a construction period of about three years. Construction worker expenditure during the three year construction period would benefit local services in the vicinity of the highway, such as cafes and takeaways, service stations, trades and services suppliers and potentially some accommodation providers. The expenditure would have flow on effects to other businesses in the area.

Construction works north of Berry may encourage a small proportion of drivers to divert to the 'Sandtrack', which could reduce highway trade, but this is not expected to be a significant impact. Potential visitors to the area may perceive that construction works would create an impact on their enjoyment of their stay, which may discourage them to visit the area. This would impact local businesses in the tourism sector.

5.1.5 Agricultural sector impacts

Some temporary losses of productive agricultural land are anticipated where sites adjacent to the project would be required for ancillary uses, such as the storage of materials. Potential sites have been identified by RMS and are located on land that has been acquired, would be acquired or leased as part of the project or is already owned by RMS. **Figure 5-1** and **Figure 5-2** illustrate the location of the ancillary sites.

As described in Section 5.2.3, land acquired that lies outside of the highway corridor would be repackaged and sold on completion of the project. Therefore, once rehabilitated and if practicable, there would be potential for the ancillary sites to be returned to their previous use once the project is complete.

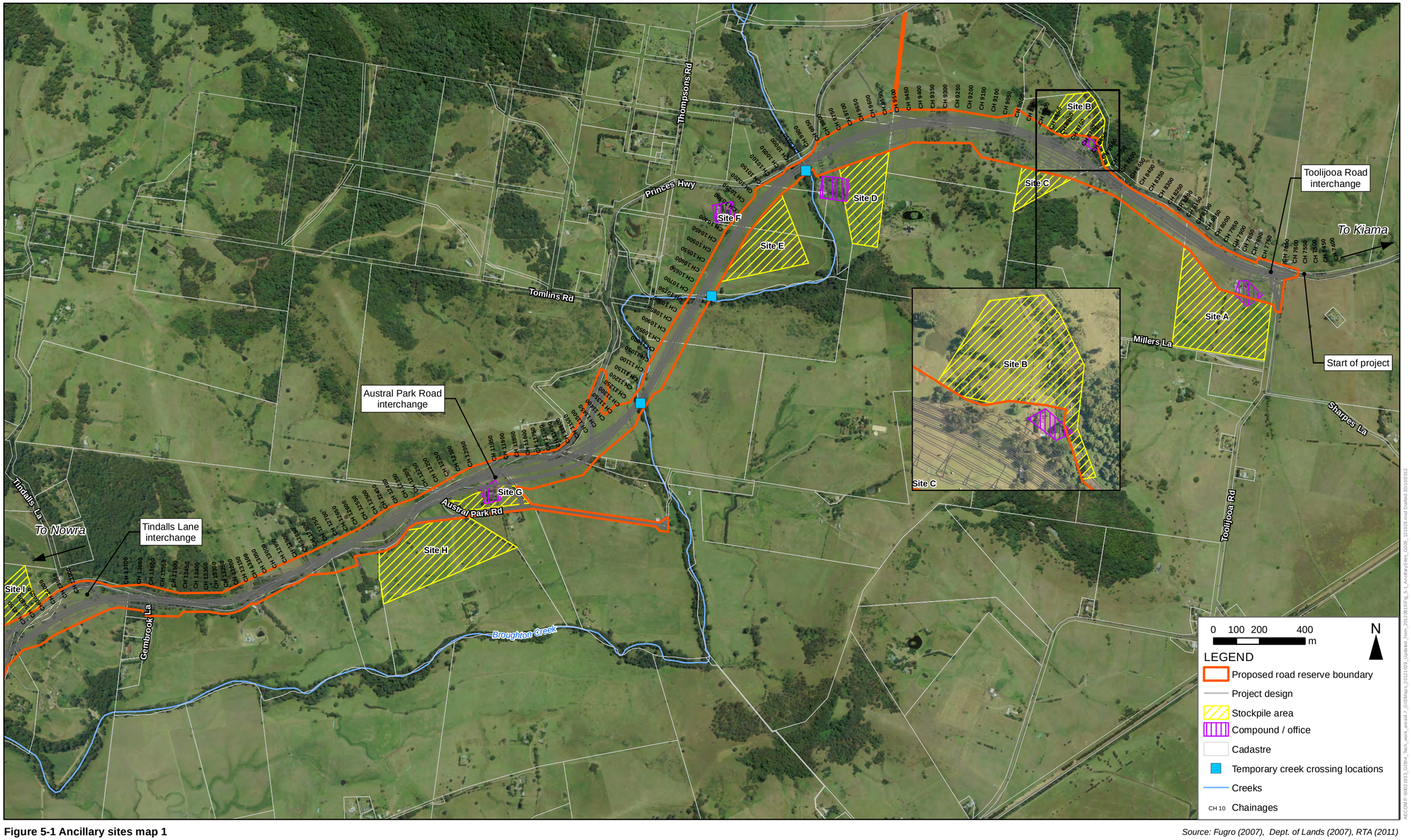

Figure 5-1 Ancillary sites map 1

Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)

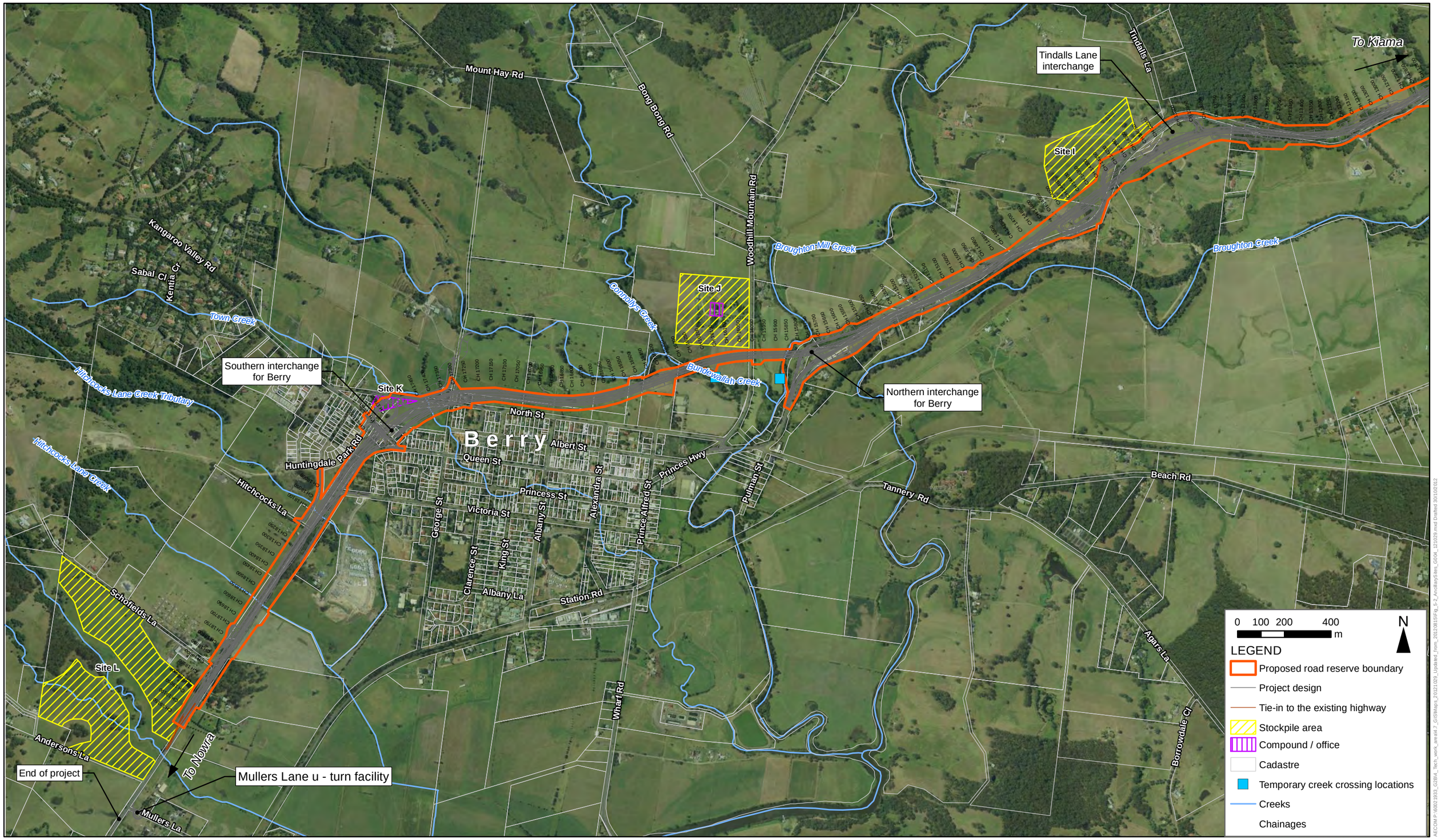

Figure 5-2 Ancillary sites map 2

Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)

5.1.6 Recreational impacts

Access to recreational fishing sites is not expected to be greatly affected as a result of the project, since existing access to the Broughton Creek bridge would be unaffected by the construction works. However, construction works may restrict movement along the creek bank in the immediate vicinity of the project to fishing sites near Broughton Creek (crossing 1) and near the Berry sportsground. See **Figure 5-7**. The main impacts would be downstream of the existing Broughton Creek Bridge. Access upstream is not likely to be impeded except where traffic control or other temporary safety works restrict roadside parking or access.

The construction of the project has the potential to impact the riparian and aquatic habitat in the vicinity of new bridges as sediment enters the water and the banks are altered to accommodate the structure. An *Aquatic Ecology and Water Quality Management Assessment* (Cardno Ecology Lab, 2012) has been prepared for the project (refer Section 7.3 and Appendix G of the environmental assessment). The assessment identifies potential risks to fish stocks including impediments to fish passage, sedimentation and pollution, which may be experienced during the construction phase and includes mitigation measures to minimise the impacts.

The following recreational impacts may also occur during the construction phase of the project:

- Minor disruption to the Berry sportsground due to small amount of land take (0.3 hectares), which should not disrupt sporting activities or passive recreational activities.
- Relocation of the Berry Riding Club located adjacent to the sportsground during construction to an alternative site in the study area. The site also accommodates two other small riding clubs.
- Disruption to passive recreational space at Mark Radium Park, due to land take associated with the southern interchange.
- Disruption to the use of North Street as an existing recreational route.[21]
- Traffic disruption for vehicles travelling from outside of Berry to access recreational facilities or clubs within town. Access within Berry to recreational sites would not change.

Apart from the relocation of the Berry Riding Club, impacts on recreational activities during construction are not expected to be significant.

5.1.7 Location specific impacts

In the Berry area, the construction phase of the project may have the following location specific impacts:

- Around the southern interchange for Berry, in particular, the Huntingdale Park area would experience elevated noise levels, visual impacts as well as disruptions to traffic movements during the realignment of Huntingdale Park Road.
- As described in Section 5.1.2, construction of the Kangaroo Valley Road interchange would require a temporary and/or partial road closure and diversion via North Street subject to detailed design and construction methods.

Consultation with directly affected residents is underway and would continue during construction.

[21] *Used for walking, cycling and jogging.*

5.1.8 Construction phase implications

During construction temporary accesses to some properties may be required but the impact is not expected to differ greatly between the construction and operations phases. A temporary road closure of Kangaroo Valley Road may be required and access between west Berry and Berry would then be via an alternative route such as North Street.

Although RMS is aiming to maintain an 80 kilometres per hour construction speed zone, in the unlikely event that the average speed along the whole route were to fall to 50 kilometres per hour, a driver travelling the entire 11.6 kilometre distance may experience a delay of around six minutes.

5.1.9 Mitigation measures for construction

Mitigation measures for construction impacts are summarised in **Table 5-1**.

Table 5-1: Mitigation measures

Mitigation measure
Amenity impacts
General: • Through implementation of a Community Involvement Plan, provide timely, regular and transparent information about changes to access and traffic conditions, details of future work programs and general construction progress throughout the construction phase of the project. Provide information in a variety of ways including letter box drops, media releases, an internet site and variable message signs. Set up a 24 hour hotline and complaints management process. Noise and vibration: • Implementation of a construction, noise and vibration management plan (CNVMP). The CNVMP would detail the “best practice” construction methods to be used, presenting a reasonable and feasible approach. The CNVMP would also detail the community engagement activities that are planned, which would include prior notification for particularly noisy activities. An extension to working hours between Toolijooa Road and Tindalls Lane has been agreed with directly affected residents. Air quality: • Implementation of an air quality management plan in accordance with the recommendation of the air quality impact assessment for the project) (PAE Holmes, 2011). Visual: • Reduce vegetation clearance where possible and progressively revegetate and landscape cleared areas as works are completed. Refer also to Landscape and visual amenity measures in Section 7.6. Construction fatigue: • Implementation of measures in the CNVMP to reduce the length of the construction phase and to provide respite periods from particularly noisy activities.

Mitigation measure
Community cohesion
By keeping the local community informed, as well as targeting affected groups with mitigation measures described in this table, the risk for community cohesion impacts is minimised. Community and stakeholder consultation would continue during the detailed design and construction phases of the project to encourage public participation in the design and to aid understanding of the project details and processes. RMS would also continue to provide timely, regular and transparent information and updates to residents and property owners such as: • Letter box drops, media releases, and/or community updates. • An internet site established and maintained for the duration of the project. • Variable message signs. • Targeted consultation with affected individuals or groups. • A 24 hour telephone hotline and complaints management process maintained throughout the construction of the project. Using the tools above, information would be provided to the community including: • Changes to access and traffic conditions. • Details of future work programs. • General construction progress.
Traffic and access arrangements
Through the community information plan, residents and road users would be advised in a timely manner before any changes to road access arrangements were implemented. Where feasible and appropriate, a variable message sign would be used to communicate road changes to road users. Should temporary or alternative property access be required, this would be provided in consultation with the affected landowner(s). Work would not be carried out on public holidays or over the Christmas and New Year holiday period. Traffic Control Plans would address peak tourist/holiday traffic such as Friday and Sunday afternoons and days immediately prior to and following public holidays. A Traffic Management Plan would be prepared and implemented and would ensure: • Construction methods and staging would be designed to minimise road closures, subject to other project constraints and ensure that disruptions to existing traffic are within acceptable levels. • Where feasible, the provision of an 80 km/h construction speed zone for highway traffic. • Continuous access to local roads and properties. • Road occupancy licences would be obtained for all work that impacts traffic on the existing highway. • The continuing performance of the local road network in Berry during the proposed closure of Kangaroo Valley Road (AECOM 2011b).
Business impacts
Potential visitors to the area would be provided with information on the RMS website about access and timing of works. Continue discussions with Shoalhaven City Council about strategies to encourage trade (refer to operational phase mitigation in **Table 5-2**) and inclusion of information on tourism websites to encourage visitors.

Mitigation measure
Agricultural sector impacts
Ancillary sites used for stockpiling materials would be located on acquired land. This land would be rehabilitated, repackaged and sold on completion of the project so that the sites can be returned to their original uses.
Recreational impacts
Adopt recommendations of Aquatic Ecology and Water Quality Management Assessment (Cardno Ecology Lab, 2012) to manage impacts on fish stocks, sedimentation and pollution. Relocate the Berry Riding Club facilities to a nearby site agreed by the Club for the period that safe access cannot be provided to the grounds. Undertake works in the area of the Club as early as practicable in the construction program.
Location specific impacts
Refer to amenity and access mitigation measures.
Phasing implications
The Traffic Management Plan would include the guidelines, general requirements and procedures to be used when activities or areas of work have a potential impact on existing traffic arrangements. The TMP would be submitted in stages to reflect the progress of work and would: • Include a framework to accommodate the different phases of the project, which would be developed by the contractor. • Identify the traffic management requirements during construction, including any changes to road safety on the 'Sandtrack' as a result of the highway construction works. • Describe the general approach and procedures to be adopted when producing specific traffic control plans. • Ensure the continuous, safe and efficient movement of traffic for both the public (for all modes of transport) and construction workers. • Produce Traffic Control Plans for all changes to existing traffic conditions, including but not limited to: sign posting, linemarking, temporary barriers, temporary traffic control devices (such as temporary traffic signals), variable message signs and a community information plan.

5.2 Operational phase impacts

5.2.1 Amenity impacts

In other cases where a town has been bypassed and heavy traffic removed from its main street, the result has been an improvement in amenity and lifestyle quality for the town concerned. In the case of Berry, the bypass would improve amenity at properties and businesses on and in the vicinity of Queen Street, by reducing noise levels, improving air quality and by diverting heavy vehicles to the upgrade.

The air quality not only in Berry but throughout the study area is expected to improve as the result of the project. Predicted ground-level carbon monoxide, nitrogen dioxide and particulate matter concentrations for the project area in 2017 and 2027 would generally be lower than those for the existing alignment in future years if the project was not constructed (refer to Appendix M to the environmental assessment for further detail).

However, residents in those areas closest to the bypass have raised concerns relating to noise and disturbed views, especially views to the escarpment which are seen to add to the attractive pastoral character of the area. In particular, the Berry community was very concerned about the impact on amenity given the proximity of the bypass to North Street and Huntingdale Park, as well as the height and location of the bridge at Berry, as described in **Table 3-2** in Chapter 3. The installation of measures to mitigate noise impacts adjacent to the upgrade such as walls and mounds, would also have implications for visual amenity.

The alignment of the bypass and the bridge has been improved in response to community concerns about noise and visual impacts as follows:

- The highway has been moved about 40 metres further away from residences most affected by the bypass (along North Street).
- The proposed highway in the vicinity of North Street has been reduced in height by up to two metres and noise barriers reduced from five to four metres.
- The bridge has been moved approximately 95 metres further away from Berry as it crosses Woodhill Mountain Road.
- The bridge has been lowered by up to 6.4 metres.
- At the southern interchange to Berry, the northbound off-ramp has been re-aligned to avoid Huntingdale Park Road.
- Vegetative screening would be provided between potential noise barriers and properties to reduce visual impacts. This mitigation would also be appropriate for the visual impacts to rural and Berry residences of other structures, such as bridges.

These features would reduce noise and visual impacts for residents closest to the bypass, as well as preserve views to the escarpment (refer to Chapter 4 of the environmental assessment for further details).

The closure of Victoria Street creates a cul-de-sac at its western end. Traffic wishing to access the highway would divert to Queen Street via local roads such as George Street, Edward Street and Albany Street, which would increase noise levels at properties in these streets, although not significantly, as the diverted traffic would be spread across a number of local roads. Noise levels on Victoria Street from local traffic may decrease so on balance, there is not expected to be a change in amenity for residents in the south of Berry.

Notwithstanding the reduced noise impact of the proposal, a total of 114 receivers are eligible to be considered for noise mitigation, such as noise barriers and architectural treatments. The design of noise mitigation measures, particularly in the Berry area, would be developed in consultation with the community and potential location specific treatments are described in Section 5.2.7.

The potential for adverse amenity impacts are mostly location specific, and so are also discussed in Sections 5.1.7 and 5.2.7 of this technical paper.

5.2.2 Community cohesion and severance

The project has the potential to impact community cohesion in both positive and negative ways. In a positive way, it has the ability to bring communities closer together through removal of physical barriers to movement in some locations although in other locations it may interrupt access to facilities and the ability of individuals or groups to interact with each other.

The route alignment has been designed to minimise impacts on the community identity of Berry and smaller localities within the study area.

Localities such as Broughton Village and Foxground are no longer active communities, although some friendships remain between farming families that settled in the area generations ago. The project would not sever these communities, and the community members are not concerned that the project would interfere with their ability to continue to interact with each other.[22] While the Toolijooa community has become stronger in recent years, the route of the project is close to the existing alignment and would not affect the integrity of this community.

Implications of changed access at Berry

There are currently two road accesses from west Berry to Berry: one via North Street and the other via the Kangaroo Valley Road/Queen Street intersection. The upgrade would sever the link via North Street to Berry and convert North Street into a cul-de-sac on both sides of the project.

The removal of the North Street link is not expected to affect access from within Berry by car to North Street destinations. However, this would increase the distance that residents in west Berry would have to walk to destinations on North Street, such as the Berry Riding Club and Berry sportsground by about 150 metres. This could create a perception of increased isolation or severance amongst these residents, particularly in the event of an incident at the southern interchange for Berry, which could result in west Berry residents being temporarily denied access to other parts of Berry or the Princes Highway, especially by vehicle. An incident on the southern interchange would require vehicles travelling to and from west Berry, including emergency vehicles, to divert via the grade-separated Tindalls Lane interchange or the at-grade Mullers Lane u-turn facility.

To improve pedestrian connectivity, the design includes a proposed pedestrian link that would be provided adjacent to the southbound carriageway. This would primarily be developed as a recreational route and would connect North Street to the intersection of Queen Street and Kangaroo Valley Road.

The current access via the Kangaroo Valley Road/Queen Street intersection would be altered to accommodate the proposed southern interchange for Berry. Initial community concerns over changes to this route, including concerns about reduced connectivity between existing and newly developing areas, have been addressed by bridging Kangaroo Valley Road over the upgrade. This bridge would be sufficiently wide to provide for off road pedestrian/cycle access adjacent to, but separated from, the carriageway and would maintain the existing connection between the main township of Berry and developing areas to the north-west. The design retains the existing alignment and level of Kangaroo Valley Road and incorporates formal pedestrian and cyclist access to reinforce connectivity between the existing urban area and newly developing areas. The Kangaroo Valley Road bridge is illustrated in **Figure 5-3**.

Pedestrians and cyclists using the shared path would be required to cross two roundabouts to move between Berry and west Berry. However the inclusion of pedestrian refuges at each leg of the roundabout means that shared path users would only be required to cross one lane of traffic at a time. The provision of a shared path and the refuges would improve pedestrian and cyclist facilities at this location.

The potential for severance between the existing and newer areas of Berry is further mitigated by maintaining the visual connection along Kangaroo Valley Road which would be designed to remain at around the same height post construction. It is expected that residents at one property west of the proposed bypass that currently access Berry across North Street would lose this direct connection as a result of the project. Alternative access arrangements to Berry via Kangaroo Valley Road would be provided to mitigate this effect. **Figure 5-6** illustrates the design of the bypass at this location.

[22] *This theme has emerged in consultations with these communities.*

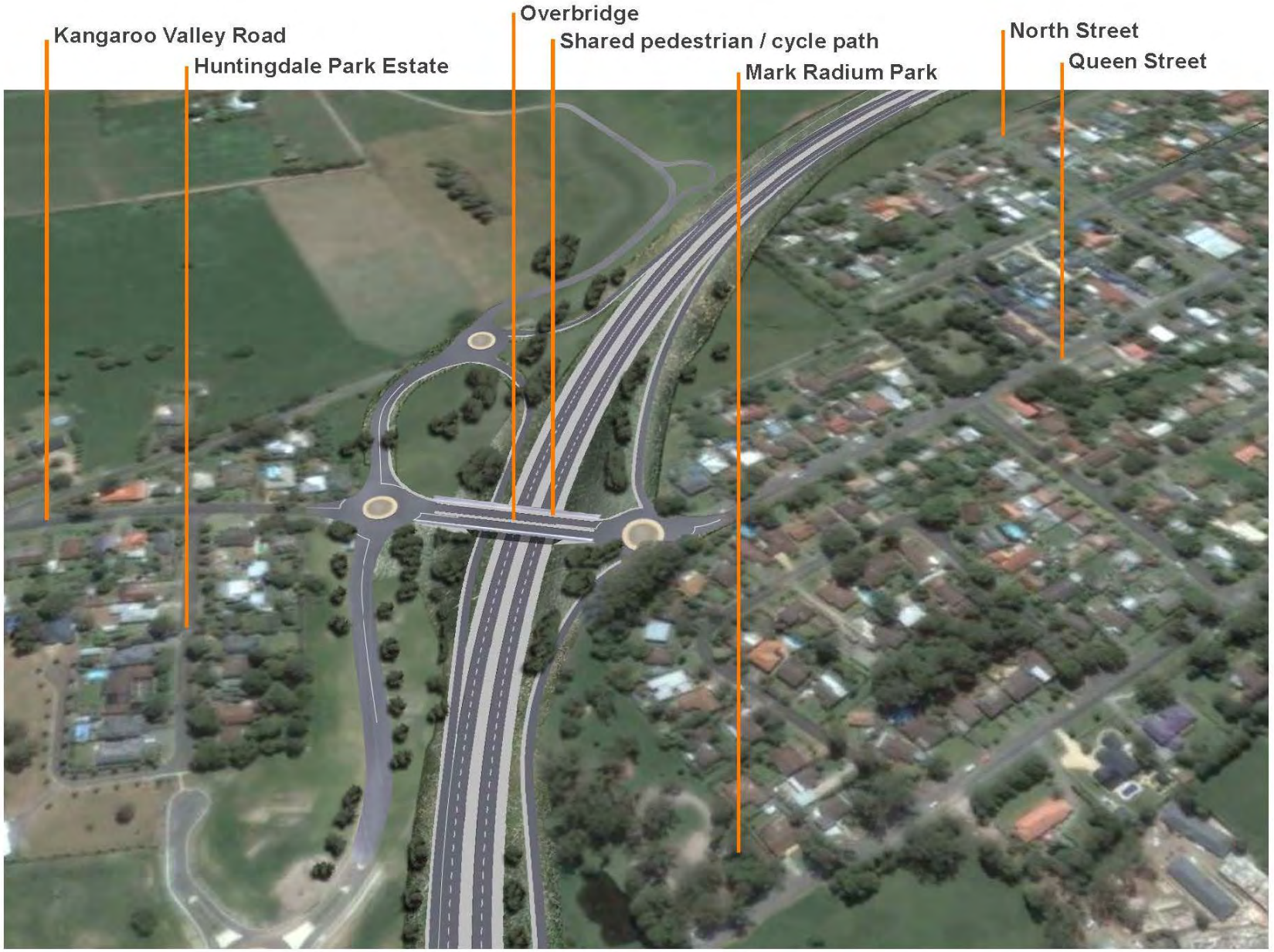

Figure 5-3: The Kangaroo Valley Road bridge at the southern Berry interchange

While the design of the upgrade has been unable to overcome the removal of an access point for west Berry residents, the trade-off following the bypass is expected to be improved safety for pedestrians and cyclists and the strengthening of Berry's identity as a destination town. The diversion of through traffic and heavy vehicles from Queen Street would not only improve the amenity of this area, the improved quality of the urban environment for businesses and the local community would reinforce a sense of community identity and community wellbeing. The amenity of Queen Street, in particular, is expected to improve significantly with the removal of heavy traffic, creating a more pedestrian friendly environment that would also reinforce community cohesion. This has been shown to be the case in other towns that were bypassed eg Berrima, Karuah, Yass, and it is likely that Berry can expect the same outcome.

Impacts of property acquisition

Properties that are located within the road corridor in the project area are described as 'potentially directly affected' by the project[23]. Such properties would be considered for partial or full acquisition by RMS, and discussions have commenced with affected owners. Where only a part of a property is required for the project, RMS would seek to acquire only that part needed for the road.

Wherever possible, the proposed road alignment has been sited such that direct impact on dwellings would be avoided. However, the road boundaries for the concept design would require acquisition of around 112 hectares of land, affecting 90 properties. This impact would be experienced prior to and during the construction phase and would be a permanent impact through the operation phase. Of the 90 properties, 39 properties have already been acquired in full by RMS, totalling around 308 hectares. In total, 14 dwellings plus additional outbuildings across the study area would be acquired and demolished prior to construction. Some of the dwellings are already owned by RMS and occupied by tenants. **Figure 5-4** and **Figure 5-5** illustrate the location of the land that would be acquired.

The majority of land that would be acquired is currently used for rural purposes, including general, residential and agriculture purposes. Within Berry, nine residential properties would need to be acquired and 18 would be affected by partial acquisition. A further nine properties zoned under the *Shoalhaven Local Environment Plan 1985* as Rural (General) would be acquired. These properties are used for a variety of activities, including agriculture. Two of these lots are prime agricultural land. The effect on dairy and other agricultural businesses is considered in Section 5.2.3 of this report.

Section 7.9 of the environmental assessment describes the property impacts of land acquisition in more detail.

[23] *The impact of the project on land uses of properties in the vicinity of the corridor is considered in Section 7.10 of the environmental assessment.*

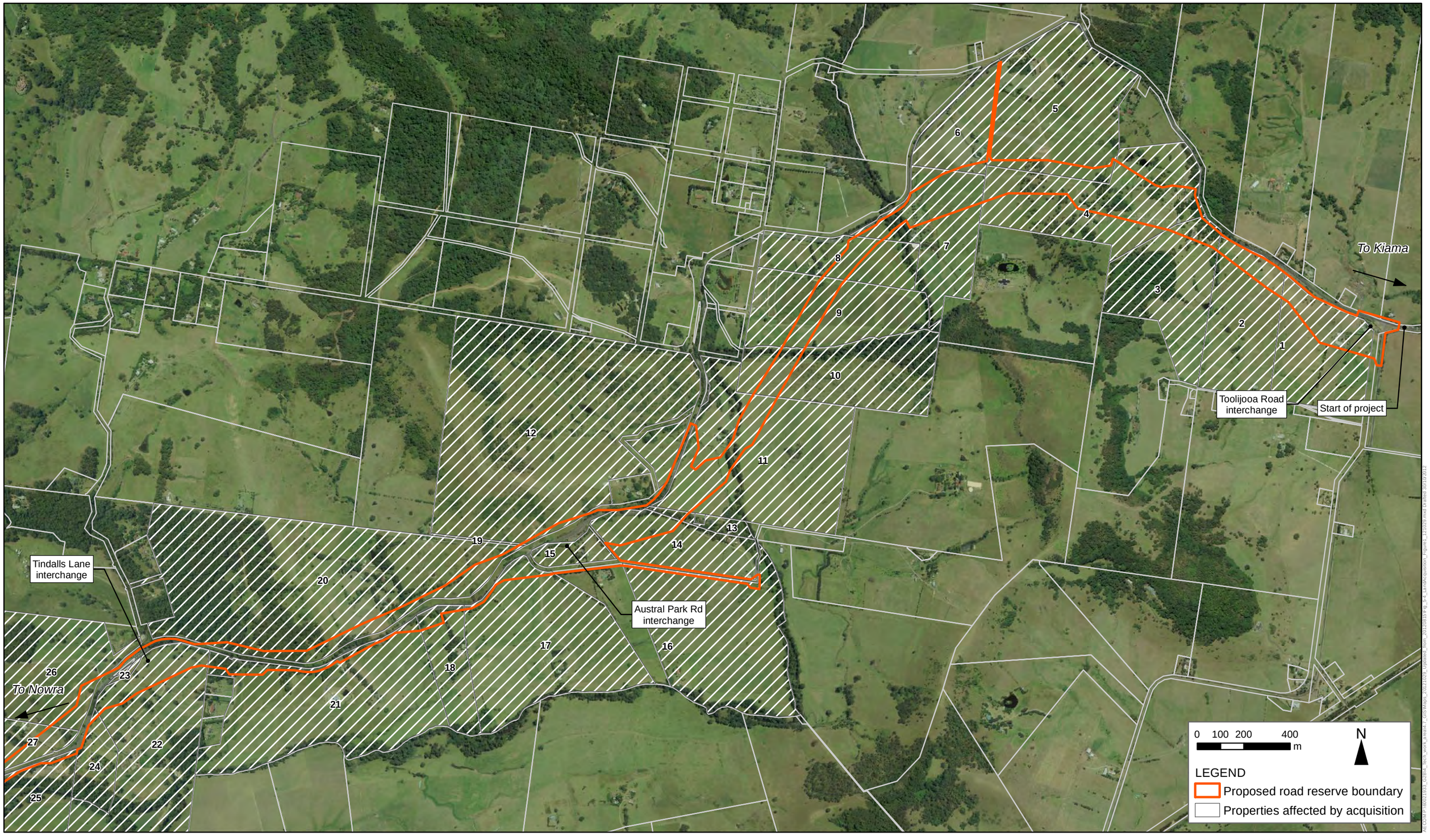

Figure 5-4 Land acquisition map 1

Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)

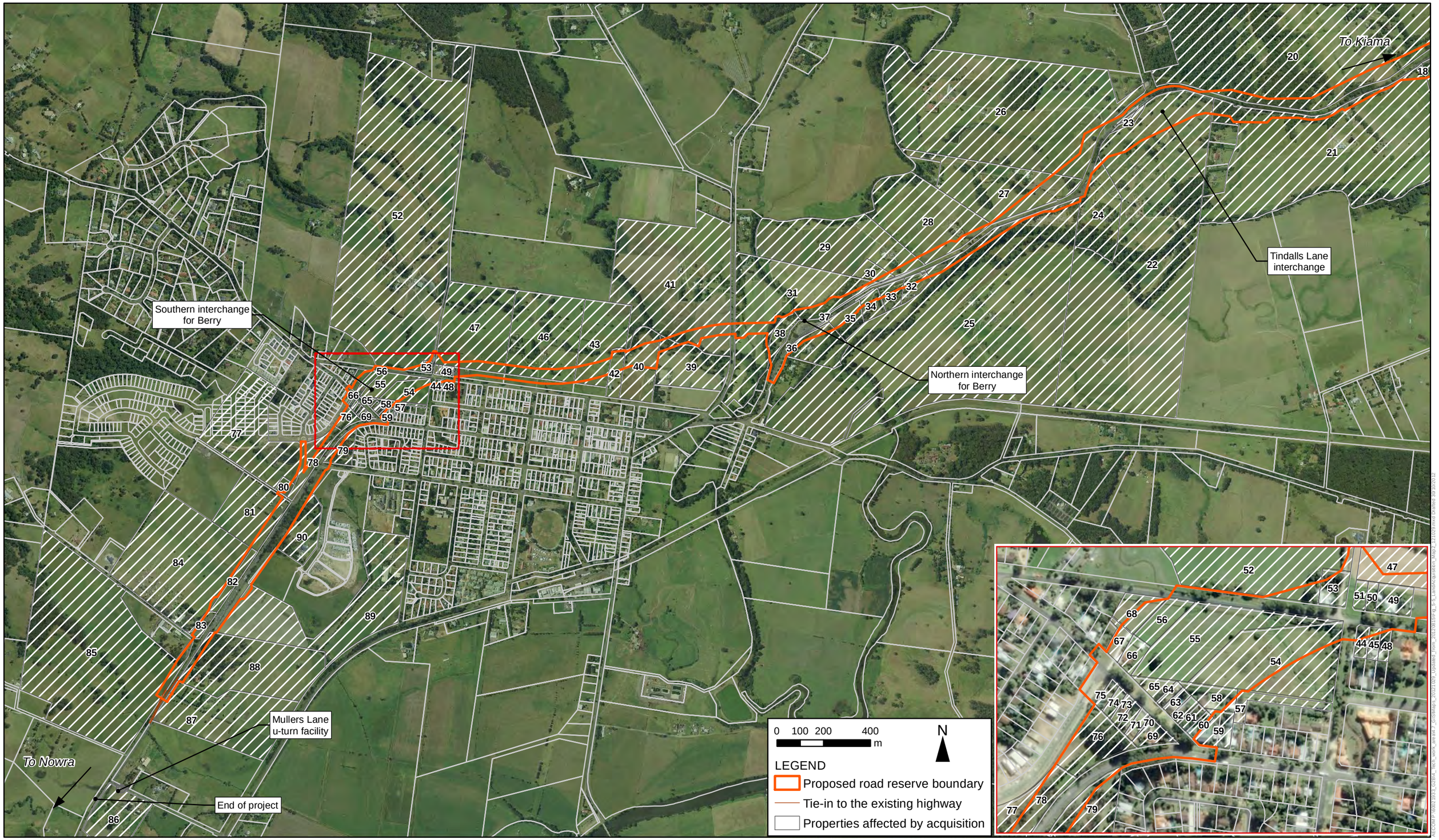

Figure 5-5 Land acquisition map 2

Source: Fugro (2007), Dept. of Lands (2007), RTA (2011)

Land acquisition may create social impacts, as it brings major changes to the lives of those affected such as anxiety and uncertainty, a loss of amenity, financial costs and isolation.

Those residents whose property would be acquired as a result of the project would relocate to an alternative location. RMS would compensate owners for land acquisition in accordance with the Land Acquisition (Just Terms Compensation) Act 1991.

In summary:

- The bypass would remove the North Street access to Berry for west Berry residents. While these residents would have access to other parts of Berry via the Kangaroo Valley Road/Queen Street intersection, there may be an increase in the distance travelled for some residents to destinations along North Street, such as the Berry Sportsground.
- Maintenance of the existing height of Kangaroo Valley Road is expected to retain the visual connection with other parts of Berry.
- Improved amenity in Berry is expected to reinforce a sense of community identity and wellbeing which, in turn, is expected to have positive outcomes for community cohesion.
- RMS would compensate owners for land acquisition in accordance with the Just Terms Compensation Act.

5.2.3 Agricultural sector viability

Where the project requires acquisition of agricultural land, it has the potential to impact on the economic productivity and the viability of agricultural businesses. Where the alignment would pass across greenfield locations there is also the potential to fragment rural properties and therefore restrict agricultural operations.

Specifically, the productivity of agricultural businesses could be affected by:

- Loss of productive land.
- Changes to the size and shape of paddocks (through strip acquisitions, severance or fragmentation of properties).
- Changes to farming conditions as a result of the road development affecting flooding behaviour and water supply.
- Changes to access between different parts of the property.

Any one of, or a combination of, these factors could result in a loss of revenue to the owner and, if significant, could affect the viability of the business.

Where possible, the orientation of property boundaries has been considered during the design of the highway so that the impact on farms would be minimised. Where a property would be fragmented, a suitable, safe and economically justifiable means of restoring internal access by connecting the portions of land has been considered and discussed with the property owner.

Figure 5-4 and **Figure 5-5** in Section 5.2.2 illustrate the location of the land that would be acquired. Each potentially directly affected lot has been considered individually to determine:

- The land acquired as a percentage of the lot and the residual area.
- The capability of the land affected in relation to the quality of other land on the property.
- Changes to external and internal access, including the impacts of fragmentation and severance.
- Any impact on dams, outbuildings etc, necessary for a farm to operate.
- How the above may affect profits/ productivity?
- How the above may affect viability of the business?

Seven rural operators have said that their businesses would no longer be viable as a result of the proposal and these properties have been acquired in full by RMS. Of the seven properties, two were used for grazing beef cattle, two for silage[24], one for horse agistment, one as a mixed hobby farm and one for goat farming. The acquired properties are currently leased to tenants and are being used for similar operations, with the exception of the goat farm, which is now used for horse agistment.

There are 16 other agricultural businesses which would be affected by land acquisition and, while they may experience a decrease in productivity, their viability is not expected to be affected. Dairy farms supplying the Berry Rural Cooperative would be affected by partial acquisition, but again this is not expected to reduce the scale of the Cooperative's operation, turnover or workforce. Consultation with agricultural business owners would continue throughout the detailed design and construction phases of the project with the aim of minimising impacts on the viability of the farms and the Cooperative where feasible. Appendix C contains a property by property analysis of agricultural business impacts.

The economic impact of the project on the agriculture sector as a whole has been determined by estimating the change to 'value added', or the contribution by a business to the gross regional product. The resulting estimates of reduction in value added during the construction and operation phases are considered reliable as indicators of the impact of the project. However, they should be used with caution when assessing the absolute impacts as they are not necessarily reflective of local value, being derived in part from national or other level data.

The estimates of the gross direct economic impact (excluding any resale potential described above) of the project as well as the number of impacted agricultural businesses is contained in **Table 5-2**[25].

[24] *Fermented fodder made from grass crops.*

[25] *The number of impact businesses includes those acquired in full.*

Table 5-2: Economic impact: agriculture sector

Potential loss of value added ($)		Economic activity of potentially directly affected agricultural businesses	No. of businesses impacted	No. of businesses acquired in full
Annual	Long-term			
385,100	8,801,900	Dairy cattle farming	3	0
		Beef cattle farming	13	2
		Silage, hay and turf farming	3	2
		Agistment	1	1
		Goat farming	1	1
		Other	2	1

Note a: Present value of annual loss of value added over 50 years discounted at seven per cent real discount rate (in discounting to present value, 50 years is a reasonable period to represent permanent). Other businesses include a hobby farm and a maze.

The loss of productive agricultural land could also impact on the contribution of agriculture to the regional economy, with flow on effects to other sectors. For instance, the operation of a dairy farm requires inputs and services from other suppliers, and the processing and transport of dairy products creates further economic benefit.

There are opportunities for fragmented land parcels to be amalgamated into large lots with access provisions and resold, potentially to neighbouring property owners thereby adding back to the stock of agricultural land. Although there would be an initial reduction in rural and agricultural land use in the study area, the reduction in agricultural land use in the long-term could be minimal if this were to occur.

In summary, the project would have impacts on the economic contribution of the agriculture sector in the study area, in that seven operators would no longer be viable and their properties have now been fully acquired by RMS and partial acquisition is necessary from 16 other properties. The viability of the dairy industry is not expected to be affected by the proposal since the extent of acquisition or its location at the edge of a property would not affect business operations of the individual properties nor of the Berry Rural Cooperative Society Ltd. The opportunity for resale of productive land to neighbouring properties has the potential to reduce the impact on the agricultural sector.

5.2.4 Access arrangements

Detailed changes to local access arrangements and traffic movements are described in the *Traffic and Transport Impact Assessment* prepared for the project (AECOM 2011b) and provided at Appendix D to the environmental assessment.

Reduced traffic volumes within Berry would increase ease of access and connectivity for local road users, including cyclists and pedestrians.

Initial community concerns over access between west Berry and Berry have been addressed by bridging Kangaroo Valley Road over the upgrade as part of the southern interchange for Berry. This bridge would be sufficiently wide to provide for off road pedestrian/cycle access adjacent to, but separated from the carriageway. This design element retains the existing alignment and level of Kangaroo Valley Road and incorporates formal pedestrian and cyclist access to maintain connectivity between the main township of Berry and developing areas to the northwest. The additional roundabouts on Kangaroo Valley Road to the west of Berry could be restrictive for pedestrians and cyclists but, as described in Section 5.2.2, the provision of pedestrian refuges at each leg of the roundabout and a shared path within the design improves pedestrian and cyclist facilities over the existing situation at this location.

The closure of North Street creates a cul-de-sac at its western end in the vicinity of George Street from which a private access would be constructed for one residence, as illustrated by **Figure 5-6**. Rawlings Lane currently provides access for one property to George Street, North Street and Berry. This link would be closed as a result of the project and alternative access provided via Kangaroo Valley Road and a new roundabout constructed as part of the southern interchange for Berry.[26]

As described in Section 5.2.1, the closure of Victoria Street also creates a cul-de-sac at its western end. Traffic wishing to access the highway would divert to Queen Street via local roads but the diversion is not expected to increase travel times for vehicular traffic and pedestrian accessibility would not be affected.

Direct access to Hitchcocks Lane would not be available from the highway. A link would be provided as part of the project from Huntingdale Park Road.

The introduction of median fencing would provide significant improvements in road safety, including the elimination of traffic turning to and from minor roads across fast-moving two-way traffic. However, this would also mean that access to adjoining properties with frontage to the highway must be restricted to left-in left-out movements only or be provided with an access road, adding up to four minutes of additional travel time to affected properties. There are 12 properties where access to the highway would be restricted to left-in left-out movements as a result of the project.

U-turn provisions would be via the grade-separated interchanges at Toolijooa Road, Austral Park Road, Tindalls Lane, the northern interchange for Berry and the southern interchange for Berry. Because a number of the interchanges would not include provision for all traffic movements, additional u-turn facilities would be provided on the existing highway north of Austral Park Road and south of Schofields Lane at Mullers Lane. u-turn manoeuvres would be facilitated via a new roundabout at the junction of Woodhill Mountain Road with the existing Princes Highway in Berry.

[26] *There are no changes in access for Huntingdale Park residents.*

Figure 5-6 North Street closure

Source: RTA (2011), LPMA (2011)

5.2.5 Business impacts

Regional economic impacts

In terms of the regional economic effects, improved connectivity to the NSW south coast would enhance business opportunities in the area and support the existing tourism industry including Jervis Bay, Batemans Bay and Ulladulla. In addition, industries in the Nowra area would benefit from improved accessibility to markets and raw materials in the Sydney and Wollongong areas due to reduced travel times and increased road safety.

When people make decisions about whether or not to work, where to work and how much to work, they take into account many things, including not only the wages on offer but also the costs associated with each option such as time forsaken, commuting costs and stress. This means that high commuting costs can lead workers to work less or in less productive and lower paid jobs than they otherwise would. Reducing travel time and costs along the Princes Highway may cause people to enter the labour market or move to more productive jobs as a result.

Tourism and other non-highway reliant businesses

The experience at other bypassed towns shows that increased amenity in the commercial precinct of Berry, resulting from lower traffic volumes and noise and improved air quality, is likely to increase turnover at non-highway reliant businesses. These businesses cater to locals and tourists and help to form the destination feel of the town. This impact could lead to an overall increase in economic activity within the town that, in turn, could expand business activity and employment in the area.

The upgraded highway and Berry interchange would become a part of the view from businesses such as bed and breakfast establishments in the Jaspers Brush area. The impact on views created by the bridge is not expected to impact the viability of these businesses since it is balanced by safer road access for guests, and they would retain views to the Cambewarra Range and escarpment. The bypass to the north of Berry provides the closest freeway access to the town centre which would enhance access to accommodation in Berry.

Highway reliant businesses

Completion of the highway upgrade may result in the diversion of traffic from the 'Sandtrack', with indirect impacts for Gerringong businesses, particularly those reliant on through traffic. This could potentially reduce the volume of passing trade for these businesses leading to decreased turnover and decreased employment at affected businesses. However, the percentage of businesses in Gerringong and Gerroa that are reliant on highway trade is low (SGS Economics and Planning, 2008).

While the Berry bypass would improve the amenity of the town, reduced traffic volumes can negatively impact those businesses that are reliant on passing trade from the highway. The design of the bypass means that Berry would be visible from the bypass and from the southern Berry interchange, which would encourage through traffic to continue to stop in the town. Studies of highway bypass impacts in NSW have shown that the most affected businesses are those directly serving the needs of the motorist such as motor vehicle services, particularly service stations, food and beverage outlets and, to a lesser extent, accommodation establishments.

An assessment of the impact on businesses has been undertaken in accordance with the *A Guide to Good Practice - Evaluation of the Economic Impacts of Bypass Roads on Country Towns* (RTA, 1966). This publication provides guidance around the assessment of the impact on the highway related sector of a town economy resulting from the diversion of through traffic from the town after the opening of a bypass. Following this approach, all estimates of changes in the value of highway generated trade are based on changes in the volume of through traffic stopping in the town. The approach required the collection of the following information:

- Extent of employment in highway related businesses.
- Gross annual turnover associated with highway related activities.
- Extent to which businesses are dependent on highway generated trade.

The assessment estimates the direct loss of jobs and turnover after the opening of the bypass. It is a worst case assessment in so far as it does not take account of an increase in turnover as businesses adapt to the conditions. The linkages with other businesses supplying goods and services to those businesses directly impacted were not quantified. These would be the indirect or second round impacts on employment and turnover resulting from the diversion of through traffic from the town. However, the *A Guide to Good Practice - Evaluation of the Economic Impacts of Bypass Roads on Country Towns* (RMS, 1966) states that "in the case of smaller settlements the multiplier effect has been shown to be very small and can safely be ignored in calculating changes in employment and turnover."

Business owners may be considerably uncertain about the extent of impact the project would have on through traffic and trade. To address this uncertainty, this assessment has examined the economic and business effects at highway reliant businesses only as a result of three traffic diversion scenarios. A central traffic diversion scenario is consistent with the traffic assessment, which estimates that 78 per cent of traffic would divert from Berry to the bypass. Under this scenario, the assessment assumes that highway reliant trade would reduce by 78 per cent upon opening of the upgraded highway. A high scenario of diverted traffic was assumed to be 100 per cent (worst case) and a low scenario 50 per cent (best case).

The business effects assessed are the potential change in employment and turnover at highway reliant businesses. The potential change in economic contribution of each business to the study area was indicated by value added per employed person[27]. The value added by a particular business represents the contribution by a business to the gross regional product.

The **Table 5-3** summarises the estimated impacts on employment, turnover and value added as a result of the three traffic scenarios.

[27] *Derived from ABS National Accounts data on industry value added and employment.*

Table 5-3: Economic impact on highway-reliant businesses

	Low			Central			High		
	Decrease in FTE jobs	**Decrease in turnover**	**Loss in value added (annual)**	**Decrease in FTE jobs**	**Decrease in turnover**	**Loss in value added (annual)**	**Decrease in FTE jobs**	**Decrease in turnover**	**Loss in value added (annual)**
Motor vehicle services	3	419,226	146,930	6	838,452	293,861	12	1,676,904	587,721
Food and beverage	4	181,903	136,955	8	363,806	273,909	17	727,611	547,819
Other retail	1	109,065	47,176	3	218,130	94,352	6	436,260	188,703
Total	**8**	**710,194**	**331,061**	**17**	**1,420,388**	**662,122**	**35**	**2,840,775**	**1,324,243**

Notes: FTE - Full time equivalent
Totals include rounding

Under the central scenario, there is potentially a loss of up to 17 full time equivalent jobs as a result of the project and a decrease in turnover equivalent to two per cent of total Berry turnover[28].

While the above analysis indicates that some businesses would experience a decrease in turnover and reduced employment at least in the short term, the evidence from bypassed towns indicates that some highway dependent businesses have been able to reposition themselves and become sustainable in the longer term.

The overall effect on business in Berry following the bypass is expected to be as follows:

- Improved amenity is likely to create new business development opportunities for both local and tourist trade.
- New business activity would lessen the overall effect of reduced turnover and employment in highway affected businesses.

This view is strengthened by evidence of bypassed towns that were established destination towns pre-bypass, which was reviewed in Section 4. Post bypass, their business sectors generally all performed well.

[28] Based on the estimate of total Berry turnover calculated by SGS (2008).

5.2.6 Recreational impacts

Community assets

Community assets used for recreation have a role in promoting cohesion and interaction among community members and are therefore an important social impact.

The buffer zone of varying width but around 40 metres between North Street and the upgrade would be made available for community uses, such as open space. This would create the potential for adding to the stock of community assets in an accessible location. Uses would be developed in consultation with and to respond to the community's needs. Similarly, a parcel of vacant land on the corner of George Street and Albert Street could be added to the community assets in the area, which is a benefit of the project. As described in Section 5.2.2, a recreational pedestrian link would be provided across this parcel of land and adjacent to the southbound carriageway, connecting North Street to the intersection of Queen Street and Kangaroo Valley Road.

As described in section 5.2.1, the closure of Victoria Street also creates a cul-de-sac at its western end. The unused road space could be used as an extension to the parking area for Mark Radium Park, which would improve the amenity and useability of the facility and is another benefit of the project. The design of this space would be developed in consultation with the community.

Feedback from the community during earlier stages of the project highlighted concerns relating to the impact of the bypass on the Berry sportsground, Camp Quality memorial park and the Pullman Street and Tannery Road European heritage precinct. As a result, the alignment was modified during the concept design phase of the project to avoid these areas. Although some land acquisition would be required on the western edge of the sportsground, access would be maintained.

The Berry Riding Club (pony club) and two other smaller clubs would not be able to operate on the existing site following the acquisition of land for construction and would require relocation. RMS is in discussions with the Berry Riding Club and Council to establish a new configuration for the club using land from the neighbouring property, which would be been acquired and that has direct access to North Street. This would retain the Clubs in the local area with comparable facilities to their current facilities including car parking.

Recreational fishing

The project would cross a number of creeks that are or could in the future be, accessed for recreational fishing, including Broughton Creek, Broughton Mill Creek, Connelly's Creek and Bundewallah Creek. The existing bridge over Broughton Creek is understood to be currently used as the main access point for fishers, and this bridge would remain following construction of the project.

RMS recognises the opportunity to reduce conflict between fishers wishing to access creeks and the owners of private land adjacent to creeks through the project. Four potential future access points are illustrated in **Figure 5-7**, including a bridge over Bundewallah Creek and Broughton Mill Creek and two new bridges over Broughton Creek. RMS has indicated that it would liaise with the NSW Department of Primary Industries (DPI) Fisheries on appropriate angler access signage and access infrastructure such as fence stiles.

Parking bays for bridge maintenance workers would be provided where possible along the route and these would be available for use by fishers wishing to access the river bank in the vicinity of the four new bridges shown in **Figure 5-7**. The existing access point at Broughton Creek bridge would be bypassed by the highway and would therefore become safer for fishers to use on completion of the upgrade.

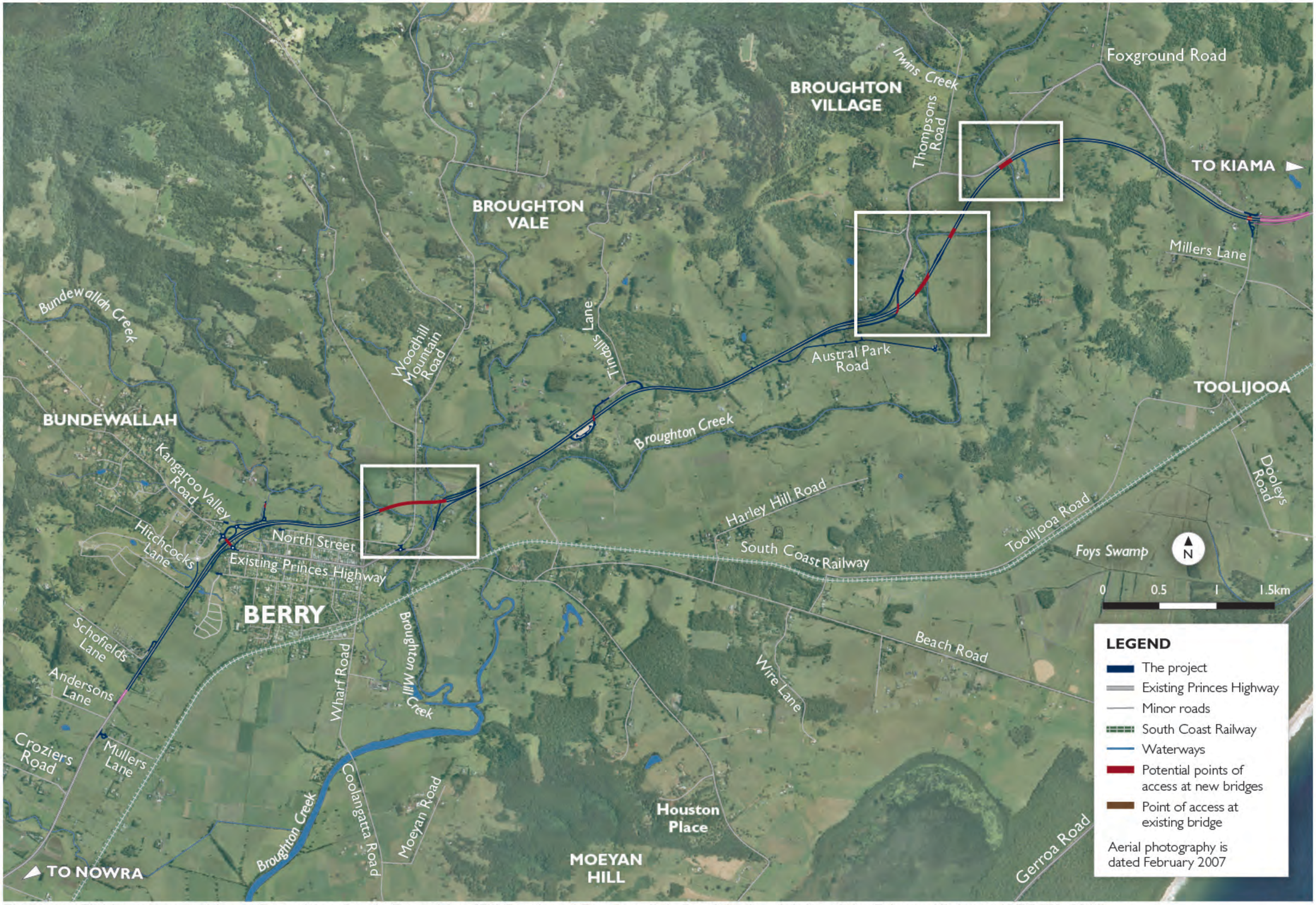

Figure 5-7 Fishing opportunities at Broughton Creek, Broughton Mill Creek and Bundewallah Creek in the vicinity of the Princes Highway (AECOM, 2011)

5.2.7 Location specific impacts

The upgrade is anticipated to have the following location specific impacts:

- Removal from Queen Street of highway traffic and heavy vehicles in particular, would significantly improve the amenity of Berry, and its attraction as a tourist destination and residential area. Although some highway reliant businesses may experience a decrease in turnover and employment, improved amenity is expected to have benefits for Berry's commercial precinct.
- Berry residents would benefit from the opportunity to zone the buffer area between North Street and the new highway upgrade for community uses.
- Impacts to dwellings[29] concentrated along the western section of North Street are expected to include increased noise levels and visual impacts of the new alignment, and interrupted views to the escarpment from noise mitigation structures. Community consultation would continue around the design of noise mitigation measures. The creation of a buffer area between North Street and the upgrade permits one potential solution to be a 'ha-ha', a type of sloping embankment, which is illustrated by **Figure 5-8.** Architectural treatments such as double glazing would be considered for those who would still be affected by noise following construction of noise mitigation measures.
- The properties on Huntingdale Park Road, Kangaroo Valley Road would also be affected by increased noise levels and visual impacts of the road alignment, noise mitigation structures and interchange ramps. The noise and vibration assessment recommends construction of noise barriers four metres in height (AECOM, 2011a). Community consultation would continue around the design of noise mitigation measures.
- The upgrade would involve changed access (particularly for pedestrians and cyclists) between west Berry and other parts of Berry. The closure of North Street means that access between west Berry and the rest of Berry would be via Queen Street, at the intersection of Kangaroo Valley Road and involve crossing of two roundabouts, although overall pedestrian facilities would be improved at this location.
- A 600 metre long bridge structure spanning Woodhill Mountain Road, Broughton Mill Creek and Bundewallah Creek, would be visible from Berry and rural properties north of Berry. Potential view impacts have been moderated by lowering the bridge by up to 6.4 metres and by moving it 95 metres away from Berry. Vegetative screening may be used to mitigate loss of view to affected properties.

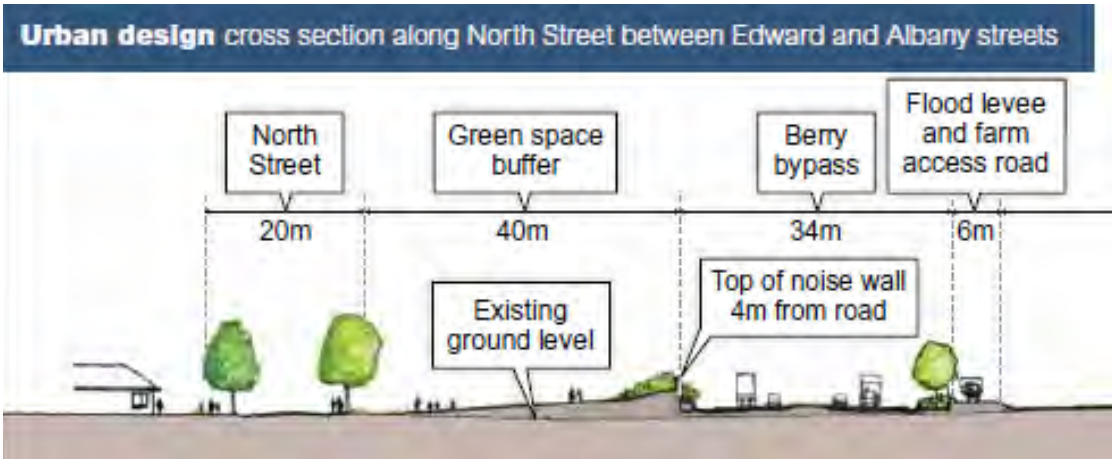

Figure 5-8: Potential design of noise mitigation measure, North Street (RMS, 2011)

[29] *Residents of 28 properties are expected to be affected.*

Elsewhere within the study area, the project would have the following location specific impacts:

- Noise impacts would be experienced by residents of nine isolated rural properties outside Berry. As it would not be feasible to construct noise mitigation structures at such locations, these properties would be considered for architectural treatments.
- There would be potential visual impacts from selected viewpoints along the project route. For example, significant cuttings would be required at Toolijooa Ridge and Austral Park Road. Bridges, interchanges and intersection structures would be visible from Berry and rural residences in other locations, especially those in the vicinity of Austral Park Road and Tindalls Lane, but are screened in part by existing vegetation.

5.2.8 Mitigation measures - operation

Mitigation measures for operational impacts are summarised in **Table 5-4**.

Table 5-4: Mitigation measures

Mitigation measure
Amenity
• The noise and vibration assessment (refer to Section 7.2 and Appendix E of the environmental assessment) recommends mitigation through a combination of low-noise pavement, noise barriers at North Street and Huntingdale Park Road and consideration of architectural treatments to 20 properties. Architectural treatments are the most suitable mitigation measure for nine isolated rural properties and may also be necessary where noise barriers or similar measures do not completely mitigate the noise impact. • Community consultation would continue around the amenity impact and design of noise mitigation measures.
Community cohesion
• Continue community consultation to provide a means of achieving outcomes that maximise benefits for the community as a whole. • RMS would continue to consult with residents, the community and stakeholders to develop a plan for providing pedestrian access and cycle links over the proposed highway connecting the east and west sides of town. This would include the consultation about the design of crossings near the proposed roundabouts to ensure adequate access for pedestrians and cyclists is maintained. Any design would aim to support and complement the Pedestrian Access and Mobility Plan (SCC, 2006) developed by Shoalhaven City Council for Berry. • Property acquisition would be carried out in accordance with the RMS Land Acquisition Information Guide (RTA, 2011) and under the terms of the Land Acquisition (Just Terms Compensation) Act 1991.
Agricultural sector viability
• Continue consultation with agricultural business owners to address the impacts of land acquisition on the viability of farm operations and the Berry Dairy Cooperative. • Repackage lots and sell parcels of acquired land to new owners or neighbouring owners. • Provide sign posting to encourage highway traffic to visit Berry for a rest stop and as a tourist destination.

Mitigation measure
Access arrangements
• Continue consultation with affected property owners during the detailed design process to ensure functional and safe access is provided. • Provide interchanges with opportunities for local drivers to perform a u-turn to reach their destination. • RMS would investigate ways of maintaining access to Berry via the Kangaroo Valley Road bridge during incidents that may involve a full or partial closure of the bridge.
Business impacts
• Provide sign posting and traffic management to encourage highway traffic to visit Berry for a rest stop. • Continue discussions with Shoalhaven City Council to offer technical advice in developing strategies to encourage the ongoing viability of businesses in the town and to encourage new businesses, for example, programs to enhance community areas and streetscapes.
Recreational impacts
• Provide parking bays for bridge maintenance workers where possible along the project that would be available for use by fishers wishing to access the river bank in the vicinity of bridges. • Continue discussions with the Berry Riding Club and Council to establish a new configuration for the club using land from the neighbouring property which would be acquired.
Location specific impacts
• Mitigation of noise to residents near North Street would be by way of a low-noise pavement, noise barriers along North Street, and architectural treatments to six properties to achieve compliance with the applicable noise goals. • Construction of a four metre high noise barrier between Huntingdale Park Road and the project and the consideration of architectural treatments to three properties on Kangaroo Valley Road and North Street to achieve compliance with the applicable noise goals. • Community consultation would continue around the design of noise mitigation measures at North Street and Huntingdale Park Road. At North Street, noise mitigation could include a 'ha-ha', a type of sloping embankment that would be constructed in place of a noise barrier. Vegetative screening between potential noise attenuation measures and affected properties would reduce visual impact. This measure would also be appropriate to mitigate the visual impacts to rural and Berry residences of other structures, such as bridges.

6 Conclusion

The report has identified and assessed the potential socio-economic impacts associated with the project. The report has had regard to the existing context of the proposal, the experience of other towns that have been bypassed, ongoing community consultation, and adoption of appropriate mitigation measures.

The project has aimed to minimise potential impacts through the project design.

The proposed road alignment has been sited to avoid direct impact on dwellings and minimise impacts on property boundaries. It has also been designed to limit property acquisition to one side of the existing highway where possible. RMS would compensate owners for land acquisition.

The upgrade is expected to make significant improvements to amenity, in particular within the Berry commercial and retail precinct. Community concerns about the proximity of the bypass to North Street and associated amenity impacts have been addressed by reducing the height of the bypass in this vicinity and moving it further away from North Street.

The closure of North Street would reduce access between west Berry and other parts of Berry. It is acknowledged that a single access has a heightened risk of severing these communities in the case of a traffic incident. In this case it is considered that any incident would be manageable with limited duration due to the low speed environment and width that would enable vehicles to pass the incident in most cases. The trade-off of this reduced access is improved amenity in Berry which, in turn, is expected to have benefits for community cohesion.

The project has caused seven agricultural businesses to cease operating. The acquired properties are currently leased to tenants and are being used for similar operations, with the exception of the goat farm, which is now used for horse agistment. The potential for the resale of productive land that has been acquired by RMS to neighbouring properties, also presents an opportunity to minimise the impact of acquisition. The upgrade is not expected to affect the viability of the dairy industry.

Reduced traffic volumes within Berry would increase ease of access and connectivity for local road users, including cyclists and pedestrians. Introduction of median fencing would improve road safety and eliminate traffic turning to and from minor roads across fast moving two-way traffic. However, this would increase travel times to and from 12 properties for which access would be restricted to left in/left out movements.

Improved connectivity is expected to benefit the tourism industry in the study area and support local businesses through reduced travel times to major markets in Sydney and Wollongong. Improved amenity for Berry is likely to have flow on effects for business and employment, both for the local and tourist trade. The proposal is expected, however, to have an impact on highway related businesses in Berry, with up to 17 jobs lost and a two per cent decrease in the town's turnover. From the experience of other towns that have been bypassed, this impact may be moderated in the medium to longer term as businesses reposition themselves and as new businesses establish in response to improved amenity.

The impacts on the community as a whole are not expected to be significant. Uncertainty is an impact that would be felt mostly before and during the construction stage but can be eased by providing updates and continuing consultation.

The project has been sited to minimise impacts on community assets. The buffer zone between North Street and the project would create opportunities for expanding community uses.

Access to recreational fishing sites is not expected to be significantly affected as a result of the project, since existing access to the Broughton Creek bridge would be unaffected by construction works. Opportunities for fishing in the local area would increase as access would be available at four new bridge crossings provided as part of the project. Parking bays for bridge maintenance workers would be provided where possible along the project and these would be available for use by fishers wishing to access the river bank in the vicinity of the bridge. Appropriate signage and fences would be installed.

In the vicinity of Berry, the project has the potential to affect the amenity of properties through increased noise and loss of views, as well as visual impacts from noise attenuation measures. North Street and west Berry (along Huntingdale Park Road) are two residential localities that would be particularly affected. Dwellings on North Street would be impacted by increased noise levels, traffic volumes and visual impacts of the new alignment that would replace rural and escarpment views. West Berry residents would be affected by a combination of, increased noise levels and visual impacts of the road alignment and interchange ramps. Noise and visual mitigation measures are recommended to ameliorate these impacts.

Where necessary, mitigation measures are recommended to address negative impacts of the upgrade, at Chapter 5 of this report.

Overall, the social and economic benefit of the proposal is expected to outweigh any negative impacts that cannot be satisfactorily mitigated.

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Appendix A

Demographic tables

Figure A-1 and **Figure A-2** illustrate the Census Collection District (CCD) boundaries within the study area at 2001 and 2006. The CCDs which comprise the study area are 1180508, 1180504, 1180812, 1180306, 1180314, 1180801, 1180502, 1180503, 1180506. There was a boundary adjustment to CCD 1180801at the 2006 Census which reduced its size.

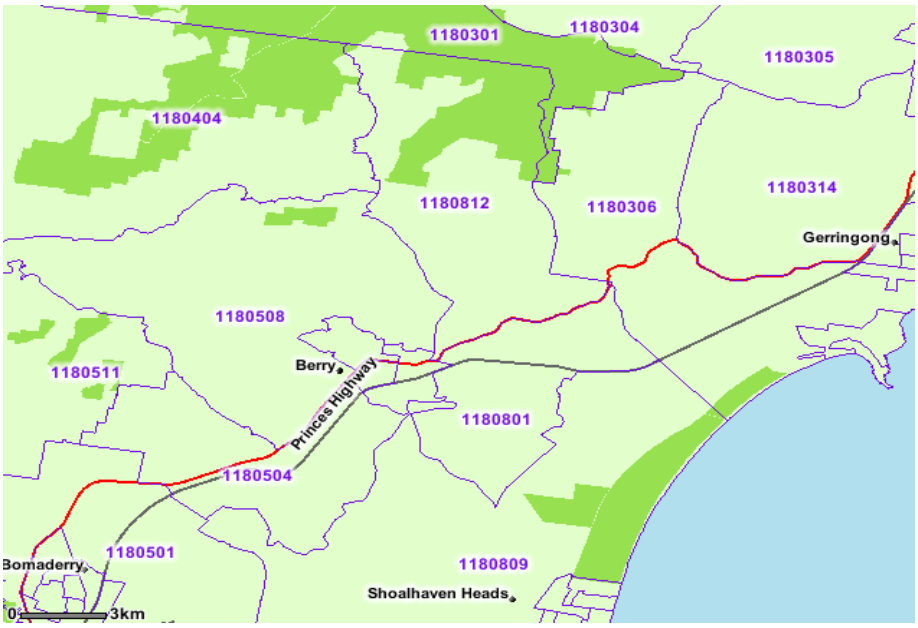


Figure A-1: CCD boundaries within the study area: 2001

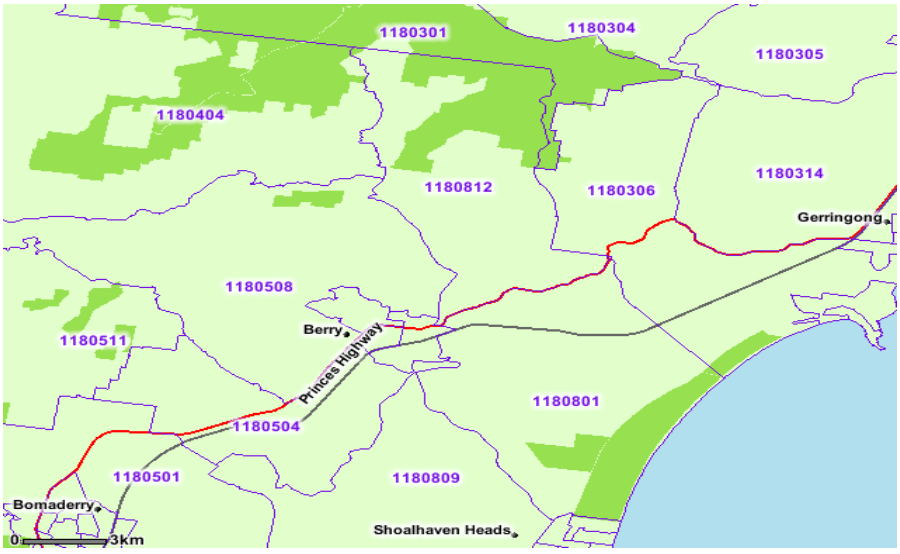


Figure A-2: CCD boundaries within the study area: 2006

Data is from the 2001 and 2006 Census (Australian Bureau of Statistics) unless otherwise stated.

Table A-1: Key demographic characteristics of the study area: 2001 and 2006

Key demographic statistics	Study area		Berry		Shoalhaven LGA		NSW	
	2001	2006	2001	2006	2001	2006	2001	2006
Median age*	38-49	45-51	42	49	41	44	35	37
Total pop	3657	3563	1597	1484	83,548	88,405	6,371,745	65,49,177
Pop aged 15+	2852	2963	1267	1258	65,354	71,374	5,052,247	5,250,261
%	77.99%	83.16%	79.34%	84.77%	78.22%	80.74%	79.29%	80.17%
Pop aged 65+	657	1040	353	420	15945	18702	833,419	905,778
%	17.97%	29.19%	22.10%	28.30%	19.08%	21.15%	13.08%	13.83%
Unemployment rate	5.48%	3.56%	5.9	4.80%	11.1	9.20%	7.20%	5.90%
Indigenous pop	37	24	23	12	3002	3311	119,865	138,506
%	1.01%	0.67%	1.44%	0.81%	3.59%	3.75%	1.88%	2.11%
Speaks a language other than English at home	80	102	33	100	2592	6982	1,196,204	1,702,884
%	2.19%	2.86%	2.07%	6.74%	3.10%	7.90%	18.77%	26.00%

**Median ranges available only for study area*

Table A-2: Population projections

Year	Kiama LGA	Shoalhaven LGA
2006	20,000	92,300
2011	20,600	98,500
2016	21,100	105,100
2021	22,100	111,700
2026	23,300	117,900
2031	24,100	123,600
2036	24,900	129,100

(Source: Projected population by sex, SLAs in NSW, 2006-2036, NSW Department of Planning and Infrastructure 2010)

Table A-3: Labour force characteristics 2006

Labour force statistics Population 15+	Study area	Berry	Shoalhaven	NSW
Total labour force	1634	662	34,479	3,092,603
Employed FT	796	349	17,451	1,879,628
%	48.71%	52.72%	50.61%	60.78%
Employed PT	572	253	11,691	842,713
%	35.01%	38.22%	33.91%	27.25%
Employed away from work*	39	18	1306	103,525
%	2.39%	2.72%	3.79%	3.35%
Employed hours not stated	55	13	845	83578
%	3.37%	1.96%	2.45%	2.70%
Unemployed	61	29	3186	183,159

***During the week of the census these respondents did not spend any time at work and so could not be classified as full-time or part-time workers*

Table A-4: Employment by industry 2006

	Study area		Berry		Shoalhaven		NSW	
	No. persons	%	No. persons	%	No. persons	%	No. persons	%
Agriculture, forestry and fishing	116	7.33	21	3.34	715	2.29	78,661	2.70
Mining	4	0.25	3	0.48	119	0.38	20,318	0.70
Manufacturing	108	6.82	35	5.57	2611	8.34	277,986	9.55
Electricity, gas, water and waste services	25	1.58	6	0.96	329	1.05	29,184	1.00
Construction	130	8.21	48	7.64	3116	9.96	212,729	7.31
Wholesale trade	31	1.96	25	3.98	672	2.15	136,761	4.70
Retail trade	196	12.38	97	15.45	4459	14.25	323,929	11.13
Accommodation and food services	124	7.83	65	10.35	2741	8.76	190,454	6.55
Transport, postal and warehousing	61	3.85	18	2.87	1142	3.65	145,518	5.00
Information media and telecommunications	16	1.01	3	0.48	387	1.24	68,976	2.37
Financial and insurance services	31	1.96	15	2.39	538	1.72	144,867	4.98
Rental, hiring and real estate services	27	1.71	11	1.75	585	1.87	50,588	1.74
Professional, scientific and technical services	99	6.25	33	5.25	1307	4.18	213,247	7.33
Administrative and support services	53	3.35	14	2.23	974	3.11	90,431	3.11
Public administration and safety	79	4.99	31	4.94	2959	9.46	174,915	6.01
Education and training	170	10.74	60	9.55	2444	7.81	219,679	7.55
Health care and social assistance	191	12.07	93	14.81	3678	11.75	304,335	10.46
Arts and recreation services	35	2.21	12	1.91%	487	1.56	39,574	1.36
Other services	44	2.78	20	3.18	1316	4.21	110,094	3.78
Inadequately described/not stated	43	2.72	18	2.87	712	2.28	77,194	2.65
Total	**1583**		**628**		**31,291**		**2,909,440**	

Table A-5: Journey to work (single method only) 2006

	Study area		Berry		Shoalhaven		NSW	
	No. persons	%	No. persons	%	No. persons	%	No. persons	%
Train	10	0.91	0	0.00	80	0.33	158,000	6.86
Bus	3	0.27	0	0.00	116	0.48	100,058	4.34
Ferry	0	0.00	*0*	0.00	0	0.00	6004	0.26
Tram (includes light rail)	0	0.00	0	0.00	3	0.01	1051	0.05
Taxi	0	0.00	0	0.00	42	0.17	8219	0.36
Car, as driver	872	78.99	350	75.59	19,359	79.30	1,639,528	71.16
Car, as passenger	82	7.43	44	9.50	2106	8.63	166,871	7.24
Truck	22	1.99	10	2.16	688	2.82	45,953	1.99
Motorbike/ scooter	20	1.81	3	0.65	235	0.96	16,495	0.72
Bicycle	6	0.54	7	1.51	260	1.07	19,274	0.84
Other	9	0.82	3	0.65	231	0.95	14,951	0.65
Walked only	80	7.25	46	9.94	1293	5.30	127,446	5.53
Total one method	1104		463		24,413		2,303,850	

Appendix B

Inventory of community and recreational facilities

Inventory of community and recreational facilities

Churches

- Berry Gateway Uniting Church, 69 Albert Street.
- St Lukes Anglican Church, 66-68A Princess Street.
- Berry Presbyterian Church, 81 Victoria Street.
- Berry Community Church, 34 Alexandra Street.
- St Patricks Catholic Church, 80 North Street.

Schools, childcare and other educational facilities

- Berry Primary School, 42 Victoria Street.
- Berry School of Arts, 19 Princess Street (Berry Community Activities Centre).
- Berry Preschool Inc, 20-24 Edward Street.
- Scouts Hall, Wharf Road.

Aged care facilities

- Accommodation for Aged and Disabled Persons, 10 Albany Lane.
- Berry Masonic Village (Aged Care facility), 41 Albany Street.

Services

- David Berry Hospital, 85 Tannery Road.
- Fire Brigade, 26 Prince Alfred Street.
- Broughton Vale Berry Rural Fire Brigade, 82 Albert Street.
- Police Station, 28 Victoria Street.
- Post Office, Princes Highway.
- Service Station, Alexandra Street.
- Court House, 58 Victoria Street.
- Berry General Cemetery, Kangaroo Valley Road.
- Berry Sewerage Treatment Works, off Wharf Road.
- Harley Hills Cemetery, Beach Road.
- Waste Depot, 175 Agars Lane.

Open spaces, recreational facilities and clubs

- Berry Showground, Station Road.
- Camp Quality memorial park, North Street.
- Berry Memorial Park, Gilliam Street.
- Anzac Memorial Park, Alexandra Street.
- Mark Radium Park, Princes Highway.
- Apex Park, Albert Street.
- Oval (adjoining Berry Primary).
- Berry Swimming Pool, Berry Showground (Hazel and David Berry Parks).
- Berry Bowling Club, 140 Princes Highway.
- Berry Sporting Complex, North Street.
- Berry Riding Club, 445 Coolangatta Road.
- Berry Tennis Club Ltd, North Street.
- Berry RSL Sub-Branch, 26 Alexander Street.

Appendix C

Agricultural business impacts

Agricultural business impacts

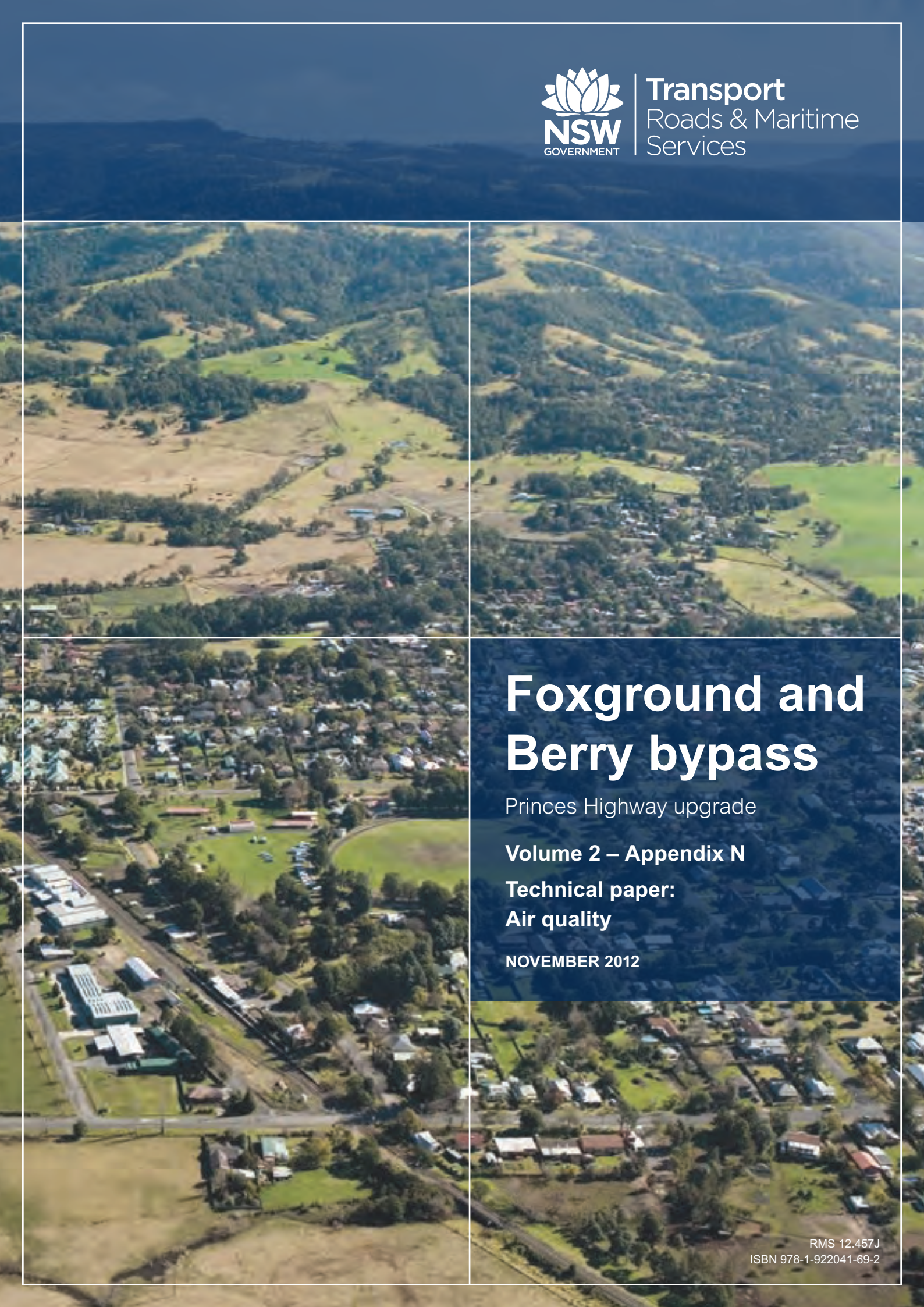
Ref no.[30]	Current Land use/zoning	Total property area	Area of impact	Remaining area	% total property affected	Description of impacts	Proposed mitigation measures
1	Rural (Agricultural Production)	183,392	58,880	124,513	32%	• Partially impacted on northern boundary through cleared land. • Land impacted is of land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of agricultural land capability classifications 1 and 3 and is identified as suitable for regular cultivation. • Dwelling directly impacted and all outbuildings directly impacted. • Loss of direct access to the highway. • Proposal would affect the profitability of property. • Proposal would impact viability of property.	• RMS has already acquired property. • Access to be reinstated from relocated Toolijooa Rd.
2	Rural (Agricultural Production)	187,408	28,553	158,855	15%	• Partially impacted on northern boundary through cleared land. • Land impacted is of highest land capability classification 1. The remaining property is of lower land capability classifications 3 and 6. • Loss of access to property. • Proposal would affect the profitability of property. • Proposal would not impact the viability of property.	• Acquisition of affected land. • Compensation for acquired land. • Relocation of property access through proposed property underpass.
3	Rural (Agricultural Production)	205,910	16,183	189,727	8%	• Partially impacted through timbered land on north eastern boundary. • Land impacted is of agricultural land capability classification 6 and is suitable for grazing with no cultivation. • Land remaining is of similar or higher land capability. • Dwelling directly impacted. • Outbuildings directly impacted. • Remaining land suitable for new dwelling. • Loss of direct access to highway. • The proposed route impacts the profitability and viability of the business.	• Acquisition of affected land. • Compensation • Relocation of property access through proposed property underpass.
4	Rural (Agricultural Production)	289,872	130,218	159,653	45%	• Property severed through cleared and timbered land. • Land impacted is of highest agricultural land capability classification and is identified as suitable for regular cultivation. • Remaining agricultural land is of similar land capability. • Outbuildings directly impacted. • Access to northern part of the property severed. • Impact would not affect the viability of property.	• RMS has already acquired property. • Access to northern part of the property to be reinstated from the new highway. • Southern part of the property still accessible from the Princes Highway. • Remaining property could be sold to neighbouring land owners or repackaged and sold.
5	Rural (Agricultural Production)	315,548	38,300	277,248	12%	• Partially impacted along southern boundary through partially cleared land. • Land impacted is of highest agricultural land capability classification and is identified as suitable for regular cultivation. • Remaining land is of agricultural land capability classifications 1 and 3 and is identified as suitable for regular cultivation. • Proposal would not impact viability or profitability of the property.	• Acquisition of affected land. • Compensation for acquired land.
6	Rural (Agricultural Production)	102,688	4,713	97,975	5%	• Partially impacted along south eastern boundary through cleared land. • Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar agricultural land capability.	• Acquisition of affected land. • Compensation for acquired land.
7	Rural	184,053	65,221	118,831	35%	• Property severed through cleared land.	• RMS has already acquired property.

[30] Reference numbers refer to **Figure 5-4** and **Figure 5-5**. Only impacts to agricultural businesses are described in **Appendix C**.

Ref no.[30]	Current Land use/zoning	Total property area	Area of impact	Remaining area	% total property affected	Description of impacts	Proposed mitigation measures
	(Agricultural Production)					• Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Loss of access to northern part of the property. • Access to western part of the property severed. • Dwelling not directly impacted. • Loss of direct access to highway. • Proposal would affect the profitability of property. • Proposal would impact viability of the land.	• Remaining property could be sold to neighbouring land owner or repackaged and sold. • Access to be reinstated.
9	Rural (Agricultural Production)	207,191	30,577	176,614	15%		
8	Rural (Agricultural Production)	122,987	19,410	103,577	16%	• Property severed through cleared and timbered land. • Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Proposal would not affect the profitability of the property. • Proposal would impact viability of the property.	• RMS has already acquired property. • Remaining property could be sold to neighbouring land owners or repackaged and sold.
10	Rural (Agricultural Production)	225,891	21,636	204,255	10%	• Property severed through cleared and timbered land. • Land impacted is of land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of agricultural land capability classifications 1, 3 and 6 and is identified as unsuitable for cultivation in some areas. • Access to western part of the property severed. • Dwelling not directly impacted. • Proposal would affect the profitability of property. • Proposal could potentially impact viability of the land.	• Acquisition of affected land, with consideration of total acquisition. • Compensation for acquired land. • Access to western part of the property to be reinstated.
11	Rural (Arterial and Main Road Protection)	436,573	79,557	357,016	18%		
12	Rural (Arterial and Main Road Protection)	776,413	4,444	771,970	1%	• Partially impacted along southern boundary through cleared land. • Land impacted is of highest agricultural land capability classification and is identified as suitable for regular cultivation. • Remaining land is of agricultural land capability of similar or lower land capability. • Dwelling not directly affected. • Loss of access to highway. • Proposal would not impact viability or profitability of the property.	• Acquisition of affected land. • Compensation for acquired land. • Access to be reinstated to highway.
14	Rural (Arterial and Main Road Protection)	135,200	41,326	93,873	31%	• Partially impacted along northern boundary through cleared and timbered land. • Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Access from highway impacted. • Proposal would not impact the profitability or viability of the property.	• Acquisition of affected land. • Compensation for acquired land. • Access would be restored via service road.
17	Rural (Arterial and Main Road Protection)	358,957	15,215	343,742	4%	• Partially impacted along northern boundary through cleared land. • Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Dwelling not directly affected. • Impact would affect the viability of property.	• RMS has already acquired property. • Remaining property could be sold to neighbouring land owners or repackaged and sold.
20	Rural (Arterial and Main Road Protection)	414,404	66592.29	629,623	10%	• Partially impacted along southern boundary through mainly timbered land. • Remaining land is of similar or higher agricultural land capability. • Dwelling not directly affected. • Impact would affect the viability or profitability of the property.	• Acquisition of affected land. • Compensation for acquired land.

Ref no.[30]	Current Land use/zoning	Total property area	Area of impact	Remaining area	% total property affected	Description of impacts	Proposed mitigation measures
21	Rural (Arterial and Main Road Protection)	414,404	31,915	382,490	8%	• Partially impacted along northern boundary. • Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Dwelling not directly impacted. • Outbuilding directly impacted by new proposal. • Loss of direct access to highway. • Proposal would affect the profitability of property. • Proposal would not impact viability of property.	• Acquisition of affected land. • Compensation for acquired land. • Access to be provided to highway.
22	Rural (Arterial and Main Road Protection)	609,230	58,362	550,868	10%	• Partially impacted along northern boundary through partially cleared land. • Land impacted is of highest agricultural land capability classification and is identified as suitable for regular cultivation. • Remaining land is of agricultural land capability classifications 1 and 3 and is identified as suitable for regular cultivation. • Dwelling not directly impacted. • Direct access to the highway severed. • Proposal would not impact viability of property.	• Acquisition of affected land. • Compensation for acquired land. • Access would be reinstated from the rear of the property.
26	Rural (Arterial and Main Road Protection)	423,075	15,742	407,333	4%	• Partially impacted along south eastern boundary through partially cleared land. • Land impacted is of highest agricultural land capability classification and is identified as suitable for regular cultivation. • Remaining land is of agricultural land capability classifications 1 and 3 and is identified as suitable for regular cultivation. • Loss of direct access to highway. • Proposal would affect the profitability of property • Proposal would impact viability of property.	• RMS has already acquired property. • Remaining property could be sold to neighbouring landowner or repackaged and sold. • Access to be reinstated via Princes Highway service road.
27	Rural (Arterial and Main Road Protection)	109,409	24,859	84,551	23%	• Partially impacted along south eastern boundary. • Land impacted is of land capability classification 1. The remaining land is also of the highest land capability classification. • Loss of direct access to highway • Proposal would affect the profitability of property • Proposal would not impact the viability of property	• Acquisition of affected land. • Compensation for acquired land. • Access to be reinstated from highway.
28	Rural (Arterial and Main Road Protection)	118,082	10,953	107,129	9%	• Partially impacted along south-eastern boundary through partially cleared land. • Land impacted is of highest agricultural land capability classification and is identified as suitable for regular cultivation. • Remaining land is of agricultural land capability classifications 1 and 3 and is identified as suitable for regular cultivation. • Dwelling not directly affected. • Outbuilding directly impacted by new proposal. • Loss of direct access to highway. • Impact would not affect the viability of the property.	• Acquisition of affected land. • Compensation for acquired land. • Access to be provided via an underpass to an access road that connects to the existing highway.
29	Rural (Arterial and Main Road Protection)	128,693	5,169	123,524	4%	• Partially impacted along south eastern boundary. • Land impacted is of highest agricultural land capability classification and is identified as suitable for regular cultivation. • Remaining land is of agricultural land capability classifications 1 and 3 and is identified as suitable for regular cultivation. • Dwelling not directly impacted.	• Acquisition of affected land. • Compensation for acquired land. • Access to be provided via an underpass to an access road that connects to the existing highway.

Ref no.[30]	Current Land use/zoning	Total property area	Area of impact	Remaining area	% total property affected	Description of impacts	Proposed mitigation measures
						• Loss of direct access to highway. • Proposal would not impact profitability of the property. • Proposal would not impact the viability of the property.	
31	Rural (Flood Liable)	169,090	25,339	143,751	15%	• Property severed through cleared and timbered land. • Land impacted is of agricultural land capability classifications 1 and 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Access to southern part of the property severed. • Proposal would not impact the viability of the property.	• Acquisition of affected land, with consideration of total acquisition. • Compensation for acquired land.
41	Rural (Flood Liable)	249,682	12,809	236,873	5%	• Partially impacted along southern boundary through partially cleared land • Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Proposal would affect viability of the property.	• RMS has already acquired property. • Remaining property could be sold to neighbouring land owners or repackaged and sold.
43	Special Uses (Proposed Arterial Roads Preservation and Widening of Existing Arterial Roads Reservation)	62,469	7,784	54,685	12%	• Property severed through cleared land. • Access to southern part of the property severed. • Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Proposal would impact profitability of the property. • Proposal would not impact the viability of the property. • Loss of access to North Street.	• Acquisition of affected land. • Compensation for acquired land. • Access to be provided to Rawlings Lane.
46	Special Uses (Proposed Arterial Roads Preservation and Widening of Existing Arterial Roads Reservation)$$$	108,141	12,768	95,373	12%		
47	Special Uses (Proposed Arterial Roads Preservation and Widening of Existing Arterial Roads Reservation)	106,478	8,988	97,490	8%		
52	Special Uses (Proposed Arterial Roads Preservation and Widening of Existing Arterial Roads Reservation)	569,476	1,528	567,948	0%	• Partially impacted along southern boundary through uncleared land. • Land impacted is of agricultural land capability classification 3 and is identified as suitable for regular cultivation. • Remaining land is of similar or higher agricultural land capability. • Acquired land is classified as Agricultural Class 1 land. • Dwelling not directly impacted. • Proposal would not impact profitability or viability of the property.	• Acquisition of affected land. • Compensation for acquired land.



Transport
Roads & Maritime
Services

NSW GOVERNMENT

Foxground and Berry bypass

Princes Highway upgrade

Volume 2 – Appendix N

Technical paper:
Air quality

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Foxground and Berry bypass

Prepared for

Roads and Maritime Services

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November 2012

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Glossary of terms and abbreviations

Abbreviation	Meaning
CO	Carbon Monoxide
$\mu g/m^3$	Microgram per cubed metre
ABS	Australian Bureau of Statistics
AQMP	Air Quality Management Plan
CAL3QHCR	Software model used for predicting air pollution concentrations of carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter (PM), and other inert gases from idle or moving motor vehicles
Caline, CALINE3/4	Software models which estimate dispersion of vehicle exhaust based on a Gaussian diffusion equation
CALRoads	An air dispersion modelling software package for predicting air quality impacts of pollutants near roadways.
Carboxyhaemoglobin	A stable complex of carbon monoxide and haemoglobin that forms in red blood cells when carbon monoxide is inhaled or produced in normal metabolism
CEMP	Construction Environmental Management Plan
DEC	NSW Department of Environment and Conservation. (now OEH)
DECCW	NSW Department of Environment, Climate Change and Water
DEH	Department of Environment and Heritage
EPA	NSW Environment Protection Authority (formerly part of DECCW)
Expectorating	To cough up and spit out phlegm, thus clearing the bronchial passages
Gaussian Model	A way of calculating concentrations of polluting chemicals from stationary industrial sources. The substance goes downwind and disperses (gets weaker) as it travels, according to Gaussian mathematics.
GLC	Ground level concentration
HC	Hydrocarbons
HGVs	Heavy Goods Vehicles
ISCMOD	Industrial Source Complex model
Lassitude	A state of weariness accompanied by listlessness or apathy
NEMP	National Environment Protection Measures.
NEPC	National Environment Protection Council of Australia
NEPC	National Environmental Protection Council
NHMRC	National Health and Medical Research Council of Australia
NO_2	Nitrogen dioxide

Abbreviation	Meaning
NO_X	Nitrogen oxides
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
EPA	NSW Environment Protection Authority
Photochemical	Relating to, or caused by the chemical action of light.
PIARC	Permanent International Association of Road Congresses
PM_{10}	Particulate matter < 10 µm
POEO	*Protection of the Environment Operations Act 1997*
Ppm	Parts per million
RAN	Royal Australian Navy
RMS	Roads and Maritime Services of New South Wales
RTA	Roads and Traffics Authority of NSW (now RMS)
SO_2	Sulphur dioxide
TOEM	Tapered Element Oscillating Microbalance (PM_{10} Monitor)
TSP	Total suspended particulates
TSP	Total Suspended Particulates
USEPA	United States Environmental Protection Agency
WHO	World Health Organisation
Windrose	A graphic tool used by meteorologists to give a succinct view of how wind speed and direction are typically distributed at a particular location

1 Introduction

The Roads and Maritime Services (RMS) (formerly the Roads and Traffic Authority of NSW (RTA)) is seeking approval under Part 3A of the *Environmental Planning and Assessment Act 1979* to upgrade 11.6 kilometres of the Princes Highway between Toolijooa Road north of Foxground and Schofields Lane south of Berry, in New South Wales (NSW) (the project), to achieve a four lane divided highway (two lanes in each direction) with median separation. The project includes bypasses of Foxground and Berry.

The project would form part of the Princes Highway upgrade which aims to provide a four lane divided highway between Waterfall and Jervis Bay Road, Falls Creek. The upgrade of the Princes Highway would improve road safety and traffic efficiency, including for freight, on the NSW south coast.

The report comprises the following components:

- Project description.
- Regional meteorology and air quality issues.
- Local air quality and dispersion conditions.
- Impacts of the existing highway alignment.
- Estimation of emissions based on traffic volumes and vehicle mix.
- Assessment of construction impacts.
- Assessment of air quality impacts associated with the project in two representative years following completion – 2017 and 2027.
- Identification of mitigation and management measures.

1.1 Study area

The project is located west of Gerringong, between the junctions of the Princes Highway with Toolijooa Road (north of Foxground) and Schofields Lane (south of Berry). South of Schofields Lane, a u-turn facility would be provided at Mullers Lane.

The study area is shown in **Figure 1-1**.

From north-east to south-west, the project traverses Toolijooa Ridge, bypasses the Foxground bends, crosses Broughton Creek in three locations and bypasses the town of Berry. An illustration of local terrain features in the study area is shown in **Figure 1-2**.

The project study area mainly comprises the existing road reserve, privately owned rural agricultural, rural residential and suburban (Berry) properties. The main agricultural land use in the study area is cattle grazing.

The project deviates from the existing Princes Highway corridor in two locations:

- Across Toolijooa Ridge and the Broughton Creek floodplain between Toolijooa Road and east of Austral Park Road.
- A northern bypass of Berry from the ridgeline to the east of Woodhill Mountain Road to the south of Berry, rejoining the existing route south-west of Kangaroo Valley Road.

Remaining portions of the project follow the existing route of the Princes Highway where potential impacts would typically affect isolated rural residences and properties fronting the existing highway.

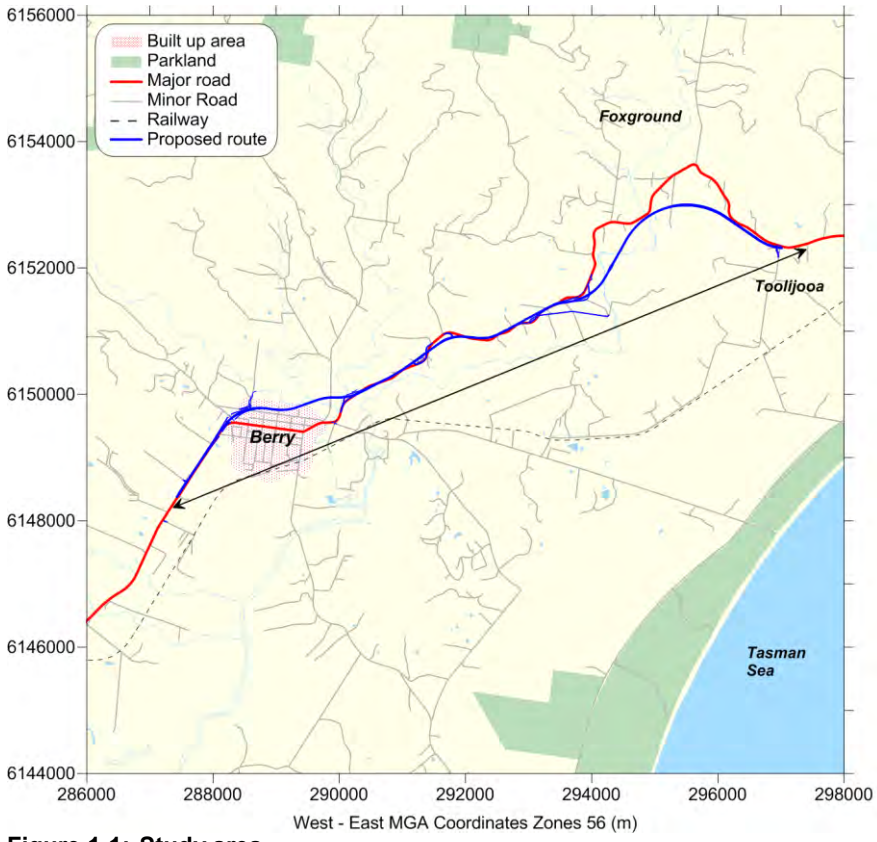

Figure 1-1: Study area

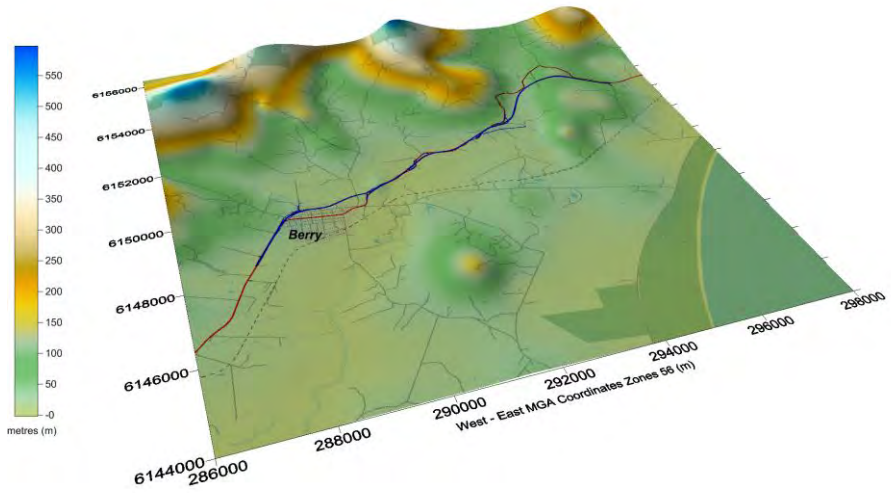

Figure 1-2: Local terrain features in the study area

2 Project description

Roads and Maritime Services (RMS) propose to upgrade 11.6 kilometres of the Princes Highway between Toolijooa Road north of Foxground and Schofields Lane south of Berry, in New South Wales (NSW) (the project), to achieve a four lane divided highway (two lanes in each direction) with median separation. The project includes bypasses of Foxground and Berry.

The project comprises the following key features:

- Construction of a four lane divided highway (two lanes in each direction) with median separation (wire rope barriers or concrete barriers where space is constrained, such as at bridge locations).
- Bypasses of the Foxground bends and the Berry township.
- Construction of around 6.6 kilometres of new highway where the project deviates from the existing highway alignment at Toolijooa Ridge, the Foxground bends and the Berry township.
- Provision for the possible widening of the highway (if required in the future) to six lanes within the road corridor and, in some areas, construction of the road formation to accommodate future additional lanes where safety considerations, traffic disruption and sub-optimal construction practices are to be avoided.
- Grade-separated interchanges at:
  - Toolijooa Road.
  - Austral Park Road.
  - Tindalls Lane.
  - East of Berry at the existing Princes Highway, referred to as the northern interchange for Berry.
  - West of Berry at Kangaroo Valley Road, referred to as the southern interchange for Berry.
- A major cutting at Toolijooa Ridge (around 900 metres long and up to 26 metres deep).
- Six lanes (two lanes plus a climbing lane in each direction) through the cutting at Toolijooa Ridge for a distance of 1.5 kilometres.
- Four new highway bridges:
  - Broughton Creek bridge 1, a four span concrete structure around 170 metres in length and nine metres in height.
  - Broughton Creek bridge 2, a three span concrete structure around 75 metres in length and eight metres in height.
  - Broughton Creek bridge 3, a six span concrete structure around 190 metres long and 13 metres in height.
  - A bridge at Berry, an 18 span concrete structure around 600 metres long and up to 12 metres in height.

- Three highway overbridges:
  - Austral Park Road interchange, providing southbound access to the highway.
  - Tindalls Lane interchange, providing southbound access to and from the highway.
  - Southern interchange for Berry, providing connectivity over the highway for Kangaroo Valley Road along its existing alignment.
- Eight underpasses including roads, drainage structures and fauna underpasses:
  - Toolijooa Road interchange, linking Toolijooa Road to the existing highway and providing northbound access to the upgrade.
  - Property access and fauna underpass in the vicinity of Toolijooa Ridge at chainage 8400.
  - Dedicated fauna underpass in the vicinity of Toolijooa Ridge at chainage 8450.
  - Property access underpass between Toolijooa Ridge and Broughton Creek at chainage 9475.
  - Combined drainage and fauna underpass in the vicinity of Austral Park Road at chainage 12770.
  - Combined drainage and fauna underpass in the vicinity of Tindalls Lane at chainage 13320.
  - Dedicated fauna underpass in the vicinity of Tindalls Lane at chainage 13700.
  - Property access underpass between the Tindalls Lane interchange and the northern interchange for Berry in the vicinity of at chainage 15100.
- Modifications to local roads, including Toolijooa Road, Austral Park Road, Gembrook Road, Tindalls Lane, North Street, Queen Street, Kangaroo Valley Road, Hitchcocks Lane and Schofields Lane.
- Diversion of Town Creek into Bundewallah Creek upstream of its confluence with Connollys Creek and to the north of the project at Berry.
- Modification to about 47 existing property accesses.
- Provision of a bus stop at Toolijooa Road and retention of the existing bus stop at Tindalls Lane.
- Dedicated u-turn facilities at Mullers Lane, the existing highway at the Austral Park Road interchange, the extension to Austral Park Road and Rawlings Lane.
- Roundabouts at the southern interchange for Berry and the Woodhill Mountain Road junction with the exiting Princes Highway.
- Two culs-de-sac on North Street and the western end of Victoria Street in Berry.
- Tie-in with the existing highway about 75 metres north of Toolijooa Road and about 440 metres south of Schofields Lane.
- Left in/left out only provisions for direct property accesses to the upgraded highway.
- Dedicated public space with shared pedestrian/cycle facilities along the southern side of the upgraded highway from the playing fields on North Street to Kangaroo Valley Road.
- Ancillary operational facilities, including permanent detention basins, stormwater treatment facilities and a permanent stockpiling site for general road maintenance.

Construction activities as part of the project would include the following:

- Site preparation and establishment works.
- Temporary construction facilities, including construction compounds, stockpile sites, creek crossings, sediment control basins and haulage roads.
- Temporary works, including relocation/protection of services, tie-ins, traffic facilities and side tracks.
- Earthworks and bridge construction.
- Pavement construction.
- Drainage construction.
- Road furniture installation.
- Site restoration.

The project and the key features of the project are shown in **Figure 2-1**.

During the detailed design phase of the project, refinements could be made to the design features and construction methods.

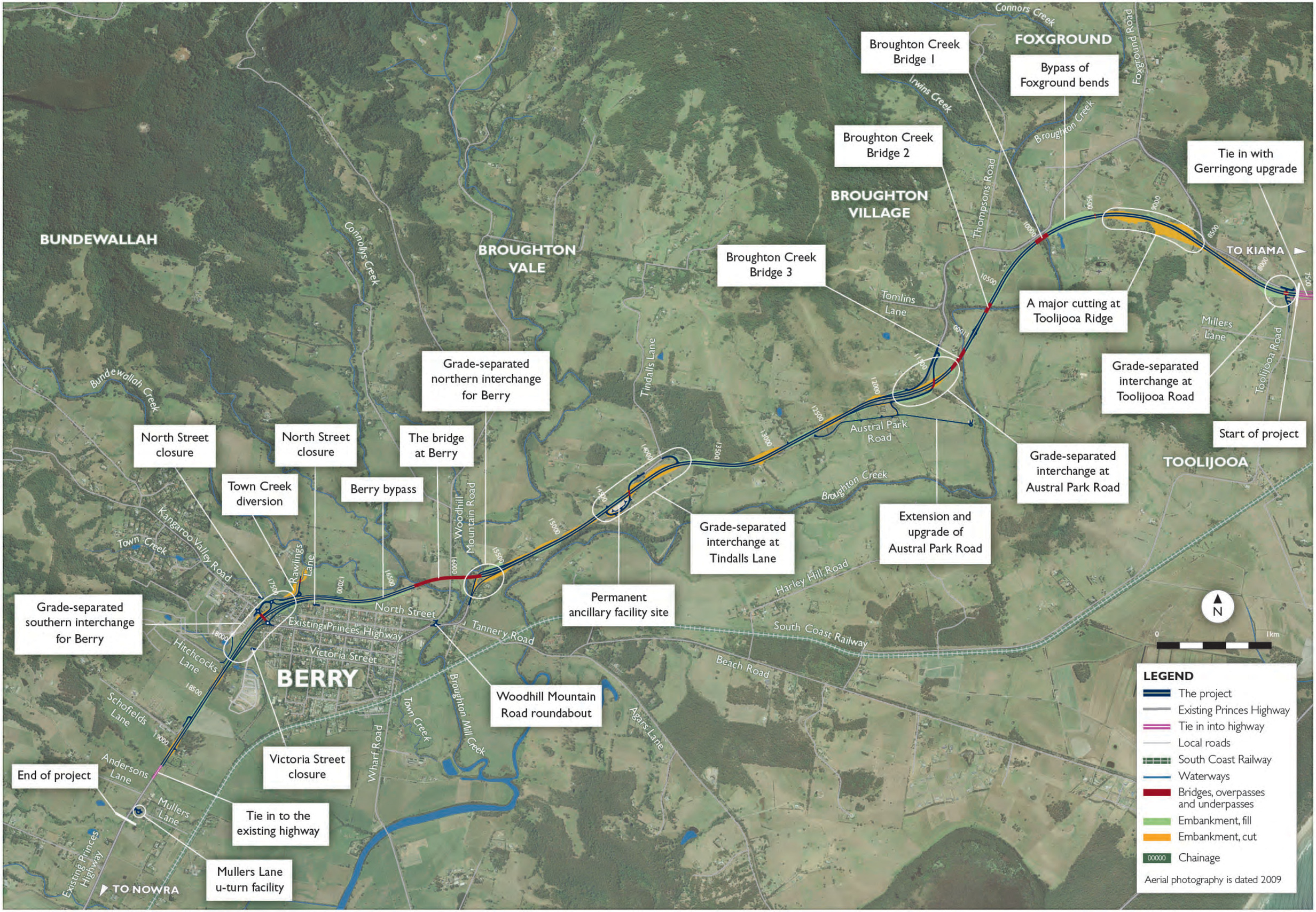

Figure 2-1: Key features of the project

3 Air quality criteria

Motor vehicles emit a number of pollutants that are known to be potentially harmful to human health. These pollutants are carbon monoxide (CO), nitrogen oxides (NO_x), hydrocarbons (HC, including benzene), sulphur dioxide (SO_2) and particulate matter. Each of these pollutants has the capacity to adversely affect health if the concentration is too great over a particular exposure period. Emissions of SO_2 are minor and are not considered further in this assessment.

The NSW Environmental Protection Authority[1] (EPA) (formerly included in the Department of Environment, Climate Change and Water, DECCW) has historically noted air quality goals determined by the World Health Organisation (WHO), the United States Environmental Protection Agency (US EPA) and the National Health and Medical Research Council of Australia (NHMRC).

In 1998, the National Environment Protection Council of Australia (NEPC) determined a set of air quality goals for adoption at a national level, which are part of the National Environment Protection Measures (NEPM). New air quality goals for nitrogen dioxide and particulate matter were adopted by the EPA in its publication "*Action for Air*" (NSW EPA, 1998).

The EPA specifies ground-level concentration (glc) criteria for criteria pollutants (NSW Department of Environment and Conservation (DEC), 2005), as listed in **Table 3-1**. The basis of these air quality goals and, where relevant, the safety margins which they provide are outlined in the following sections.

Table 3-1: EPA air quality assessment criteria

Pollutant	Goal	Averaging period	Source
Carbon monoxide	30 mg/m^3 10 mg/m^3	1-hour 8-hour	WHO (2000) NEPC (1998)
Nitrogen dioxide	246 µg/m^3 62 µg/m^3	1-hour Annual	NEPC (1998) NEPC (1998)
Particulate matter < 10 µm (PM_{10})	50 µg/m^3 30 µg/m^3	24-hour Annual	NEPC (1998) EPA (1998)

mg/m^3 – milligrams per cubic metre
ppm – parts per million
µg/m^3 – micrograms per cubic metre

3.1 Carbon monoxide

Carbon monoxide is produced from incomplete combustion of fuels, where carbon is only partially oxidised instead of being fully oxidised to form carbon dioxide.

Carbon monoxide can be harmful to humans because of its affinity for haemoglobin, which is more than 200 times greater than that of oxygen. When it is inhaled it is taken up by the blood and therefore reduces the capacity of the blood to transport oxygen. This process is reversible and reducing the exposure will lead to the establishment of a new equilibrium. A period of three hours is the approximate time required to reach 50 per cent of the equilibrium value.

[1] *OEH was previously part of the Department of Environment, Climate Change and Water (DECCW). The DECCW was also recently known as the Department of Environment and Climate Change (DECC), and prior to that the Department of Environment and Conservation (DEC). The terms NSW OEH, DECCW, DECC and DEC are used interchangeably in this report.*

Symptoms of carbon monoxide intoxication are lassitude and headaches. These symptoms are not however generally reported until the concentration of carboxyhaemoglobin in the blood is in excess of 10 per cent of saturation. This is about the equilibrium value achieved with an ambient atmospheric concentration of 70 milligrams per cubic metre for a person engaged in light activity. Further, there is evidence of an increased risk for individuals with cardiovascular disease once carboxyhaemoglobin concentration reaches four per cent, and the WHO recommends that ambient concentrations be kept to values which would protect individuals from exceeding the four per cent level.

The 15 minute, one hour and eight hour goals noted by the EPA provide a significant margin for safety in protecting the community, including the very young and elderly. The 15 minute, one hour and eight hour goals are 100 milligrams per cubic metre, 30 milligrams per cubic metre and 10 milligrams per cubic metre respectively.

3.2 Oxides of nitrogen

Oxides of nitrogen are produced by motor vehicles when nitrogen from the air is oxidised at high temperature and pressure in the combustion chamber.

Nitrogen oxides emitted by motor vehicles are comprised mainly of nitric oxide (approximately 95 per cent at the point of emission) and nitrogen dioxide (approximately five per cent at the point of emission). Nitric oxide is much less harmful to humans than nitrogen dioxide and is not generally considered a pollutant at the concentrations normally found in urban environments. Monitoring data collected in Sydney (RTA, 1997) indicates that close to roadways, nitrogen dioxide makes up between five to 20 per cent by weight of the total oxides of nitrogen.

Concern with nitric oxide is related to its transformation to nitrogen dioxide and its role in the formation of photochemical smog. Nitrogen dioxide has been reported as having an effect on respiratory function, although evidence concerning the effects has been mixed and conflicting.

The EPA has not set any air quality goals for nitric oxide, however it has adopted the NEPM standard one hour and annual average goals for nitrogen dioxide as shown in **Table 3-1**.

3.3 Particulate matter

Particulate matter is emitted by motor vehicles and results from incomplete combustion of fuels, additives in fuels and lubricants, worn material that accumulates in the engine lubricant, and brake and tyre wear.

The presence of particulate matter in the atmosphere can have an adverse effect on health and amenity. Larger particles, that is, those greater than 10 microns, generally adhere to mucus in the nose, mouth, pharynx and larger bronchi, and from there are removed by either swallowing or expectorating. Finer particles can enter bronchial and pulmonary regions of the respiratory tract, with increased deposition during mouth breathing, which increases during exercise. The health effects of particulate matter are further complicated by the chemical nature of the particles and by the possibility of synergistic effects with other air pollutants such as sulfur dioxide.

The current project will be assessed using the NEPM standards for particulate matter shown in **Table 3-1**, adopted by the EPA.

3.4 Vehicle emissions and photochemical smog

Motor vehicle emissions have the potential to contribute significantly to photochemical smog in an urban environment. Photochemical smog is formed from a reaction between nitrogen oxides and reactive hydrocarbons in the presence of sunlight. Models for the formation of photochemical smog envisage hydrocarbon emissions resulting predominately from motor cars, facilities for the storage of hydrocarbons or spray painting operations, mixing with nitrogen oxides from either industrial sources or motor cars. The mixture of pollution from these sources then reacts photochemically to form photochemical smog comprising mainly of ozone, but also including other oxidants. At concentrations of 0.1 parts per million and above, the smog can affect the eyes and respiratory system and can adversely affect plants and building materials.

Ozone is not emitted directly from motor vehicles but results from photochemical reactions that take some time to occur. Concentrations close to roadways are low because fresh emissions of nitric oxide titrate takes the place of any ozone that may be present.

4 Existing air quality

4.1 Monitoring data

Air quality standards and goals refer to pollutant levels resulting from a combination of both the project and existing sources. To fully assess impacts against all the relevant air quality standards and goals (detailed in Section 3 and listed in **Table 3-1**) it is therefore necessary to have information or estimates on existing background pollutant concentrations for the area in which the project is likely to contribute to these levels.

The closest EPA monitoring station was located at Croom Road in Albion Park, approximately 15 kilometres north of Gerringong. This site was however decommissioned in early 2005 and a new station was commissioned at Terry Reserve (Albion Park South) in December 2005. **Table 4-1** presents a summary of air monitoring data from both sites from 1997 to 2007, which includes the most recent available data[2]. Pollutants monitored at these sites were nitrogen dioxide, ozone, sulphur dioxide and PM_{10}. The data is taken from the *National Ambient Air Quality Status and Trends Report, 1991 – 2001* (DEH, 2004) and the EPA quarterly air quality reports (NSW DECCW, 2002 - 2007).

Maximum one hour average and annual average nitrogen dioxide concentrations are well below the EPA air quality criteria. The maximum measured one hour average nitrogen dioxide concentration over the 11 year monitoring period was 166 micrograms per cubic metre in 1998. The maximum annual average was measured at 31 micrograms per cubic metre in 2003, with an average over the whole monitoring period of 11 micrograms per cubic metre.

The maximum one hour and four hour ozone air quality goals were regularly exceeded during the monitoring period. These exceedances can be attributed, in part, to variability in meteorological conditions and often occurred in the warmer summer months when sunlight hours are higher. Bushfires are also known to cause elevated ozone concentrations.

Maximum PM_{10} concentrations were on occasions above the 24 hour goal of 50 micrograms per cubic metre. For example, in 2003 the maximum recorded 24 hour average concentration recorded was 281 micrograms per cubic metre. The EPA *Annual Compliance Report* (NSW DEC, 2004) notes that dust storms occurred on the day this value was recorded. Particle pollution is affected by environmental factors such as bushfires and dust storms and some of the other high levels may also be attributed to these factors. Annual average concentrations of PM_{10} are below the EPA air quality goal of 30 micrograms per cubic metre, except in 2003. Exceedances in that year were likely to be the result of dust storms.

4.2 Modelled existing alignment

In 2007, PAEHolmes (then Holmes Air Sciences) conducted a modelling study, *Air Quality Impact Assessment – Gerringong to Bomaderry Princes Highway Upgrade* (Holmes Air Sciences, 2007), which investigated air quality impacts of the existing highway alignment in the study area. The results of this modelling are provided in **Table 4-2** and show all predicted concentrations as well below their respective air quality goals. The nearest residences through the township of Berry are about 10 metres from the kerb. Levels at this distance due to existing traffic volumes are very low and well below air quality criteria.

[2] *Data from 2008 – 2010 is not available in this format at this time.*

Table 4-1: Summary of monitoring data from 1997 to 2007

Year	NO_2		O_3		TEOM PM_{10}		CO[(d)]	
	Maximum 1 hour average	Annual average	Maximum 1 hour average	Maximum 4 hour average	Maximum 24 hour average	Annual average	Maximum 1 hour average	Maximum 8 hour average
Goal	**246 ($\mu g/m^3$)**	**62 ($\mu g/m^3$)**	**214 ($\mu g/m^3$)**	**171 ($\mu g/m^3$)**	**50 ($\mu g/m^3$)**	**30 ($\mu g/m^3$)**	**30 (mg/m^3)**	**10 (mg/m^3)**
1997[(a)]	90	8	308	265	62	18*	ND	ND
1998[(a)]	166	8	300	248	64	15	5.5	2.8
1999[(a)]	100	8	193	173	49	13	5.1	3.0
2000[(a)]	113	10	227	178	63	15	5.6	3.0
2001[(a)]	105	8	188	175	59	16	10.6	5.3
2002[(b)]	98	10	201	178	88	20	4.8	2.9
2003[(b)]	113	31	278	235	281	40	4.1	2.6
2004[(b)]	90	8	235	197	195	18	4.0	2.6
2005	ND	ND	ND	ND	ND	ND	3.5	2.3
2006[(c)]	104	9	205	167	60	18	3.4	1.9
2007[(c)]	92	9	197	171	54	16	3.2	1.6
Median	102	9	216	178	63	17	4.5	2.7
Maximum	166	31	308	265	281	40	10.6	5.3

ND = No data available
TOEM = Tapered Element Oscillating Microbalance (PM_{10} Monitor)
** one or more quarters of the year had data availability less than 75 per cent*
(a) DEH (2004)
(b) EPA (2002-2007)
(c) Monitoring site now located at Albion Park Reserve
(d) Wollongong monitoring site

Table 4-2: Predicted maximum ground level concentrations for existing alignment

Direction of traffic flow	Distance from kerb (m)	CO		NO_2		PM_{10}	
		1 hour average	8 hour average	1 hour average	Annual average	24 hour average	Annual average
		EPA assessment criteria					
		30 (mg/m^3)	**10 (mg/m^3)**	**246 ($\mu g/m^3$)**	**62 ($\mu g/m^3$)**	**50 ($\mu g/m^3$)**	**30 ($\mu g/m^3$)**
Northbound	0	0.9	0.2	231	6.1	10.8	3.6
	10	0.4	0.1	158	1.9	4.0	1.1
	30	0.2	0.1	94	0.9	2.1	0.5
	50	0.2	0.0	37	0.6	1.5	0.3
Southbound	0	0.9	0.2	297	6.2	9.2	3.7
	10	0.6	0.1	171	1.9	3.3	1.1
	30	0.3	0.1	88	0.9	1.8	0.5
	50	0.2	0.1	66	0.7	1.3	0.4

Note: The values for the NO_2 annual averages in the Holmes Air Sciences (2007) document were incorrect by a factor of 10. They have been corrected for this table.

5 Dispersion meteorology and climate

The dispersion model used for this assessment, CAL3QHCR, requires information about the dispersion characteristics of the area. In particular, data is required on wind speed, wind direction, temperature, atmospheric stability class[3] and mixing height[4].

5.1 Wind speed and direction

Meteorological data is available from two sites in the vicinity of the project. The data collected in 2000 was collected from a site located at Gerroa Tip, which is approximately five kilometres to the south-west of Gerringong. Data was also collected in 2001 from a site on Beirnfels Lane, approximately three kilometres to the south-west of Gerringong. The data was collected by the PAEHolmes (formerly Holmes Air Sciences) on behalf of Veolia Water. Permission has been granted by Veolia Water to use this data.

The Beirnfels data has an unusually high percentage of calms (wind speed of 0.5 metres per second or less) which have been attributed to some equipment malfunction during spring and early summer. For this reason data from Gerroa Tip was used in the air quality impact assessment. The data consists of hourly records of wind speed, wind direction and temperature and is presented in a format suitable for dispersion modelling. Windroses prepared from these data are shown in **Figure 5-1**.

On an annual basis, the most common winds were recorded from the west, west-north-west and north-east. During the summer the predominant winds were recorded from the north-east, while in spring they were recorded from the west, west-north-west and north-east. In autumn and winter the winds were mainly from the west and west-north-west. In autumn there were also winds from the north-east. The annual average speed recorded at the Gerroa Tip was 2.4 metres per second.

[3] In dispersion modelling stability class is used to categorise the rate at which a plume would disperse. In the Pasquill-Gifford stability class assignment scheme, as used in this study, there are six stability classes A through to F. Class A relates to unstable conditions such as might be found on a sunny day with light winds. In such conditions plumes would spread rapidly. Class F relates to stable conditions, such as occur when the sky is clear, the winds are light and an inversion is present. Plume spreading is slow in these circumstances. The intermediate classes B, C, D and E relate to intermediate dispersion conditions.

[4] The term mixing height refers to the height of the turbulent layer of air near the earth's surface into which ground-level emissions would be rapidly mixed. A plume emitted above the mixed-layer would remain isolated from the ground until such time as the mixed-layer reaches the height of the plume. The height of the mixed-layer is controlled mainly by convection (resulting from solar heating of the ground) and by mechanically generated turbulence as the wind blows over the rough ground.

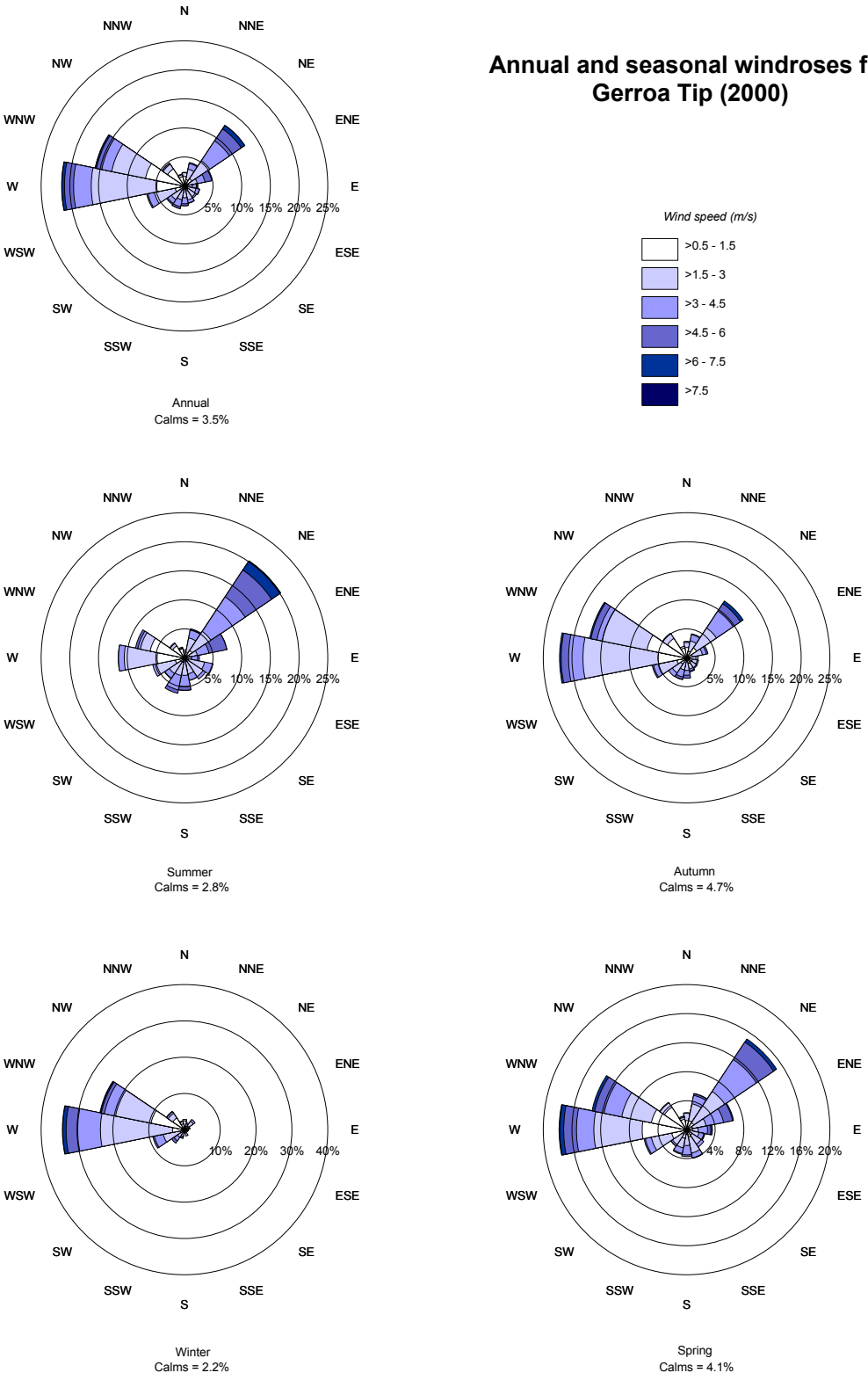

Figure 5-1: Annual and seasonal windroses for Gerroa Tip

5.2 Atmospheric stability

For the Gerroa Tip dataset, a stability class was assigned to each hour of the meteorological data using concurrent cloud cover information and the method of Turner (Turner, 1970). **Table 5-1** shows the frequency of occurrence of the stability categories expected in the area. The most common stability occurrences were calculated to be D class stabilities (21 per cent) suggesting that emissions would disperse quickly for a significant proportion of the time. For 40 per cent of the time conditions are stable (E and F class), indicating poor dispersion at those times.

Mixing height was determined using a scheme defined by Powell (1976) for daytime conditions and an approach described by Venkatram (1980) for night-time conditions. These two methods provide a good estimate of mixing height in the absence of upper air data.

Joint wind speed, wind direction and stability class frequency tables for the Gerroa Tip dataset are presented in Appendix A.

Table 5-1: Frequency of occurrence of stability classes at Gerroa tip

Stability class	Frequency of occurrence (per cent)
A	18.2
B	14.1
C	7.8
D	21.1
E	19.7
F	19.1
Total	100.0

5.3 Climate data

Table 5-2 presents the temperature, humidity and rainfall data from the Nowra Royal Australian Navy (RAN) automatic weather station (Bureau of Meteorology, 2011). Temperature and humidity data consist of monthly averages of 9am and 3pm readings. Also presented are monthly averages of maximum and minimum temperatures, and mean monthly rainfall data.

The annual average maximum and minimum temperatures experienced at Nowra RAN are 21.3 degrees Celsius and 11.3 degrees Celsius respectively. On average, January and February are the hottest months with an average maximum temperature of 25.8 degrees Celsius. July is the coldest month, with average minimum temperature of 6.2 degrees Celsius.

The annual average humidity reading collected at 9am is 70 per cent, and at 3pm the annual average is 58 per cent. The month with the highest humidity on average is February with a 9am average of 76 per cent, and the lowest humidity is in August and September with a 3pm average of 52 per cent.

Rainfall data collected shows that February is the wettest month, with an average rainfall of 120.0 millimetres. The average annual rainfall is 1110 millimetres.

Table 5-2: Temperature, humidity and rainfall data for Nowra RAN

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual average
9am mean dry-bulb and wet-bulb temperatures (^{o}C) and relative humidity (%)													
Dry-bulb	20.8	20.6	19.6	17.1	13.8	11.1	10.0	11.6	14.4	17.0	18.3	19.9	16.2
Wet-bulb	17.6	17.9	16.8	14.1	11.4	9.0	7.8	8.8	10.9	13.1	14.6	16.2	13.2
Humidity	72	76	74	71	74	75	72	68	63	63	66	68	70
3pm mean dry-bulb and wet-bulb temperatures (^{o}C) and relative humidity (%)													
Dry-bulb	24.1	24.3	23.0	20.8	18.0	15.4	14.8	15.9	17.8	19.5	21.3	23.0	19.8
Wet-bulb	19.0	19.3	18.3	15.9	13.5	11.4	10.4	11.0	12.5	14.4	16.0	17.7	15.0
Humidity	62	63	62	59	59	59	54	52	52	57	58	59	58
Daily maximum temperature (^{o}C)													
Mean	25.8	25.8	24.5	22.1	19.0	16.4	15.8	17.1	19.3	21.5	23.1	24.8	21.3
Daily minimum temperature (^{o}C)													
Mean	15.9	16.3	14.8	12.1	9.7	7.6	6.2	6.7	8.3	10.7	12.6	14.6	11.3
Rainfall (mm)													
Mean	88.4	120.0	24.4	97.1	90.5	104.8	56.5	75.8	65.6	107.5	98.1	80.5	1110

Station number 068076; Commenced: 1942, Last record: 2000; Latitude (deg S): - 34.94; Longitude (deg E): 150.55; Elevation: 190 metres
Source: Bureau of Meteorology (2011)

6 Approach to assessment

6.1 Introduction

This chapter provides a description of the methods used to model the emissions from the proposed upgrade following completion of the project. Three sections of the project were modelled, namely:

- Princes Highway, between Toolijooa Road interchange and Berry North interchange.
- Princes Highway, between Berry North interchange and Berry South interchange.
- Princes Highway, between Berry South interchange and Schofields Lane.

6.2 Caline

The Caline series of dispersion models has been used to estimate the concentration of oxides of nitrogen, carbon monoxide and particulate matter that are likely to occur in the vicinity of the existing Princes Highway. The CALINE4 model is widely used in roadway studies throughout Australia and was validated for Australian conditions in a study undertaken in Sydney by Williams et. al. (1994).

This model is an upgrade of CALINE3, the most recently US EPA approved model. It is a steady state Gaussian model which can determine concentrations at receptor locations downwind of 'at grade', 'fill', 'bridges' and 'cut section' highways located in relatively uncomplicated terrain. The model is applicable for any wind direction, highway orientation and receptor location.

For this study, the CALRoads package was used to assess the impacts. This package incorporates CALINE4 as well as CAL3QHCR, which is an enhanced version of CALINE3 able to process up to a year of meteorological data.

Information needed as input to the model includes:

- Meteorological conditions.
- Traffic volumes.
- Emissions information.
- Receptor location information.

The following sections discuss each of the input requirements.

6.2.1 Meteorological conditions

As discussed in **Chapter 5**, meteorological data from Gerroa Tip for the year 2000 was the closest data to the project site that was available and was deemed to be appropriate for use in the assessment.

6.2.2 Traffic volumes

AECOM provided hourly traffic volumes for each section of highway for both years being assessed. **Table 6-1, Table 6-2** and **Table 6-3** present a summary of this data, as well as the percentage of heavy vehicles for each hour, for the years 2017 and 2027.

Table 6-1: Hourly traffic volumes (vehicles/hour) – Toolijooa Road interchange to Berry north interchange

Hour	2017				2027			
	Northbound		Southbound		Northbound		Southbound	
	Total	% Heavy vehicles	Total	% Heavy vehicles	Total	% Heavy vehicles	Total	% Heavy vehicles
1*	20	30	44	26	30	24	70	21
2	17	44	29	36	25	37	45	29
3	20	54	21	53	29	47	30	45
4	28	45	18	47	42	38	27	39
5	63	37	35	53	95	30	52	45
6	113	21	84	33	180	17	131	27
7	226	16	218	24	363	13	346	18
8	366	12	328	18	595	9	531	14
9	437	12	449	11	711	10	739	9
10	449	12	458	12	729	10	753	9
11	500	10	530	12	817	8	872	9
12	556	9	549	11	912	7	905	8
13	579	10	544	9	949	7	901	7
14	584	9	494	10	957	7	818	7
15	676	9	500	10	1110	7	827	7
16	704	7	544	9	1162	5	903	7
17	673	7	578	8	1112	5	961	6
18	577	6	503	6	955	4	840	4
19	327	6	371	7	540	5	619	5
20	167	7	252	7	276	5	420	5
21	107	10	194	8	176	8	321	6
22	77	14	148	8	124	11	246	6
23	52	19	98	10	84	15	161	8
24	33	27	61	14	51	21	100	10

**1 represents the first hour of the day, between midnight and 1 am*

Table 6-2: Hourly traffic volumes (vehicles/hour) – Berry north interchange to Berry south interchange

Hour	2017				2027			
	Northbound		Southbound		Northbound		Southbound	
	Total	% Heavy vehicles	Total	% Heavy vehicles	Total	% Heavy vehicles	Total	% Heavy vehicles
1*	20	24	41	26	31	21	63	23
2	16	40	27	36	24	36	42	31
3	17	50	19	53	25	45	28	48
4	25	43	17	47	37	38	25	42
5	54	37	33	53	82	33	48	48
6	97	22	78	33	150	19	120	29
7	208	19	201	24	323	16	314	20
8	321	16	303	18	502	14	479	15
9	392	13	414	11	615	11	663	10
10	469	11	423	12	740	9	675	10
11	492	10	489	12	778	8	782	10
12	544	9	507	11	860	8	811	9
13	551	9	502	9	872	8	806	8
14	539	10	456	10	852	8	732	8
15	566	9	462	10	895	8	740	8
16	614	7	502	9	974	6	807	7
17	615	7	533	8	977	6	859	7
18	543	6	464	6	864	5	749	5
19	302	6	343	7	480	5	552	6
20	164	6	233	7	261	5	375	6
21	102	10	179	8	161	9	287	7
22	82	11	137	8	129	10	220	7
23	57	15	90	11	89	13	144	9
24	35	22	56	14	54	19	90	12

**1 represents the first hour of the day, between midnight and 1 am*

Table 6-3: Hourly traffic volumes (vehicles/hour) – Berry south interchange to Schofields Lane

Hour	2017				2027			
	Northbound		Southbound		Northbound		Southbound	
	Total	% Heavy vehicles	Total	% Heavy vehicles	Total	% Heavy vehicles	Total	% Heavy vehicles
1*	26	24	48	26	37	21	68	22
2	20	40	34	35	28	36	48	31
3	22	50	25	49	29	45	34	44
4	32	43	20	38	44	38	28	34
5	68	37	37	42	95	33	52	37
6	121	22	84	33	174	19	120	28
7	261	19	236	22	377	16	341	19
8	403	16	400	16	585	14	586	14
9	492	13	598	10	717	11	886	9
10	589	11	540	11	862	9	798	9
11	618	10	565	14	906	8	832	11
12	683	9	610	13	1002	8	899	11
13	692	9	616	11	1017	8	911	9
14	677	10	606	11	993	8	896	9
15	710	9	636	10	1043	8	942	9
16	770	7	689	9	1135	6	1022	8
17	772	7	690	8	1138	6	1025	7
18	681	6	593	6	1007	5	886	5
19	379	6	404	7	560	5	601	6
20	206	6	265	7	304	5	394	6
21	128	10	190	9	187	9	282	7
22	103	11	155	8	151	10	230	7
23	72	15	107	10	104	13	159	9
24	44	22	71	14	63	19	104	11

**1 represents the first hour of the day, between midnight and 1 am*

6.2.3 Vehicle emission rates

This section provides a brief description of the methods used to calculate the emissions of carbon monoxide, nitrogen oxides and PM_{10} from vehicles.

Vehicle emission data from the Permanent International Association of Road Congresses (PIARC) (PIARC, 2004) was adjusted to reflect the NSW vehicle fleet. The modified tables include emissions of carbon monoxide, nitrogen oxides and PM_{10} by age and type of vehicle. The ages of vehicles are categorised into seven periods which correspond to the introduction of emission standards. The types of vehicle are categorised into light and heavy vehicle groups.

Proportions of traffic within each age category for 2017 and 2027 have been extrapolated from the proportions of traffic within each age category using NSW traffic registration data from the Australian Bureau of Statistics (ABS) Motor Vehicle Census (ABS, 2005). No future improvements in vehicle technology or fuel standards have been included in the emission estimates. The data collected by Australasian Traffic Surveys showed that the proportion of the fleet that is heavy-goods vehicles (HGVs) varies throughout the day. It was assumed that five per cent of the passenger vehicles are diesel and 95 per cent are petrol.

The CAL3QHCR model requires emission factors in units of grams per vehicle mile. The emission factors along each section of road have been calculated from the traffic flow, vehicle mix and the emission rate per vehicle derived from the PIARC tables. Due to the variability of the light and heavy vehicle traffic mix, the emission factors would be different for each hour. **Table 6-4, Table 6-5**, and **Table 6-6** present the estimated carbon monoxide, nitrogen oxide and PM_{10} emission rates for 2017 and 2027, along each section of the highway.

Table 6-4: Estimated vehicle emission rates – Toolijooa Road interchange to Berry north interchange (g/veh-mile)

Hour	Northbound						Southbound					
	CO		NO_2		CO		NO_2		CO		NO_2	
	2017	2027	2017	2027	2017	2027	2017	2027	2017	2027	2017	2027
1*	4.38	3.83	2.97	1.95	0.18	0.10	4.42	3.89	2.72	1.79	0.16	0.09
2	4.19	3.59	3.94	2.59	0.24	0.14	4.29	3.73	3.37	2.20	0.20	0.12
3	4.05	3.40	4.64	3.08	0.29	0.17	4.07	3.43	4.53	3.00	0.28	0.17
4	4.18	3.57	4.01	2.64	0.25	0.15	4.14	3.53	4.15	2.72	0.26	0.15
5	4.28	3.71	3.46	2.27	0.21	0.12	4.07	3.42	4.57	3.01	0.29	0.17
6	4.48	3.97	2.38	1.60	0.14	0.08	4.33	3.78	3.20	2.09	0.19	0.11
7	4.55	4.05	2.05	1.40	0.11	0.07	4.46	3.93	2.54	1.69	0.15	0.09
8	4.61	4.11	1.76	1.23	0.09	0.06	4.53	4.03	2.15	1.45	0.12	0.07
9	4.61	4.11	1.78	1.24	0.09	0.06	4.62	4.13	1.70	1.19	0.09	0.05
10	4.61	4.11	1.78	1.24	0.09	0.06	4.61	4.11	1.76	1.23	0.09	0.06
11	4.63	4.14	1.63	1.16	0.08	0.05	4.61	4.12	1.74	1.22	0.09	0.06
12	4.65	4.16	1.56	1.12	0.08	0.05	4.62	4.13	1.69	1.19	0.09	0.05
13	4.64	4.15	1.58	1.14	0.08	0.05	4.65	4.15	1.57	1.12	0.08	0.05
14	4.64	4.15	1.57	1.13	0.08	0.05	4.64	4.15	1.60	1.13	0.08	0.05
15	4.66	4.17	1.52	1.10	0.08	0.05	4.64	4.15	1.61	1.15	0.08	0.05
16	4.68	4.19	1.40	1.03	0.07	0.04	4.65	4.16	1.54	1.10	0.08	0.05
17	4.68	4.19	1.38	1.02	0.07	0.04	4.67	4.18	1.47	1.07	0.07	0.05
18	4.69	4.20	1.32	0.99	0.06	0.04	4.69	4.20	1.34	0.99	0.06	0.04
19	4.68	4.20	1.36	1.01	0.06	0.04	4.68	4.19	1.41	1.04	0.07	0.04
20	4.67	4.19	1.41	1.04	0.07	0.05	4.67	4.19	1.42	1.04	0.07	0.05
21	4.64	4.14	1.62	1.15	0.08	0.05	4.66	4.17	1.50	1.09	0.07	0.05
22	4.58	4.08	1.87	1.30	0.10	0.06	4.66	4.17	1.50	1.09	0.07	0.05
23	4.52	4.01	2.22	1.50	0.12	0.07	4.63	4.14	1.65	1.17	0.08	0.05
24	4.42	3.88	2.76	1.82	0.16	0.09	4.59	4.09	1.86	1.29	0.10	0.06

g/veh-mile – grams per vehicle mile
**1 represents the first hour of the day, between midnight and 1 am*

Table 6-5: Estimated vehicle emission rates – Berry north interchange to Berry south interchange (g/veh-mile)

Hour	Northbound						Southbound					
	CO		NO_2		CO		NO_2		CO		NO_2	
	2017	2027	2017	2027	2017	2027	2017	2027	2017	2027	2017	2027
1*	4.46	3.89	2.55	1.79	0.15	0.09	4.42	3.86	2.73	1.90	0.16	0.10
2	4.23	3.60	3.69	2.55	0.22	0.14	4.30	3.69	3.38	2.33	0.20	0.13
3	4.11	3.42	4.35	3.02	0.27	0.17	4.07	3.37	4.55	3.14	0.28	0.18
4	4.20	3.55	3.87	2.68	0.24	0.15	4.15	3.47	4.16	2.87	0.26	0.16
5	4.28	3.66	3.45	2.39	0.21	0.13	4.06	3.36	4.57	3.17	0.29	0.18
6	4.48	3.92	2.46	1.73	0.14	0.09	4.33	3.73	3.20	2.21	0.19	0.12
7	4.52	3.98	2.20	1.56	0.12	0.08	4.45	3.90	2.55	1.78	0.15	0.09
8	4.56	4.03	2.02	1.44	0.11	0.07	4.53	3.99	2.16	1.53	0.12	0.08
9	4.59	4.07	1.85	1.34	0.10	0.06	4.62	4.11	1.71	1.25	0.09	0.06
10	4.63	4.11	1.68	1.23	0.09	0.06	4.61	4.09	1.77	1.28	0.09	0.06
11	4.64	4.13	1.59	1.18	0.08	0.05	4.61	4.10	1.75	1.27	0.09	0.06
12	4.64	4.14	1.56	1.17	0.08	0.05	4.62	4.11	1.69	1.23	0.09	0.06
13	4.65	4.14	1.55	1.16	0.08	0.05	4.64	4.14	1.57	1.17	0.08	0.05
14	4.64	4.14	1.59	1.18	0.08	0.05	4.64	4.13	1.60	1.18	0.08	0.05
15	4.65	4.15	1.53	1.15	0.08	0.05	4.64	4.13	1.62	1.19	0.08	0.05
16	4.67	4.17	1.42	1.08	0.07	0.05	4.65	4.14	1.53	1.14	0.08	0.05
17	4.68	4.18	1.38	1.06	0.07	0.05	4.67	4.16	1.47	1.10	0.07	0.05
18	4.69	4.20	1.31	1.01	0.06	0.04	4.69	4.20	1.34	1.02	0.06	0.04
19	4.69	4.20	1.32	1.02	0.06	0.04	4.68	4.18	1.41	1.07	0.07	0.05
20	4.69	4.19	1.35	1.03	0.06	0.04	4.67	4.17	1.42	1.08	0.07	0.05
21	4.64	4.13	1.62	1.19	0.08	0.05	4.66	4.16	1.51	1.13	0.07	0.05
22	4.61	4.10	1.71	1.25	0.09	0.06	4.66	4.15	1.50	1.12	0.07	0.05
23	4.57	4.04	1.97	1.42	0.11	0.07	4.63	4.12	1.64	1.21	0.08	0.06
24	4.48	3.94	2.41	1.70	0.14	0.09	4.58	4.07	1.86	1.35	0.10	0.06

g/veh-mile – grams per vehicle mile
**1 represents the first hour of the day, between midnight and 1 am*

Table 6-6: Estimated vehicle emission rates – Berry south interchange to Schofields Lane (g/veh-mile)

Hour	Northbound						Southbound					
	CO		NO_2		PM_{10}		CO		NO_2		PM_{10}	
	2017	2027	2017	2027	2017	2027	2017	2027	2017	2027	2017	2027
1*	4.46	3.89	2.55	1.79	0.15	0.09	4.43	3.86	2.69	1.87	0.16	0.10
2	4.23	3.60	3.69	2.55	0.22	0.14	4.31	3.70	3.33	2.29	0.20	0.12
3	4.11	3.42	4.35	3.02	0.27	0.17	4.12	3.44	4.31	2.98	0.27	0.17
4	4.20	3.55	3.87	2.68	0.24	0.15	4.26	3.64	3.54	2.43	0.21	0.13
5	4.28	3.66	3.45	2.39	0.21	0.13	4.22	3.57	3.79	2.61	0.23	0.14
6	4.48	3.92	2.46	1.73	0.14	0.09	4.34	3.74	3.16	2.18	0.19	0.12
7	4.52	3.98	2.20	1.56	0.12	0.08	4.48	3.93	2.44	1.71	0.14	0.09
8	4.56	4.03	2.02	1.44	0.11	0.07	4.56	4.03	2.03	1.45	0.11	0.07
9	4.59	4.07	1.85	1.34	0.10	0.06	4.63	4.12	1.63	1.20	0.08	0.06
10	4.63	4.11	1.68	1.23	0.09	0.06	4.62	4.11	1.69	1.24	0.09	0.06
11	4.64	4.13	1.59	1.18	0.08	0.05	4.59	4.07	1.85	1.34	0.10	0.06
12	4.64	4.14	1.56	1.17	0.08	0.05	4.60	4.08	1.79	1.30	0.09	0.06
13	4.65	4.14	1.55	1.16	0.08	0.05	4.63	4.12	1.66	1.22	0.09	0.06
14	4.64	4.14	1.59	1.18	0.08	0.05	4.62	4.11	1.67	1.22	0.09	0.06
15	4.65	4.15	1.53	1.15	0.08	0.05	4.63	4.12	1.63	1.20	0.08	0.06
16	4.67	4.17	1.42	1.08	0.07	0.05	4.65	4.14	1.56	1.15	0.08	0.05
17	4.68	4.18	1.38	1.06	0.07	0.05	4.66	4.15	1.50	1.12	0.07	0.05
18	4.69	4.20	1.31	1.01	0.06	0.04	4.69	4.20	1.32	1.01	0.06	0.04
19	4.69	4.20	1.32	1.02	0.06	0.04	4.67	4.18	1.43	1.08	0.07	0.05
20	4.69	4.19	1.35	1.03	0.06	0.04	4.68	4.18	1.39	1.05	0.07	0.05
21	4.64	4.13	1.62	1.19	0.08	0.05	4.66	4.15	1.52	1.13	0.08	0.05
22	4.61	4.10	1.71	1.25	0.09	0.06	4.66	4.15	1.50	1.12	0.07	0.05
23	4.57	4.04	1.97	1.42	0.11	0.07	4.63	4.12	1.64	1.20	0.08	0.06
24	4.48	3.94	2.41	1.70	0.14	0.09	4.59	4.07	1.86	1.34	0.10	0.06

g/veh-mile – grams per vehicle mile
**1 represents the first hour of the day, between midnight and 1 am*

6.2.4 Receptor locations

Receptors were positioned at the nearest residential receptors along the proposed alignment. **Figure 6-1** shows the locations of residences, as well as the ancillary construction facilities, which would include stockpile compounds that would be used during construction as assessed in Section 8.2. The 69 receptors used for the operational modelling represent those closest to the proposed roadway alignment. An additional number of receptors were chosen for the modelling of wind erosion from stockpiles at the ancillary facilities (discussed in Section 8.2), and those are also shown in **Figure 6-1**.

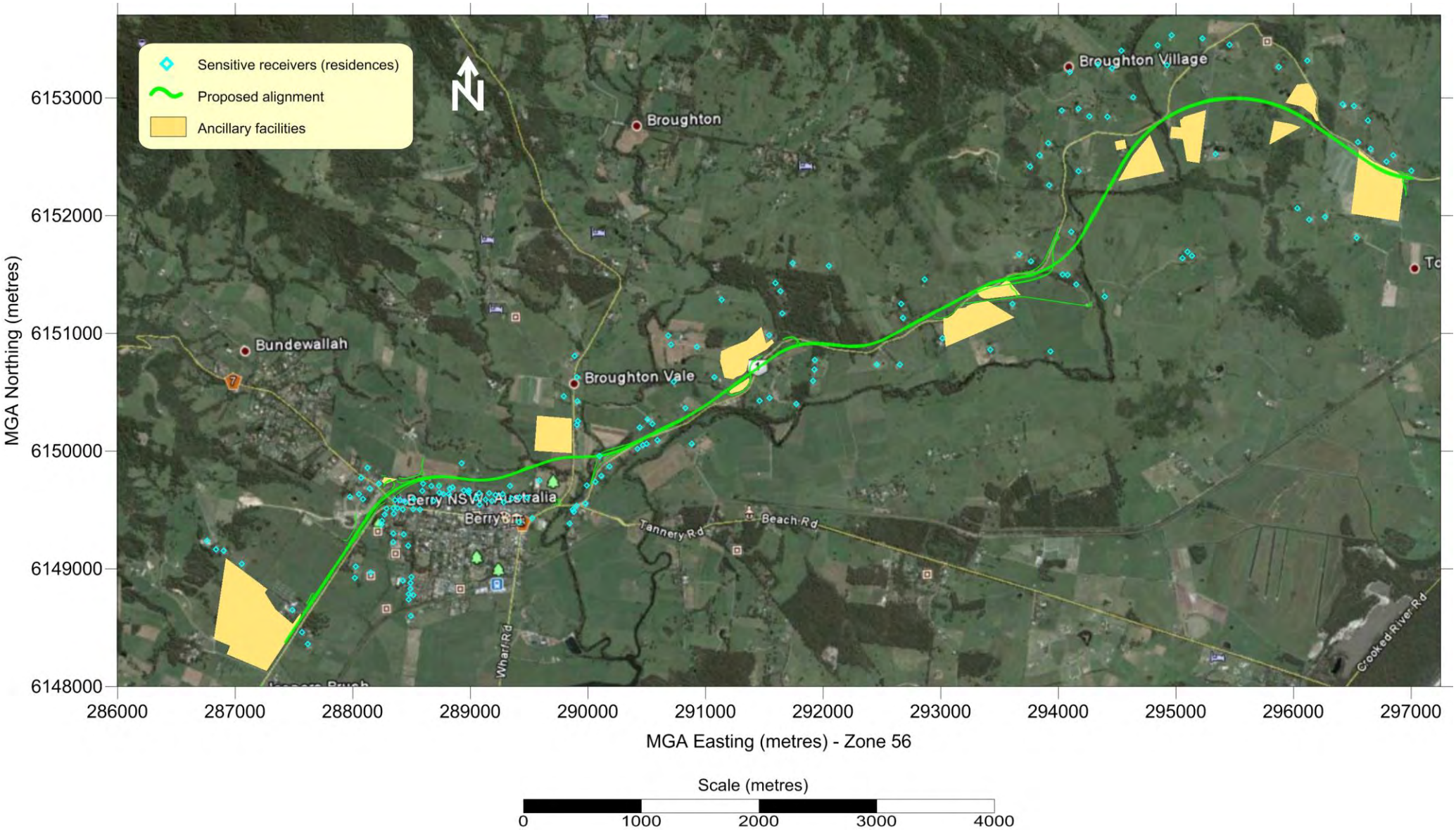

Figure 6-1: Location of sensitive receptors (residences) and potential ancillary facilities locations along the proposed alignment

7 Assessment of impacts

7.1 Introduction

This chapter assesses the predicted local air quality impacts due to emissions from the project. The maximum predicted concentrations for 2017 and 2027 at 69 of the closest receptors are shown in **Table 7-1** and **Table 7-2** respectively.

Table 7-1 Predicted maximum ground-level concentrations in 2017

	EPA criteria					
	CO		NO_2		PM_{10}	
Receptors	30 (mg/m^3)	10 (mg/m^3)	246 ($\mu g/m^3$)	62 ($\mu g/m^3$)	50 ($\mu g/m^3$)	30 ($\mu g/m^3$)
1	0.16	0.05	4.1	0.04	0.17	0.01
2	0.15	0.04	4.2	0.23	0.18	0.03
3	0.11	0.03	3.0	0.16	0.27	0.04
4	0.16	0.03	4.7	0.10	0.20	0.02
5	0.16	0.03	4.4	0.09	0.18	0.02
6	0.17	0.03	4.7	0.10	0.17	0.02
7	0.16	0.03	4.5	0.09	0.17	0.02
8	0.16	0.03	4.6	0.09	0.17	0.02
9	0.16	0.03	4.6	0.09	0.19	0.01
10	0.17	0.04	4.8	0.09	0.18	0.01
11	0.17	0.03	4.7	0.08	0.14	0.01
12	0.28	0.05	7.8	0.13	0.23	0.02
13	0.24	0.04	6.7	0.10	0.20	0.02
14	0.25	0.04	6.9	0.09	0.20	0.01
15	0.21	0.04	5.9	0.08	0.17	0.01
16	0.21	0.04	5.9	0.08	0.17	0.01
17	0.14	0.03	3.9	0.06	0.12	0.01
18	0.12	0.03	3.5	0.16	0.15	0.02
19	0.10	0.03	2.9	0.13	0.14	0.01
20	0.17	0.05	4.8	0.24	0.25	0.04
21	0.16	0.04	4.5	0.23	0.22	0.03
22	0.19	0.06	5.3	0.36	0.35	0.07
23	0.25	0.05	7.1	0.10	0.20	0.02
24	0.21	0.04	5.9	0.08	0.10	0.01
25	0.23	0.04	6.4	0.08	0.18	0.01
26	0.12	0.02	3.3	0.05	0.11	0.01
27	0.11	0.02	3.3	0.07	0.09	0.01
28	0.27	0.05	6.9	0.28	0.26	0.04
29	0.14	0.03	3.3	0.17	0.15	0.02
30	0.16	0.03	4.1	0.15	0.14	0.02
31	0.20	0.06	5.9	0.25	0.29	0.05
32	0.20	0.05	5.7	0.21	0.22	0.04

Receptors	EPA criteria					
	CO		NO_2		PM_{10}	
	30 (mg/m^3)	10 (mg/m^3)	246 ($\mu g/m^3$)	62 ($\mu g/m^3$)	50 ($\mu g/m^3$)	30 ($\mu g/m^3$)
33	0.21	0.05	5.9	0.21	0.25	0.04
34	0.23	0.06	6.3	0.23	0.28	0.04
35	0.27	0.05	7.6	0.19	0.24	0.04
36	0.28	0.05	7.7	0.18	0.26	0.04
37	0.29	0.05	8.0	0.19	0.31	0.04
38	0.20	0.04	5.3	0.16	0.21	0.03
39	0.32	0.06	8.9	0.24	0.38	0.05
40	0.21	0.04	5.8	0.18	0.23	0.03
41	0.21	0.04	6.2	0.20	0.31	0.04
42	0.23	0.04	6.7	0.21	0.31	0.04
43	0.18	0.04	5.4	0.16	0.22	0.02
44	0.21	0.04	6.2	0.20	0.26	0.03
45	0.19	0.05	5.6	0.20	0.28	0.04
46	0.17	0.05	5.1	0.21	0.30	0.04
47	0.13	0.05	3.8	0.20	0.26	0.03
48	0.13	0.05	3.6	0.17	0.24	0.03
49	0.13	0.05	3.6	0.18	0.23	0.03
50	0.13	0.05	3.6	0.18	0.25	0.03
51	0.11	0.04	3.3	0.15	0.20	0.02
52	0.12	0.04	3.5	0.15	0.19	0.02
53	0.13	0.04	3.7	0.15	0.19	0.02
54	0.13	0.04	3.7	0.15	0.20	0.02
55	0.12	0.04	3.6	0.14	0.17	0.02
56	0.12	0.04	3.6	0.13	0.17	0.02
57	0.12	0.03	3.5	0.11	0.13	0.01
58	0.15	0.04	4.1	0.18	0.20	0.02
59	0.22	0.07	5.7	0.38	0.33	0.08
60	0.13	0.05	3.5	0.18	0.18	0.03
61	0.39	0.10	10.8	0.44	0.55	0.14
62	0.37	0.10	10.7	0.40	0.48	0.11
63	0.33	0.09	9.4	0.00	0.40	0.00
64	0.24	0.07	6.3	0.30	0.36	0.06
65	0.12	0.04	3.5	0.11	0.13	0.02
66	0.10	0.02	2.7	0.10	0.12	0.01
67	0.20	0.04	5.6	0.14	0.13	0.02
68	0.12	0.03	3.1	0.09	0.16	0.02
69	0.19	0.04	5.7	0.13	0.18	0.03

Table 7-2: Predicted maximum ground-level concentrations in 2027

Receptors	EPA criteria					
	CO		NO_2		PM_{10}	
	30 (mg/m^3)	10 (mg/m^3)	246 ($\mu g/m^3$)	62 ($\mu g/m^3$)	50 ($\mu g/m^3$)	30 ($\mu g/m^3$)
1	0.21	0.06	4.6	0.05	0.18	0.01
2	0.20	0.05	4.7	0.24	0.18	0.03
3	0.15	0.05	3.4	0.17	0.27	0.04
4	0.21	0.05	5.1	0.11	0.18	0.02
5	0.21	0.05	4.9	0.10	0.18	0.02
6	0.22	0.05	5.2	0.11	0.17	0.02
7	0.21	0.05	5.1	0.10	0.17	0.02
8	0.22	0.05	5.1	0.10	0.17	0.02
9	0.22	0.05	5.1	0.10	0.21	0.01
10	0.22	0.05	5.4	0.10	0.18	0.01
11	0.22	0.04	5.3	0.09	0.15	0.01
12	0.37	0.07	8.7	0.14	0.24	0.02
13	0.32	0.06	7.6	0.11	0.20	0.02
14	0.33	0.06	7.7	0.10	0.20	0.01
15	0.28	0.05	6.6	0.09	0.18	0.01
16	0.28	0.05	6.7	0.09	0.17	0.01
17	0.19	0.04	4.4	0.07	0.12	0.01
18	0.16	0.04	3.9	0.18	0.15	0.02
19	0.14	0.04	3.2	0.14	0.14	0.01
20	0.22	0.06	5.4	0.26	0.24	0.04
21	0.21	0.06	5.1	0.24	0.21	0.03
22	0.25	0.08	5.9	0.39	0.36	0.07
23	0.33	0.06	7.9	0.11	0.20	0.02
24	0.28	0.05	6.6	0.09	0.18	0.01
25	0.30	0.05	7.2	0.09	0.18	0.01
26	0.16	0.03	3.7	0.05	0.10	0.01
27	0.17	0.03	4.0	0.08	0.10	0.01
28	0.38	0.07	8.5	0.33	0.27	0.05
29	0.18	0.04	4.0	0.20	0.17	0.02
30	0.23	0.04	5.1	0.18	0.14	0.02
31	0.28	0.09	7.1	0.30	0.30	0.06
32	0.29	0.08	6.8	0.26	0.24	0.05
33	0.30	0.08	7.2	0.26	0.25	0.04
34	0.32	0.08	7.7	0.27	0.28	0.05

Receptors	EPA criteria					
	CO		NO_2		PM_{10}	
	30 (mg/m^3)	10 (mg/m^3)	246 ($\mu g/m^3$)	62 ($\mu g/m^3$)	50 ($\mu g/m^3$)	30 ($\mu g/m^3$)
35	0.38	0.07	9.1	0.23	0.27	0.04
36	0.40	0.07	9.3	0.22	0.31	0.04
37	0.41	0.07	9.7	0.23	0.33	0.05
38	0.27	0.05	6.5	0.20	0.23	0.03
39	0.46	0.08	10.7	0.29	0.43	0.06
40	0.29	0.06	7.1	0.22	0.27	0.03
41	0.31	0.06	7.5	0.25	0.34	0.04
42	0.33	0.06	8.1	0.26	0.30	0.04
43	0.27	0.05	6.5	0.20	0.22	0.03
44	0.30	0.06	7.4	0.24	0.30	0.04
45	0.27	0.07	6.8	0.25	0.28	0.04
46	0.25	0.07	6.2	0.26	0.31	0.05
47	0.19	0.07	4.6	0.24	0.29	0.04
48	0.18	0.07	4.4	0.21	0.26	0.03
49	0.18	0.07	4.4	0.21	0.25	0.03
50	0.18	0.07	4.3	0.21	0.25	0.03
51	0.16	0.06	4.0	0.18	0.20	0.02
52	0.17	0.06	4.2	0.19	0.20	0.02
53	0.18	0.06	4.4	0.19	0.20	0.02
54	0.19	0.06	4.5	0.18	0.22	0.02
55	0.18	0.05	4.3	0.17	0.18	0.02
56	0.18	0.06	4.3	0.16	0.19	0.02
57	0.19	0.05	4.3	0.13	0.14	0.01
58	0.22	0.06	5.0	0.21	0.20	0.02
59	0.32	0.10	7.0	0.44	0.33	0.08
60	0.19	0.07	4.2	0.21	0.20	0.03
61	0.57	0.15	13.0	0.51	0.58	0.15
62	0.55	0.14	12.8	0.47	0.53	0.12
63	0.49	0.13	11.4	0.43	0.45	0.10
64	0.36	0.10	7.8	0.35	0.38	0.06
65	0.18	0.05	4.2	0.13	0.14	0.02
66	0.15	0.03	3.3	0.12	0.11	0.01
67	0.30	0.06	6.7	0.16	0.15	0.02
68	0.18	0.05	3.9	0.11	0.16	0.02
69	0.30	0.06	6.8	0.15	0.20	0.03

7.2 Carbon monoxide

7.2.1 Predicted impacts

Table 7-1 and **Table 7-2** show that the highest predicted one hour average carbon monoxide concentrations along the proposed highway are 0.39 milligrams per cubic metre and 0.57 milligrams per cubic metre in 2017 and 2027, respectively. Both these concentrations occurred at residences to the east of Berry. The maximum predicted eight hour average carbon monoxide concentration is approximately 0.10 milligrams per cubic metre and 0.15 milligrams per cubic metre in 2017 and 2027 respectively. These values are well below their respective EPA criteria of 30 milligrams per cubic metre (one hour) and 10 micrograms per cubic metre (eight hour).

These results are of the same order as those presented for the existing alignment in **Table 4-2** for distances 30 metres from the highway. This is not surprising given that even though traffic volumes have increased, the vehicles are spread further across four lane widths instead of two. Also, although no specific future improvements in emissions technology have been incorporated in the modelling, the vehicle mix is considered and in 2017 and 2027, the vehicle fleet would have a lower percentage of older, more inefficient vehicles.

7.2.2 Cumulative impacts

Based on the data presented in **Table 4-1**, the maximum one hour average carbon monoxide concentration is 10.6 milligrams per cubic metre. Therefore, the cumulative impact with the maximum predicted one hour average concentration of 0.39 milligrams per cubic metre at the most affected residence, is 11 milligrams per cubic metre. The cumulative eight hour average carbon monoxide concentration is estimated to be 5.4 milligrams per cubic metre [5.3 milligrams per cubic metre + 0.1 milligrams per cubic metre]. It is therefore unlikely that the EPA one hour average impact assessment criteria of 30 milligrams per cubic metre would be exceeded due to emissions from the proposed highway. Concentrations at residences further from the highway would be lower.

It should be noted, that the existing air quality data presented in **Table 4-1** includes emissions from the current sources in the area including the existing highway. Therefore, simply summing the maximum modelled concentration and maximum measured background concentration would result in a very conservative assessment of cumulative impacts. However, it has been shown that even this conservative approach does not result in an exceedance of the EPA criteria.

7.3 Oxides of nitrogen

7.3.1 Introduction

Estimating nitrogen dioxide concentrations is more complicated than estimating carbon monoxide concentrations. As discussed in Section 3.2, nitrogen oxides are initially emitted as a mixture of nitric oxide and other oxides of nitrogen, which are oxidised to nitrogen dioxide. At the point of emission the mixture is generally about five per cent nitrogen dioxide by mass. However, while the maximum concentrations of total oxides of nitrogen generally occur during peak hour, this is not necessarily the case for nitrogen dioxide. The monitoring program undertaken by RMS (RTA, 1997) indicates that during peak hour the percentage nitrogen dioxide at 10 metres from the highway edge is likely to be about five per cent. The conversion rate from nitric oxide to nitrogen dioxide at other times of the day may be significantly higher than this although the total oxides of nitrogen levels may be significantly lower than peak hour levels. It is therefore necessary to assume some intermediate value for a worst-case assessment.

Data from the air quality monitoring program (RTA, 1997) indicates that at 10 metres from the highway, a conversion rate of 15 per cent by weight is conservative (ie an overestimate). At distances of between 20 metres and 60 metres from the kerbside, the 20 per cent conversion rate appears to be appropriate. There are no monitoring data for the kerbside location in the present study, but it is considered that a 15 per cent conversion rate at 10 metres is likely to still be conservative. Given that the nearest residences are 20-30 metres or more from the highway, a rate of 20 per cent would be appropriate. However, for this study a 100 per cent conversion rate has been used to show that, even at this rate, levels would remain below the air quality criteria.

7.3.2 Predicted impacts

Table 7-1 and **Table 7-2** show that the highest predicted one hour and annual average concentrations of nitrogen dioxide, are 10.8 micrograms per cubic metre and 0.4 micrograms per cubic metre (2017) and 13.0 micrograms per cubic metre and 0.5 micrograms per cubic metre (2027), respectively. These are well within the EPA assessment criteria and are also lower than those predicted for the existing alignment, for reasons already discussed in Section 7.2.1.

7.3.3 Cumulative impacts

As summarised in **Table 4-1** the maximum measured nitrogen dioxide concentrations in the area were 166 micrograms per cubic metre (one hour average) and 31 micrograms per cubic metre (annual average). It should be remembered that these were maximum values over an 11 year monitoring period and most values were much lower, so adding model predictions to these is a very conservative method of assessment. However, even when using this conservative method, the nitrogen dioxide values remain below EPA criteria.

7.4 Particulate matter

7.4.1 Predicted impacts

Table 7-1 and **Table 7-2** show that the highest predicted 24 hour average PM_{10} concentrations contributed by emissions from the project alone are 0.55 micrograms per cubic metre and 0.58 micrograms per cubic metre in 2017 and 2027, respectively, at the nearest residential receptor. The maximum predicted annual average concentrations contributed by emissions from the project alone are approximately 0.14 micrograms per cubic metre and 0.15 micrograms per cubic metre in 2017 and 2027 respectively. These values are well below their respective EPA criteria of 50 micrograms per cubic metre and 30 micrograms per cubic metre respectively. These predicted PM_{10} concentrations are not significant increases to the emission levels from the existing highway and are not likely to result in adverse impacts on air quality at residences.

When comparing these PM_{10} results with those for the existing alignment, as shown in **Table 4-2**, it can be seen that PM_{10} values are predicted to be lower following completion of the project. Given the extremely variable nature of 24 hour PM_{10} measurements due to local sources, these increases are unlikely to be detectable.

7.4.2 Cumulative impacts

In the case of particulate matter, there would be exceedances of the 24 hour assessment criteria from time to time, as background levels on occasions are already close to or in exceedance of the goal (as can be seen from the data presented in **Table 4-1**). This is due to the fact that 24 hour levels can be greatly affected by local dust generating activities near the monitor, and may be quite high when levels not far away are much lower. These measurements can also be influenced by more regional phenomenon such as dust storms which is indeed the case for some of the excessive levels.

Also, the 24 hour average values presented in **Table 4-1** are the maximum values over the whole year, and may have occurred on a single day while the majority of readings were well below these.

If the logic that there should be no exceedances of impact assessment criteria is followed, no project could be approved on the basis of particulate emissions given that the goals are already exceeded on occasion. In the case of a relatively rural area such as for this project, these exceedances are often caused by local dust generating activities and are usually short lived. In these circumstances it is useful to consider the degree to which the project on its own compromises the impact assessment criteria.

The approach adopted in this report has been to consider first the case of adding the maximum predicted to the median background. If this approach shows exceedances, the degree to which the predicted concentrations of pollutants make up the relevant impact assessment criteria has been considered.

Based on the data presented in **Table 4-1**, the median 24 hour average PM_{10} concentration is 63 micrograms per cubic metre. This exceeds the EPA impact assessment criteria of 50 micrograms per cubic metre without the inclusion of the predicted concentrations due to the project. The maximum predicted 24 hour average concentration of 0.55 micrograms per cubic metre represents less than one per cent of the EPA assessment criteria. This percentage is approximately the same in 2027. It is therefore unlikely that the goal would be exceeded due to the small contribution from the proposed upgrade.

Based on the data presented in **Table 4-1**, the median annual PM_{10} concentration is 17 micrograms per cubic metre. Therefore, the cumulative impact with the maximum predicted annual average concentration of 0.15 micrograms per cubic metre is 17.2 micrograms per cubic metre at the nearest residences. This is well below the EPA annual average criteria of 30 micrograms per cubic metre.

8 Construction impacts

Dust would be generated from earthworks associated with the construction of the proposed highway and the total amount of dust would depend on the silt and moisture content in the soil and the types of activities being carried out.

There are a number of activities involved in the construction process but the main sources would be blasting, the use of excavators, front-end loaders and dump trucks, as well as wind erosion from exposed areas.

8.1 Earth moving operations

In order to estimate what emissions may be expected in an area where drilling and blasting would occur, emissions have been calculated on information provided by AECOM and are summarised in **Table 8-1**. It has been assumed that the construction would occur over a 39 month period. Blasting, however, has been assumed to occur only at the beginning of construction for the first 24 months.

There would be other sources of dust such as vehicle movement on unsealed roads (an estimate for which has been made in **Table 8-1**), but these are not as easily quantifiable due to the highly variable distances travelled. The use of a water cart would assist to substantially reduce these emissions.

Table 8-1: Estimated dust emissions due to earthworks

Source/activity	Intensity	Emission factor[5]	Total dust emissions
Site setup and excavation (Time period – 39 months)			
Blasting	300 blasts	14 kg/blast[6]	4200 kg
Excavators on material	441,100 t[7]	0.0022 kg/t	970 kg
Front-end loaders moving material	441,100 t	0.0022 kg/t	970 kg
Haulage	441,100 t	0.0139 kg/t[8]	6130 kg
Surface area exposed to wind erosion	8 ha	0.4 kg/ha/h	91,100 kg
Total (over a 39 month period)			103,370 kg
Average annual emission			31,800 kg/y

t = tonne
kg = kilogram
kg/t = kilogram per tonne
kg/blast = kilogram per blast
kg/y = kilogram per year
kg/ha/h = kilogram per hectare per hour

[5] *Using equations from US EPA, 1995 and updates.*

[6] *Assuming 1600 square metres blasts and 150 blasts per year (300 total blasts over construction period).*

[7] *Assuming a density of 2.3 tonnes per bank cubic metre (used to convert cubic metres into tonnes for use with emission factors). Bank cubic metre refers to the amount of material when it is in the ground.) for the 192,000 cubic metres of rock to be excavated through Toolijooa Ridge.*

[8] *This assumes a truck capacity of about 36 tonne, travelling approximately 500 metres on unsealed/watered roads.*

Dust emissions of this scale are unlikely to cause any adverse impacts at the nearest residential areas. As a comparison, there are major dust producing industries such as quarries which emit dust at rates significantly greater than this and still comply with both health and nuisance long-term criteria. There may be short-term nuisance impacts at locations adjacent to the construction site and these would generally occur on days where wind speeds are elevated.

8.2 Wind erosion from proposed ancillary facilities

A simple modelling study was undertaken to estimate the impacts of wind erosion emissions from proposed ancillary facilities on sensitive receptors. It was assumed that all sites would be stockpile compounds and that all stockpiles were 50 per cent exposed at all times over a 12 month period, and subject to wind erosion 24 hours per day. This is a conservative (ie worst case) estimate as it is more likely that construction would occur in phases and therefore not all stockpiles would be active simultaneously for the whole year.

Predictions were made using a modified version of the United States Environment Protection Agency (USEPA) Industrial Source Complex model, namely ISCMOD[9], at sensitive receptors (residences) along the proposed route. Both maximum 24 hour and annual average PM_{10} concentrations were predicted as well as annual average total suspended particulates (TSP) concentrations and dust deposition levels. As discussed in Section 3.3, the maximum 24 hour and annual average PM_{10} criteria are 50 micrograms per cubic metre and 30 micrograms per cubic metre, respectively, and the annual average criterion for TSP is 90 micrograms per cubic metre.

In addition to this, airborne dust also has the potential to cause nuisance effects by depositing on surfaces, and deposition criteria are set to protect against these nuisance impacts (NSW DEC, 2005). The maximum acceptable increase in dust deposition over the existing dust levels from an amenity perspective is two grams per square metre per month. So for the project alone, the incremental criterion is two grams per square metre per month and for total deposition (including background) is four grams per square metre per month.

Modelling results for both concentration and deposition are shown in contour plots from **Figures 8-1** to **Figure 8-4**, and show that none of these annual concentration criteria are predicted to be exceeded due to wind erosion from the stockpile compounds along the alignment route. The highest predicted annual average PM_{10} level at any of the sensitive receptors was estimated to be approximately six micrograms per cubic metre, while the maximum predicted annual average TSP concentration at these receptors was 12 micrograms per cubic metre. These predictions are both well below their respective goals of 30 micrograms per cubic metre and 90 micrograms per cubic metre and are likely to remain so even when adding in a conservative background level.

Dust deposition predictions at a single residence (indicated as a red cross) showed an annual average level of three grams per square metre per month as a result of the project. This is an exceedance of the incremental criterion. However, this is unlikely to occur in reality given the conservative assumptions made about the wind erosion occurring from all stockpile compounds simultaneously for the entire year. Also, and perhaps more importantly, it should be noted that no dust mitigation measures (discussed in Section 9) have been incorporated into the modelling. With these measures in place, particularly at times of elevated wind speeds, emissions are likely to be lower than those modelled and within the criterion. Predictions at all other sensitive receptors remained well below the incremental criterion of two grams per square metre per month. It is also unlikely that the cumulative criterion would be exceeded at this receiver.

[9] *ISCMOD has been accepted for use in NSW by the EPA*

Predictions of 24 hour PM_{10} concentrations at almost all of the sensitive receptors were below 10 micrograms per cubic metre. One residence (identified with a red cross on **Figure 8-1)** is predicted to experience a maximum 24 hour PM_{10} concentration of 38 micrograms per cubic metre, which is below 50 micrograms per cubic metre criteria. Further review of results at that particular residence showed that there were only two days in the year where predictions were above 20 micrograms per cubic metre, and that the 90^{th} percentile 24 hour average PM_{10} level was very low at four micrograms per cubic metre.

This low 90^{th} percentile indicates that these higher values are infrequent and likely to be the result of winds blowing directly from the stockpile towards that particular receptor for a number of hours within the 24 hour period. Again, it should also be noted that mitigation measures have not been incorporated into the modelling, and on a 24 hour basis these can reduce ground level concentrations significantly. The implementation of the standard and best practice mitigation measures, discussed further in Section 9 is more than likely to be able to manage both the long-term deposition and short-term PM_{10} impacts.

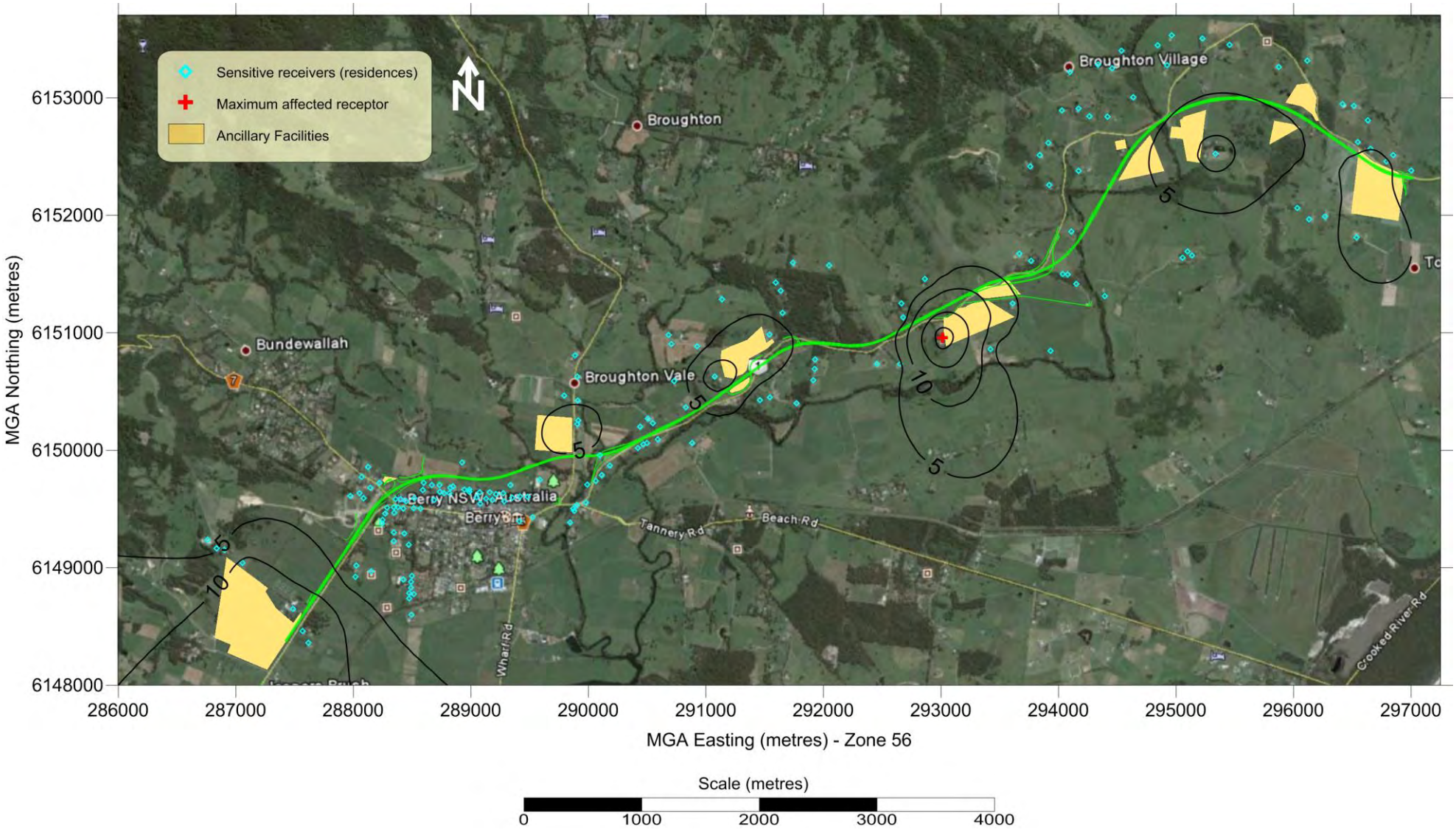

Figure 8-1: **Predicted maximum 24 hour average PM10 concentrations (unmitigated) due to wind erosion from the potential ancillary facilities locations (µg/m3)**

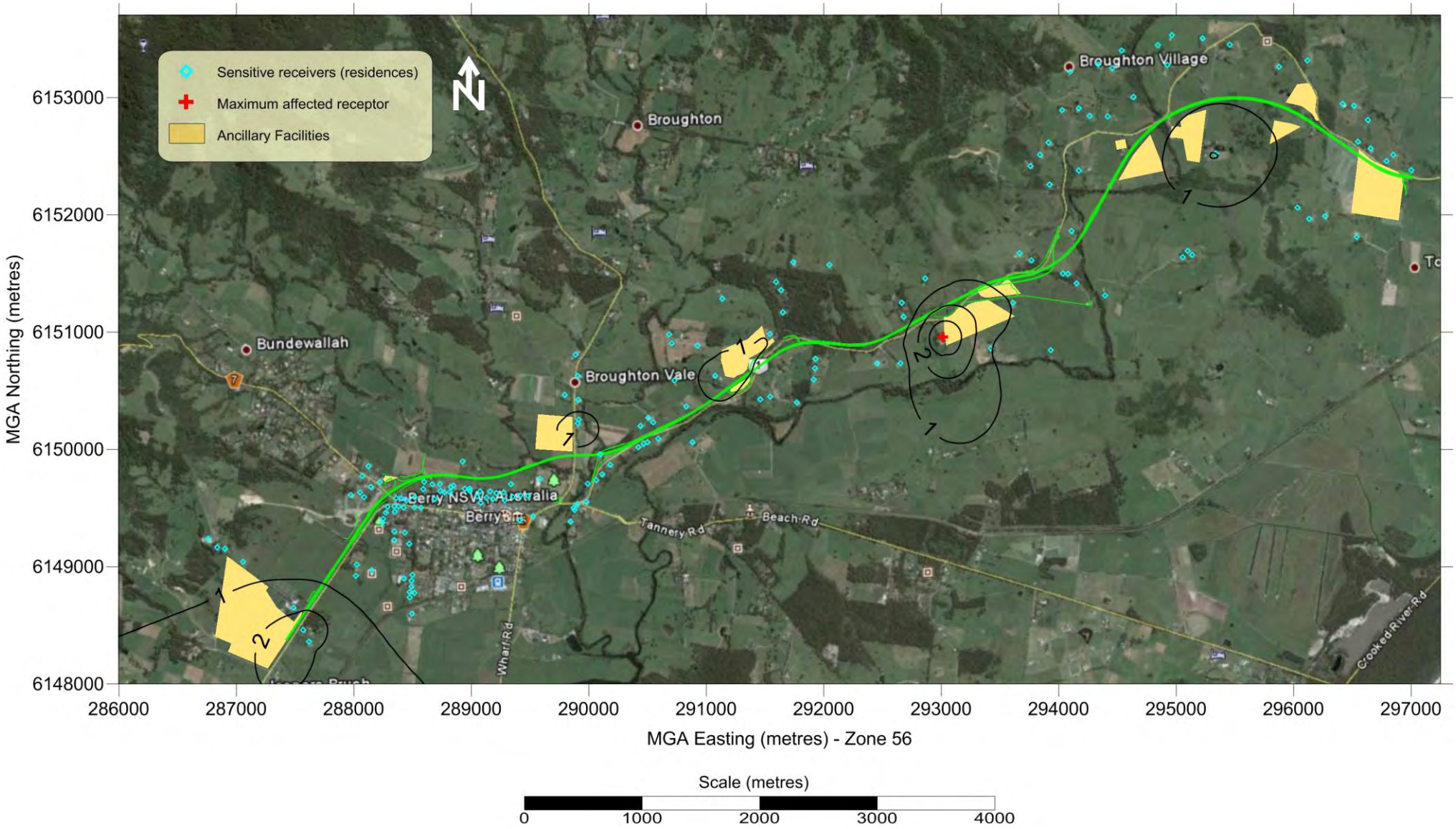

Figure 8-2: **Predicted annual average PM10 concentrations (unmitigated) due to wind erosion from the potential ancillary facilities locations (µg/m3)**

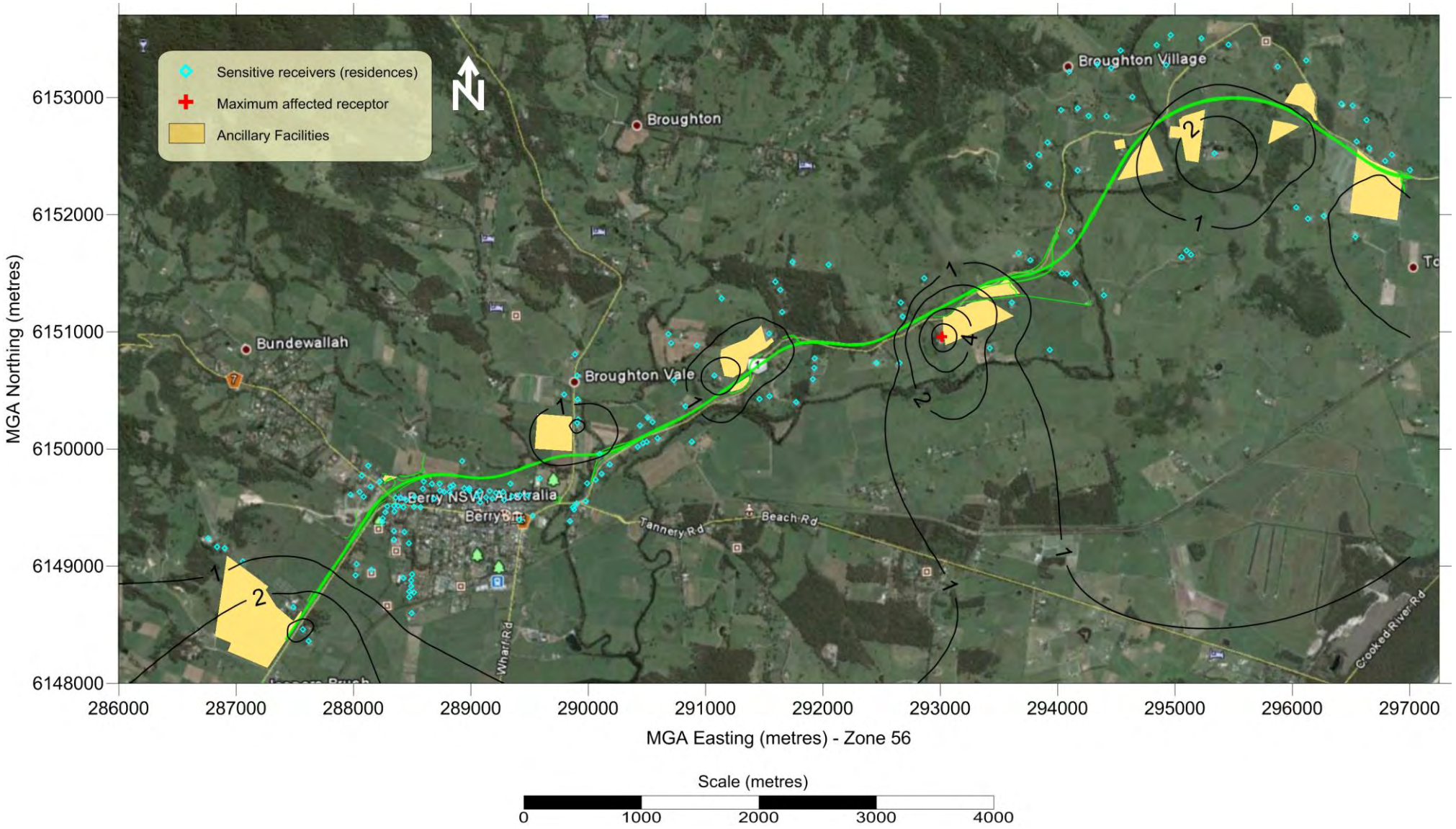

Figure 8-3: **Predicted annual average TSP concentrations (unmitigated) due to wind erosion from the potential ancillary facilities locations (µg/m3)**

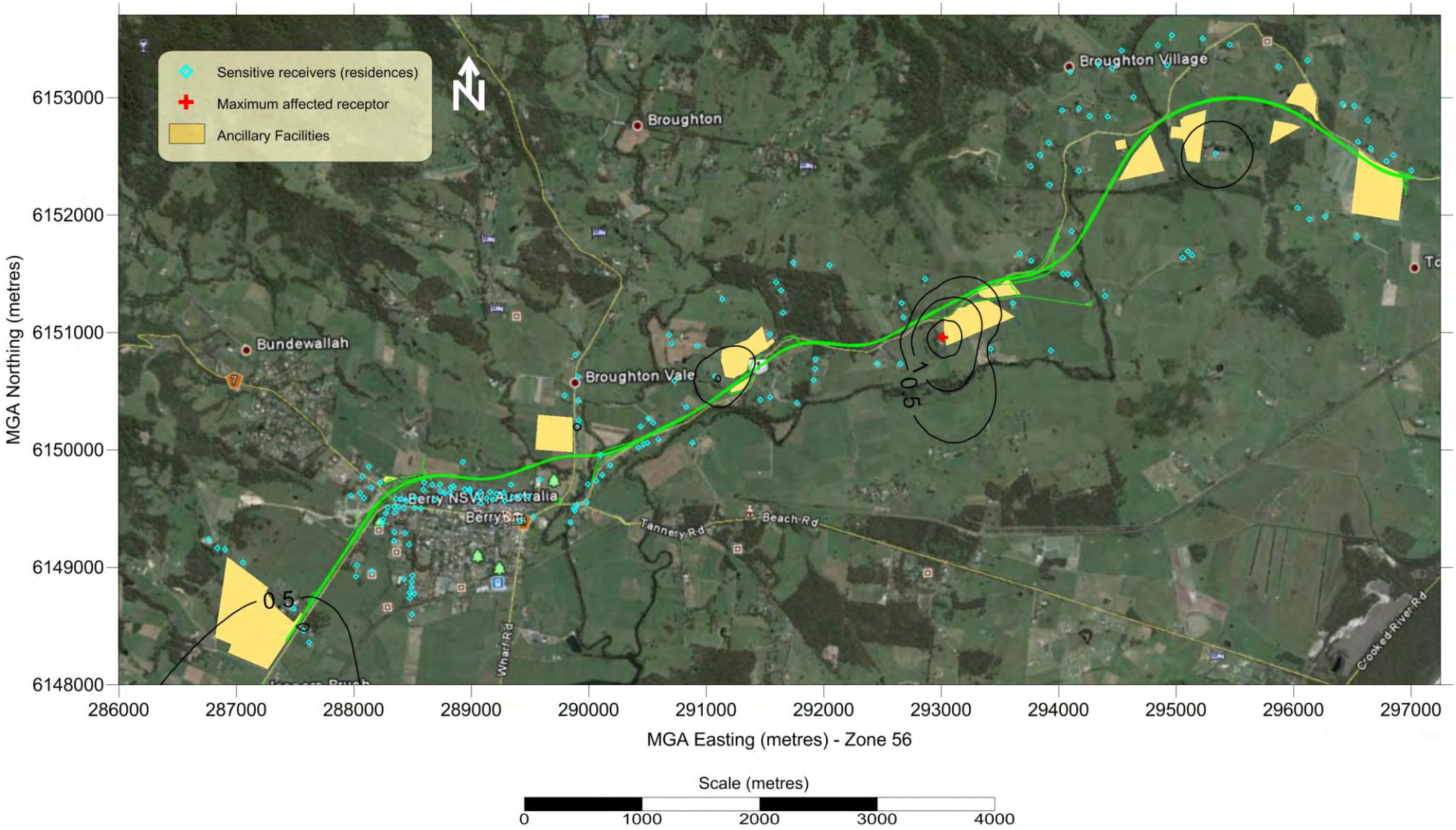

Figure 8-4: **Predicted annual average dust deposition (unmitigated) due to wind erosion from the potential ancillary facilities locations (g/m2/month)**

9 Dust mitigation and management

The EPA has reviewed the environmental hazards associated with construction/excavation sites and prepared a general document containing safeguards to protect the environment during such activities. Many of these safeguards relate to controlling water pollution and runoff. However, these procedures frequently assist in the control of air pollution. The recommendations of the EPA include mitigation measures such as:

- Watering of haul roads and sealing of roads, where possible.
- Maintenance of all trucks entering and leaving the site in accordance with the manufacturer's specification to comply with all relevant regulations. Fines may be imposed on vehicles that do not comply with smoke emission standards.
- Truck movement controlled on-site and restricted to designated roadways.
- Truck wheel washes or other dust removal procedures installed to minimise transport of dust off-site.
- If necessary, modification of construction activities during periods of high wind.
- Watering / revegetating of stockpiles and exposed areas.

It may be necessary to carry out dust monitoring at sensitive receptors during construction to determine compliance with dust deposition goals currently noted by the EPA and summarised in **Table 9-1** below. The interpretation of these goals is that the maximum total dust deposited should be no more than four grams per square metre per month over a twelve-month period. This total includes ambient levels already present in the area. The project alone should not contribute more than an additional two grams per square metre per month to this total, as indicated by the maximum increase listed in **Table 9-1**.

Table 9-1: EPA criteria for dust fallout

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

An air quality management plan (AQMP) for the proposed works is also recommended as part of an overall construction environmental management plan. The general principles of the AQMP are listed below.

- All disturbed areas would be stabilised as soon as practicable to prevent or minimise windblown dust.
- All unsealed trafficable areas would be kept sufficiently damp during working hours to minimise windblown or traffic generated dust emissions.
- Water sprays, sprinklers and water carts would be employed if needed to adequately dampen stockpiles, work areas and exposed soils to prevent the emission of dust from the site.
- Stockpiles and handling areas would be maintained in a condition that minimises windblown or traffic generated dust. Areas that may be inaccessible by water carts would be kept in a condition which minimises windblown or traffic generated dust using other means, such as alternative soil treatment or reduction of wind through use of windbreaks.

- All equipment for dust control would be kept in good operating condition. The equipment would be operable at all times with the exception of shutdowns required for maintenance. Construction equipment would be properly maintained to ensure exhaust emissions comply with the *Protection of the Environment Operations Act 1997.*
- Silt would be removed from behind filter fences and other erosion control structures on a regular basis, so that collected silt would not become a source of dust.
- Any dust, soil or mud deposited on public roads by subcontractors construction activities and vehicle movements would be removed immediately and disposed of appropriately.

10 Conclusions

The Caline series of dispersion models was used to predict concentrations of carbon monoxide, nitrogen dioxide and PM_{10} due to emissions from the project. The model was used to predict pollutant concentrations from vehicle emissions at the nearest residential receptors.

Predictions of ground-level concentrations from the existing alignment were also used to determine the potential changes due to the project. It was determined that the predictions for the project in 2017 and 2027 were generally lower than those for the existing alignment. The predicted concentrations of carbon monoxide, nitrogen dioxide, and PM_{10}, were found to be within the relevant EPA air quality standards.

Dust impacts associated with construction were also analysed using both qualitative and quantitative techniques. Emissions for drilling and blasting areas were calculated and determined to be minimal and not likely to result in adverse concentration or deposition impacts. Some preliminary modelling was undertaken for wind erosion emissions from stockpile compounds and assumed that all stockpile compounds are fully exposed simultaneously and all year. These were conservative assumptions and the modelling determined that there were unlikely to be any long-term PM_{10} or TSP adverse impacts at any of the sensitive receptors along the proposed alignment.

Dust deposition and short-term PM_{10} predictions indicated that although there may be impacts at one residence, these are unlikely and could be avoided or controlled by implementing standard and best practice management and mitigation measures as outlined in Section 9.

11 References

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Appendix A

Joint wind speed, wind direction and stability class frequency tables for the Gerroa Tip - 2000

STATISTICS FOR FILE: C:\Jobs\G2B\Met\Ger00_rev1.AUS
MONTHS: All
HOURS : All
OPTION: Frequency

PASQUILL STABILITY CLASS 'A'
Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000343	0.002862	0.001603	0.000114	0.000000	0.000000	0.000000	0.000000	0.004922
NE	0.001717	0.003320	0.002633	0.000572	0.000000	0.000000	0.000000	0.000000	0.008242
ENE	0.000916	0.001717	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.002862
E	0.001030	0.001030	0.000458	0.000000	0.000000	0.000000	0.000000	0.000000	0.002518
ESE	0.001145	0.000916	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.002175
SE	0.001030	0.003892	0.000916	0.000000	0.000000	0.000000	0.000000	0.000000	0.005838
SSE	0.002976	0.007784	0.002976	0.000458	0.000000	0.000000	0.000000	0.000000	0.014194
S	0.002633	0.006296	0.004235	0.001717	0.000000	0.000000	0.000000	0.000000	0.014881
SSW	0.002060	0.009272	0.006410	0.001832	0.000000	0.000000	0.000000	0.000000	0.019574
SW	0.003434	0.008585	0.004579	0.001259	0.000000	0.000000	0.000000	0.000000	0.017857
WSW	0.002976	0.011103	0.005266	0.000916	0.000000	0.000000	0.000000	0.000000	0.020261
W	0.004922	0.011905	0.010417	0.006410	0.000000	0.000000	0.000000	0.000000	0.033654
WNW	0.002060	0.006868	0.006983	0.004808	0.000000	0.000000	0.000000	0.000000	0.020719
NW	0.001946	0.002633	0.000687	0.000000	0.000000	0.000000	0.000000	0.000000	0.005266
NNW	0.000801	0.001145	0.000572	0.000229	0.000000	0.000000	0.000000	0.000000	0.002747
N	0.001145	0.001259	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.002518
CALM									0.003434
TOTAL	0.031136	0.080586	0.048191	0.018315	0.000000	0.000000	0.000000	0.000000	0.181662

MEAN WIND SPEED (m/s) = 2.74
NUMBER OF OBSERVATIONS = 1587

PASQUILL STABILITY CLASS 'B'
Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000687	0.001832	0.001946	0.000458	0.000000	0.000000	0.000000	0.000000	0.004922
NE	0.000687	0.005723	0.016598	0.014423	0.000000	0.000000	0.000000	0.000000	0.037431
ENE	0.000572	0.003205	0.007326	0.006181	0.000000	0.000000	0.000000	0.000000	0.017285
E	0.000229	0.001145	0.001488	0.000458	0.000000	0.000000	0.000000	0.000000	0.003320
ESE	0.000572	0.001374	0.000458	0.000000	0.000000	0.000000	0.000000	0.000000	0.002404
SE	0.001717	0.006181	0.001145	0.000000	0.000000	0.000000	0.000000	0.000000	0.009043
SSE	0.002633	0.003663	0.000687	0.000229	0.000000	0.000000	0.000000	0.000000	0.007212
S	0.001030	0.006067	0.002175	0.000458	0.000000	0.000000	0.000000	0.000000	0.009730
SSW	0.001717	0.001946	0.000916	0.000000	0.000000	0.000000	0.000000	0.000000	0.004579
SW	0.000801	0.001374	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.002289
WSW	0.002862	0.005037	0.000343	0.000114	0.000000	0.000000	0.000000	0.000000	0.008356
W	0.004006	0.013851	0.002060	0.000343	0.000000	0.000000	0.000000	0.000000	0.020261
WNW	0.001488	0.003205	0.003892	0.000916	0.000000	0.000000	0.000000	0.000000	0.009501
NW	0.000458	0.000687	0.000343	0.000114	0.000000	0.000000	0.000000	0.000000	0.001603
NNW	0.000343	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000343
N	0.000458	0.000458	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000916
CALM									0.001374
TOTAL	0.020261	0.055746	0.039492	0.023695	0.000000	0.000000	0.000000	0.000000	0.140568

MEAN WIND SPEED (m/s) = 3.02
NUMBER OF OBSERVATIONS = 1228

PASQUILL STABILITY CLASS 'C'
Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000114	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000343
NE	0.000114	0.003320	0.004579	0.003434	0.000000	0.000000	0.000000	0.000000	0.011447
ENE	0.000343	0.003205	0.004006	0.004579	0.000000	0.000000	0.000000	0.000000	0.012134
E	0.000458	0.003892	0.004121	0.001488	0.000000	0.000000	0.000000	0.000000	0.009959
ESE	0.000801	0.008242	0.004121	0.000229	0.000000	0.000000	0.000000	0.000000	0.013393
SE	0.001488	0.003320	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.004922
SSE	0.001259	0.000801	0.000572	0.000000	0.000000	0.000000	0.000000	0.000000	0.002633
S	0.000229	0.000687	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000916
SSW	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000229
SW	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000229
WSW	0.000916	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001145
W	0.003549	0.006754	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.010531
WNW	0.003434	0.002747	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.006296
NW	0.000916	0.000229	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.001259
NNW	0.000343	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000343
N	0.000000	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000114
CALM									0.001946
TOTAL	0.014423	0.033768	0.017972	0.009730	0.000000	0.000000	0.000000	0.000000	0.077839

MEAN WIND SPEED (m/s) = 2.71
NUMBER OF OBSERVATIONS = 680

PASQUILL STABILITY CLASS 'D'
Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000916	0.000572	0.005037	0.000916	0.000114	0.000000	0.000000	0.000000	0.007555
NE	0.001832	0.003091	0.016827	0.006410	0.007212	0.000229	0.000000	0.000000	0.035600
ENE	0.001603	0.001145	0.001946	0.001145	0.000458	0.000000	0.000000	0.000000	0.006296
E	0.000458	0.000801	0.000916	0.000000	0.000572	0.000000	0.000000	0.000000	0.002747
ESE	0.000343	0.000572	0.001374	0.000000	0.000114	0.000000	0.000000	0.000000	0.002404
SE	0.000229	0.000114	0.000687	0.000000	0.000000	0.000000	0.000000	0.000000	0.001030
SSE	0.000114	0.000000	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.000343
S	0.000000	0.000000	0.002747	0.001259	0.000114	0.000000	0.000000	0.000000	0.004121
SSW	0.000000	0.000000	0.002747	0.001374	0.000114	0.000000	0.000000	0.000000	0.004235
SW	0.000114	0.000000	0.001832	0.001030	0.000000	0.000000	0.000000	0.000000	0.002976
WSW	0.000458	0.000114	0.003549	0.001145	0.000000	0.000000	0.000000	0.000000	0.005266
W	0.009615	0.013851	0.014766	0.009158	0.004464	0.000343	0.000114	0.000000	0.052312
WNW	0.027816	0.020604	0.005838	0.003434	0.002289	0.000114	0.000114	0.000000	0.060211
NW	0.008814	0.001374	0.000801	0.000114	0.000114	0.000000	0.000000	0.000000	0.011218
NNW	0.004808	0.000114	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.005151
N	0.002747	0.000114	0.000343	0.000000	0.000000	0.000000	0.000000	0.000000	0.003205
CALM									0.006525
TOTAL	0.059867	0.042468	0.059867	0.025984	0.015568	0.000687	0.000229	0.000000	0.211195

MEAN WIND SPEED (m/s) = 2.96
NUMBER OF OBSERVATIONS = 1845

PASQUILL STABILITY CLASS 'E'
Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.004006	0.004006	0.001488	0.000000	0.000000	0.000000	0.000000	0.000000	0.009501
NE	0.004464	0.011790	0.000801	0.000000	0.000000	0.000000	0.000000	0.000000	0.017056
ENE	0.001603	0.003777	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.005495
E	0.001145	0.001030	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.002175
ESE	0.000343	0.001145	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001488
SE	0.000000	0.000343	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000343
SSE	0.000343	0.000458	0.000801	0.000000	0.000000	0.000000	0.000000	0.000000	0.001603
S	0.000114	0.000343	0.001145	0.000000	0.000000	0.000000	0.000000	0.000000	0.001603
SSW	0.000229	0.000916	0.002289	0.000000	0.000000	0.000000	0.000000	0.000000	0.003434
SW	0.000229	0.001374	0.001374	0.000000	0.000000	0.000000	0.000000	0.000000	0.002976
WSW	0.003320	0.005151	0.002633	0.000000	0.000000	0.000000	0.000000	0.000000	0.011103
W	0.015797	0.048077	0.003320	0.000000	0.000000	0.000000	0.000000	0.000000	0.067193
WNW	0.021864	0.018086	0.000916	0.000000	0.000000	0.000000	0.000000	0.000000	0.040865
NW	0.012134	0.001832	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.014080
NNW	0.004350	0.000916	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.005380
N	0.004235	0.000687	0.000229	0.000000	0.000000	0.000000	0.000000	0.000000	0.005151
CALM									0.007898
TOTAL	0.074176	0.099931	0.015339	0.000000	0.000000	0.000000	0.000000	0.000000	0.197344

MEAN WIND SPEED (m/s) = 1.79
NUMBER OF OBSERVATIONS = 1724

PASQUILL STABILITY CLASS 'F'
Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.005266	0.008814	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.014080
NE	0.006525	0.009730	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.016255
ENE	0.002633	0.001717	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.004350
E	0.001603	0.000572	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.002175
ESE	0.002289	0.002289	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.004579
SE	0.001717	0.001946	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.003663
SSE	0.001603	0.002633	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.004235
S	0.001145	0.001374	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.002518
SSW	0.002747	0.004693	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.007440
SW	0.004235	0.007440	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.011676
WSW	0.006410	0.014995	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.021406
W	0.010646	0.019918	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.030563
WNW	0.012935	0.008585	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.021520
NW	0.011447	0.002747	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.014194
NNW	0.005952	0.001374	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.007326
N	0.008013	0.003892	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.011905
CALM									0.013507
TOTAL	0.085165	0.092720	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.191392

MEAN WIND SPEED (m/s) = 1.54
NUMBER OF OBSERVATIONS = 1672

ALL PASQUILL STABILITY CLASSES
Wind Speed Class (m/s)

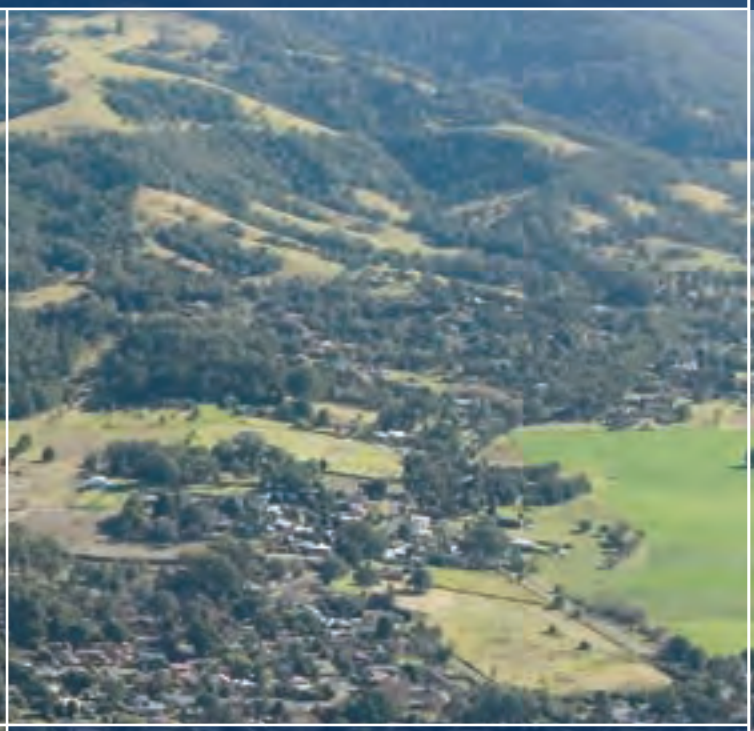
WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.011332	0.018315	0.010073	0.001488	0.000114	0.000000	0.000000	0.000000	0.041323
NE	0.015339	0.036973	0.041438	0.024840	0.007212	0.000229	0.000000	0.000000	0.126030
ENE	0.007669	0.014766	0.013622	0.011905	0.000458	0.000000	0.000000	0.000000	0.048420
E	0.004922	0.008471	0.006983	0.001946	0.000572	0.000000	0.000000	0.000000	0.022894
ESE	0.005495	0.014538	0.006067	0.000229	0.000114	0.000000	0.000000	0.000000	0.026442
SE	0.006181	0.015797	0.002862	0.000000	0.000000	0.000000	0.000000	0.000000	0.024840
SSE	0.008929	0.015339	0.005266	0.000687	0.000000	0.000000	0.000000	0.000000	0.030220
S	0.005151	0.014766	0.010302	0.003434	0.000114	0.000000	0.000000	0.000000	0.033768
SSW	0.006983	0.016827	0.012363	0.003205	0.000114	0.000000	0.000000	0.000000	0.039492
SW	0.009043	0.018773	0.007898	0.002289	0.000000	0.000000	0.000000	0.000000	0.038004
WSW	0.016941	0.036630	0.011790	0.002175	0.000000	0.000000	0.000000	0.000000	0.067537
W	0.048535	0.114354	0.030792	0.015911	0.004464	0.000343	0.000114	0.000000	0.214515
WNW	0.069597	0.060096	0.017743	0.009158	0.002289	0.000114	0.000114	0.000000	0.159112
NW	0.035714	0.009501	0.002060	0.000229	0.000114	0.000000	0.000000	0.000000	0.047619
NNW	0.016598	0.003549	0.000916	0.000229	0.000000	0.000000	0.000000	0.000000	0.021291
N	0.016598	0.006525	0.000687	0.000000	0.000000	0.000000	0.000000	0.000000	0.023810
CALM									0.034684
TOTAL	0.285027	0.405220	0.180861	0.077724	0.015568	0.000687	0.000229	0.000000	1.000000

MEAN WIND SPEED (m/s) = 2.40
NUMBER OF OBSERVATIONS = 8736

FREQUENCY OF OCCURENCE OF STABILITY CLASSES

A : 18.2%
B : 14.1%
C : 7.8%
D : 21.1%
E : 19.7%
F : 19.1%

NSW GOVERNMENT
Transport
Roads & Maritime
Services



Foxground and Berry bypass

Princes Highway upgrade

Volume 2 – Appendix O

Greenhouse gas and climate change

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Appendix O: Detailed GHG assessment results, GHG emissions activity data and calculation methodology

Detailed GHG assessment results

Table O-1 gives the Greenhouse gas (GHG) assessment results for the GHG emissions estimated to occur during construction of the project, reported according to Scope 1, Scope 2, Scope 3 and total emissions.

Table O-1: Detailed construction GHG emissions assessment results

Emission source category	Emission source	Quantity	Unit	GHG emissions (t CO_2-e)				
				Scope 1	Scope 2	Scope 3	Total	% Total
Fuel - diesel	Mobile equipment	17,315.1	kilolitres (kL)	46,658.4	0.0	3,542.3	**50,200.7**	**50.41**
	Transport - site vehicles	489.6	kilolitres (kL)	1,319.3	0.0	100.2	**1,419.5**	**1.43**
	Transport - material delivery	463.1	kilolitres (kL)	0.0	0.0	1,342.8	**1,342.8**	**1.35**
	Transport - equipment delivery	1.5	kilolitres (kL)	0.0	0.0	4.2	**4.2**	**0.00**
	Transport - earthworks	364.0	kilolitres (kL)	980.9	0.0	74.5	**1,055.4**	**1.06**
	Transport - spoil removal	191.1	kilolitres (kL)	0.0	0.0	554.0	**554.0**	**0.56**
	Transport - vegetation removal	4.9	kilolitres (kL)	0.0	0.0	14.1	**14.1**	**0.01**
Materials	Pavement - aggregate	214,414.0	tonnes (t)	0.0	0.0	857.7	**857.7**	**0.86**
	Concrete	107,886.6	tonnes (t)	0.0	0.0	13,701.6	**13,701.6**	**13.76**
	Pavement - cement	6,304.2	tonnes (t)	0.0	0.0	5,169.4	**5,169.4**	**5.19**
	Sand	45,740.0	tonnes (t)	0.0	0.0	137.2	**137.2**	**0.14**
	Structural Steel	14,726.3	tonnes (t)	0.0	0.0	15,462.6	**15,462.6**	**15.53**
	Pavement - hot mix asphalt	113,032.8	tonnes (t)	0.0	0.0	6,555.9	**6,555.9**	**6.58**
	Pavement - bitumen	525.2	tonnes (t)	0.0	0.0	330.8	**330.8**	**0.33**
	Pavement - lime	2,547.7	tonnes (t)	0.0	0.0	2,777.0	**2,777.0**	**2.79**
	Gravel	600.0	tonnes (t)	0.0	0.0	2.6	**2.6**	**0.00**
Totals				**48,958.6**	**0.0**	**50,626.9**	**99,585.5**	**100**
% Total				**49.2**	**0.0**	**50.8**	**100.0**	

Table O-2 gives the GHG emissions associated with the use of electricity in site offices and the clearing of vegetation. These emissions sources were removed from the GHG assessment boundary, based on materiality criteria. Table 3.3 in the Supporting Document for the *Greenhouse Gas Assessment Workbook for Road projects* (the Workbook) (Transport Authorities Greenhouse Group (TAGG), 2011) lists vegetation removal as an emission source that may be insignificant and removed from the GHG assessment boundary on a project specific basis. Additionally, Table 3.3 of the Supporting document recommends excluding the use of electricity in site offices from the GHG assessment boundary, as it would generally be insignificant to the assessment. The GHG emissions associated with these activities are listed below for information purposes, however they do not form part of the GHG assessment boundary of GHG emissions associated with construction of the project, as when calculated, these emission source categories represented less than five per cent of the GHG inventory.

Table O-2: Construction GHG emissions assessment results – immaterial emissions

Emission source category	Emission source	Quantity	Unit	GHG emissions (t CO_2-e)			
				Scope 1	Scope 2	Scope 3	Total
Electricity	Site offices	87,600	kWh	0.0	78.0	14.9	**92.9**
Land use Change	Vegetation removal - undisturbed	26.0	hectares (ha)	12.7	0.0	0.0	**12.7**
Land use Change	Vegetation removal - disturbed	86.4	hectares (ha)	7.8	0.0	0.0	**7.8**

Greenhouse gas emissions activity data

This section details the quantification of the GHG emission source data used for estimating the GHG emissions associated with construction, operation and maintenance of the project, including the sources of information used and assumptions made.

Table O-3 to **Table O-7** details the GHG emission source data used in the GHG assessment, including assumptions and information sources.

Table O-3: GHG emission source data used in the GHG assessment

Emission source category	Emission source	Quantity	Unit	Source	Assumptions
Fuel – diesel (construction)	Mobile equipment	17,315.1	kL	Equipment types and hours of operation: Cost Estimate (Risk Summary Rev D dated January 2012) Equipment Rate of Fuel Consumption: Workbook and California EPA OFFROAD inventory database	Refer to **Table O-3** below: Emission Source Data: Diesel Fuel Use
	Transport - site vehicles	489.6	kL	Workbook Table 5.3 Default Quantity Factors - Site offices and vehicles	Large project with 4 sites along road, each with 10 hilux utes, all diesel operated, over 36 construction months
	Transport - material delivery	463.1	kL	Vehicle capacity, haulage quantity, number of trips: FBB Traffic and Transport Assessment November 2011	Refer to **Table O-4** below: Emission Source Data: Transport Fuel Use
	Transport - equipment delivery	1.5	kL	Equipment Types: Cost Estimate (Risk Summary Rev D dated January 2012)	Refer to **Table O-4** below: Emission Source Data: Transport Fuel Use
	Transport - earthworks	364.0	kL	Vehicle capacity : FBB Traffic and Transport Assessment November 2011 Haulage Quantity: Cost Estimate (Risk Summary Rev D dated January 2012) and AECOM Quantity estimate update_120706_pavement and earthworks	Refer to **Table O-4** below: Emission Source Data: Transport Fuel Use
	Transport - spoil removal	191.1	kL	Excess earthworks material: Cost Estimate (Risk Summary Rev D dated January 2012) and AECOM Quantity estimate update_120706_pavement and earthworks	Refer to **Table O-4** below: Emission Source Data: Transport Fuel Use
	Transport - vegetation removal	4.9	kL	Vegetation removal quantity: email from Brett Morrisey, Biosis Research, dated 12 January 2012	Refer to **Table O-4** below: Emission Source Data: Transport Fuel Use
Electricity consumption	Site offices	87,600.0	kWh	-	Five houses used as site offices, with an average electricity consumption of 7300kWh (NSW Government Power Use in NSW accessed 19/01/2012 http://www.savepower.nsw.gov.au/get-the-facts/power-use-in-nsw.aspx), over a period of 2.4 years per house.

Emission source category	Emission source	Quantity	Unit	Source	Assumptions
Vegetation Removal	Vegetation removal - undisturbed	26.0	ha	Vegetation removal quantity: email from Brett Morrisey, Biosis Research, dated 12 January 2012	-
Vegetation Removal	Vegetation removal - disturbed	86.4	ha	Vegetation removal quantity: email from Brett Morrisey, Biosis Research, dated 12 January 2012	-
Materials usage - construction	Pavement - aggregate	214,414.0	t	Cost Estimate (Risk Summary Rev D dated January 2012) and AECOM Quantity estimate update_120706_pavement and earthworks Bridge steel and concrete quantities sourced from AECOM	Refer to **Table O-5** below: Emission Source Data: Materials
	Concrete	107,886.6	t		
	Pavement - cement	6,304.2	t		
	Sand	45,740.0	t		
	Structural steel	14,726.3	t		
	Pavement - hot mix asphalt	113,032.8	t		
	Pavement - bitumen	525.2	t		
	Pavement - lime	2,547.7	t		
	Gravel	600.0	t		
Electricity consumption	Street lighting	59,130.0	kWh	Wattage of lamps: Workbook, Table 6.3, for freeway ramps and arterial roads Number of lights: AECOM design	250 Watt lamps 54 lights 12 hours of operation per day, 365 days per year
	Variable message sign	10,512.0	kWh	Wattage of variable message sign: Workbook, Table 6.3 Number of variable message signs: Cost Estimate (Risk Summary Rev D dated January 2012)	1200 Watt 1 variable message sign 24 hours of operation per day, 365 days per year
Fuel combustion – diesel – operation and maintenance	Mobile equipment	2,576.2	kL	Workbook default quantity factor for maintenance activities Table 7.3	One major rehabilitation with top 150mm replaced - once every 50 years and 5% of road replaced every 50 years for patching/repair (TAGG, 2011)
	Transport - material delivery	516.5	kL	-	10 tonne Articulated truck, with fuel efficiency of 54.6 L/100km, average return trip distance of 70km.

Emission source category	Emission source	Quantity	Unit	Source	Assumptions
Materials usage - maintenance	Pavement - aggregate	38,368.9	t	Based on construction material quantities	One major rehabilitation with top 150mm replaced - once every 50 years and 5% of road replaced every 50 years for patching/repair (TAGG 2011)
	Pavement - cement	315.2	t		
	Pavement - hot mix asphalt	95,773.0	t		
	Pavement - bitumen	551.4	t		
	Pavement - lime	127.4	t		

Table O-4: Emission source data: diesel fuel use

Emission Activity	Quantity	Unit	Equipment	Equipment Category	Duration of operation	Unit	Months of operation	Rate of fuel use (kL/UOM)	UOM	Quantity of Diesel Used (kL)	Assumptions
SMZ layer	70,000.0	m^3	140 grader	Grader	1,795.1	hr	6.0	5.1	Months	30.5	Class 110, Medium application, 300 hours/month (TAGG 2011)
Cut to fill	1,000,000.0	m^3	14G grader		16,666.4	hr	55.6	5.1	Months	283.3	
SMZ layer	70,000.0	m^3	14G grader		2,333.2	hr	7.8	5.1	Months	39.7	
Surcharge loading	30,000.0	m^3	14G grader		429	hr	1.4	5.1	Months	7.3	
Rip floor, trim and compact	116,125.0	m^2	Grader		774	hr	2.6	5.1	Months	13.2	
250mm DGS 40	53,983.7	m^2	Grader		540	hr	1.8	5.1	Months	9.2	
250mm DGS 40	53,983.7	m^2	Grader		416	hr	1.4	5.1	Months	7.1	
150mm DGB 20	51,413.6	m^2	Grader		386	hr	1.3	5.1	Months	6.6	
150mm DGB 20	51,413.6	m^2	Grader		428	hr	1.4	5.1	Months	7.3	
275mm heavily bound base	262,577.9	m^2	Grader		4814	hr	16.0	5.1	Months	81.8	
275mm heavily bound base	262,577.9	m^2	Grader		2387	hr	8.0	5.1	Months	40.6	
300mm DGB 20	10,500.0	m^2	Grader		79	hr	0.3	5.1	Months	1.3	
300mm DGB 20	10,500.0	m^2	Grader		88	hr	0.3	5.1	Months	1.5	
Cut to fill	1,000,000.0	m^3	25t artic dumps	-	149,999.7	hr		0.06	hr	9000.0	Assumed average rate of fuel consumption of 60L/hr
Cut to fill	1,000,000.0	m^3	825 compactor		16,666.4	hr		0.06	hr	1000.0	Assumed average rate of fuel consumption of 60L/hr
Surcharge loading	30,000.0	m^3	825 compactor		429	hr	-	0.06	hr	25.7	Assumed average rate of fuel consumption of 60L/hr

Emission Activity	Quantity	Unit	Equipment	Equipment Category	Duration of operation	Unit	Months of operation	Rate of fuel use (kL/UOM)	UOM	Quantity of Diesel Used (kL)	Assumptions
Hay bales	1,368.0	No	Backhoe	Backhoe loader (backhoe)	45.6	hr	0.2	3	Months	0.5	4WD Class 2 to Class 5, medium application, 300 hours/month (TAGG 2011)
Subsoil drains	45,600.0	m	Backhoe		4560	hr	15.2	3	Months	45.6	
500mm drainage layer	20,000.0	m^2	CA30 roller	Vibrating Roller (asphalt, soil)	167	hr	0.6	4.8	Months	2.7	Class VR35, Medium application, 300 hours/month (TAGG 2011)
SMZ layer	70,000.0	m^3	CA30 roller 50%		1,167.1	hr	3.9	4.8	Months	18.7	
Cut to fill	1,000,000.0	m^3	CA30 roller dry		8,333.6	hr	27.8	4.8	Months	133.3	
Sediment basins	16.0	No	Roller		600.0	hr	2.0	4.8	Months	9.6	
SMZ layer	70,000.0	m^3	Roller		2,333.2	hr	7.8	4.8	Months	37.3	
SMZ layer	70,000.0	m^3	Roller		1,795.1	hr	6.0	4.8	Months	28.7	
Excavate and dispose on site to Preload area	150,000.0	m^3	Roller		2,999.9	hr	10.0	4.8	Months	48.0	
Rip floor, trim and compact	116,125.0	m^2	Roller		774	hr	2.6	4.8	Months	12.4	
250mm DGS 40	53,983.7	m^2	Roller		539.6	hr	1.8	4.8	Months	8.6	
250mm DGS 40	53,983.7	m^2	Roller		415.5	hr	1.4	4.8	Months	6.6	
150mm DGB 20	51,413.6	m^2	Roller		386	hr	1.3	4.8	Months	6.2	
150mm DGB 20	51,413.6	m^2	Roller		428	hr	1.4	4.8	Months	6.8	
275mm heavily bound base	262,577.9	m^2	Roller		4814	hr	16.0	4.8	Months	77.0	
275mm heavily bound base	262,577.9	m^2	Roller		2387	hr	8.0	4.8	Months	38.2	
300mm DGB 20	10,500.0	m^2	Roller		79	hr	0.3	4.8	Months	1.3	
300mm DGB 20	10,500.0	m^2	Roller		88	hr	0.3	4.8	Months	1.4	

Emission Activity	Quantity	Unit	Equipment	Equipment Category	Duration of operation	Unit	Months of operation	Rate of fuel use (kL/UOM)	UOM	Quantity of Diesel Used (kL)	Assumptions
Rock-extra over	103,830.0	m^3	D10150m^3/ hr	Tractor Dozer	277.0	hr	0.9	12.9	Months	11.9	Class 300C (D9 size) Medium application, 300 hours/month (TAGG 2011)
Rock-extra over	103,830.0	m^3	D10 to push		311.0	hr	1.0	12.9	Months	13.4	
Cut to fill	1,000,000.0	m^3	D6 dozer		16,666.4	hr	55.6	12.9	Months	716.7	
Surcharge loading	30,000.0	m^3	D6 dozer		429	hr	1.4	12.9	Months	18.4	
Sediment basins	16.0	No	Dozer @ 40m^3/hr		600.0	hr	2.0	12.9	Months	25.8	
Rip floor, trim and compact	116,125.0	m^2	Dozer D10		774	hr	2.6	12.9	Months	33.3	
Clear and grubb	3.0	ha	Dozer D6		14.0	hr	0.0	12.9	Months	0.6	
Excavate and dispose on site to preload area	150,000.0	m^3	Dozer D6 @ 50m^3/hr		2,999.9	hr	10.0	12.9	Months	129.0	
Clear and grubb	3.0	ha	Dozer D8		10.0	hr	0.0	12.9	Months	0.4	
Remove and stockpile topsoil	108,634.0	m^3	Dozer push up		1,358.0	hr	4.5	12.9	Months	58.4	
Clear and grubb	3.0	ha	Exc + grab	Excavator (digger, trackhoe)	48.0	hr	0.2	5.1	Months	0.8	Crawler class 100, medium application, 300 hours/month (TAGG 2011)
Clear and grubb	3.0	ha	Exc + grab		8.0	hr	0.0	5.1	Months	0.1	
Revetment	12,000.0	m^2	Excavation		3600	m^3	12.0	5.1	Months	61.2	
Transverse RCBC	60.0	m	Excavation		1380	m^3	4.6	5.1	Months	23.5	
Transverse RCBC	10.0	m	Excavation		300	m^3	1.0	5.1	Months	5.1	
Transverse RCBC	80.0	m	Excavation		672	m^3	2.2	5.1	Months	11.4	
Truck cleaning facilities	6.0	No	Excavator		48.0	hr	0.2	5.1	Months	0.8	
Sediment basins	16.0	No	Excavator		600.0	hr	2.0	5.1	Months	10.2	
Headwalls	44.0	No	Excavator		88	hr	0.3	5.1	Months	1.5	

Emission Activity	Quantity	Unit	Equipment	Equipment Category	Duration of operation	Unit	Months of operation	Rate of fuel use (kL/UOM)	UOM	Quantity of Diesel Used (kL)	Assumptions
Remove and stockpile topsoil	108,634.0	m^3	Excavator @ 80m^3/hr		1,358.0	hr	4.5	5.1	Months	23.1	
Excavate and dispose on site to Preload area	150,000.0	m^3	Excavator @50m3/hr		2,999.9	hr	10.0	5.1	Months	51.0	
Cut to fill	1,000,000.0	m^3	Excavator PC300 @ 60m^3/hr		16,666.4	hr	55.6	5.1	Months	283.3	
500mm drainage layer	20,000.0	m^2	Loader	Loader - wheeled	167	hr	0.6	4.5	Months	2.5	Class 50WL, Medium application, 300 hours/month (TAGG 2011)
Silt fence	19,950.0	m	Loader/ dozer with rip		456.0	hr	1.5	4.5	Months	6.8	
Remove and stockpile topsoil	108,634.0	m^3	Moxies x 20min hauls		4,074.0	hr	-	0.06	hr	244.4	Assumed average rate of fuel consumption of 60L/hr
Clear and grubb	3.0	ha	S/Plant		32.0	hr	-	0.06	hr	1.9	Assumed average rate of fuel consumption of 60L/hr
Clear and grubb	3.0	ha	S/Plant		40.0	hr	-	0.06	hr	2.4	Assumed average rate of fuel consumption of 60L/hr
Cut to fill	1,000,000.0	m^3	Spotter	Spotter	8,333.6	hr		0.06	hr	500.0	Assumed average rate of fuel consumption of 60L/hr
SMZ layer	70,000.0	m^3	Spotter		2,333.2	hr		0.06	hr	140.0	
500mm drainage layer	20,000.0	m^2	Spotter		167	hr	-	0.06	hr	10.0	
Surcharge loading	30,000.0	m^3	Spotter		429	hr	-	0.06	hr	25.7	

Emission Activity	Quantity	Unit	Equipment	Equipment Category	Duration of operation	Unit	Months of operation	Rate of fuel use (kL/UOM)	UOM	Quantity of Diesel Used (kL)	Assumptions
Truck cleaning facilities	6.0	No	Truck	Truck	48.0	hr	-	0.0995		4.8	Fuel consumption for 'off-highway trucks' sourced from the California EPA OFFROAD inventory database, for 500HP (average) truck
Clear and grubb	3.0	ha	Truck		192.0	hr	-	0.0995	-	19.1	
Clear and grubb	3.0	ha	Truck		32.0	hr	-	0.0995	-	3.2	
Cut to fill	1,175,242.0	m^3	Truck haul		1,175,242.0	m^3	-	-	-	-	Already accounted for
Clear and grubb	3.0	ha	Tub grinder	Tub grinder	48.0	hr	-	0.07	hr	3.4	Fuel consumption for 'chippers/stump grinders' sourced from the California EPA OFFROAD inventory database, for 500HP (average)
Clear and grubb	3.0	ha	Tub grinder		8.0	hr	-	0.07	hr	0.6	
Sediment basins	16.0	No	Water cart	Water cart	600.0	hr	-	0.045	hr	27.0	Fuel consumption for 'hydrant truck' sourced from the California EPA OFFROAD inventory database
Cut to fill	1,000,000.0	m^3	Water cart		66,667.1	hr		0.045	hr	3000.0	
SMZ layer	70,000.0	t	Water cart		2,333.2	hr		0.045	hr	105.0	
SMZ layer	70,000.0	t	Water cart		1,795.1	hr		0.045	hr	80.8	
Excavate and dispose on site to Preload area	150,000.0	m^3	Water cart		2,999.9	hr		0.045	hr	135.0	
Rip floor, trim and compact	116,125.0	m^2	Water cart		774	hr	-	0.045	hr	34.8	
Surcharge loading	30,000.0	m^3	Water cart		857	hr	-	0.045	hr	38.6	
250mm DGS 40	53,983.7	m^2	Water cart		540	hr	-	0.045	hr	24.3	
250mm DGS 40	53,983.7	m^2	Water cart		416	hr	-	0.045	hr	18.7	
150mm DGB 20	51,413.6	m^2	Water cart		386	hr	-	-0.045	hr	17.4	

Emission Activity	Quantity	Unit	Equipment	Equipment Category	Duration of operation	Unit	Months of operation	Rate of fuel use (kL/UOM)	UOM	Quantity of Diesel Used (kL)	Assumptions
150mm DGB 20	51,413.6	m^2	Water cart		428	hr	-	0.045	hr	19.3	
275mm heavily bound base	262,577.9	m^2	Water cart		4814	hr	-	0.045	hr	216.6	
275mm heavily bound base	262,577.9	m^2	Water cart		2387	hr	-	-0.045	hr	107.4	
300mm DGB 20	10,500.0	m^2	Water cart		79	hr	-	0.045	hr	3.6	
300mm DGB 20	10,500.0	m^2	Water cart		88	hr	-	0.045	hr	4.0	
TOTAL										**17,315.1**	kL

Table O-5: Emission source data: transport fuel use

Transport category	Fuel type	Vehicle type	Vehicle load	Unit	Vehicle rate of fuel use* (L/100km)	Average trip distance (km)	Total haulage quantity	Unit	Number of trips	Total distance (km)	Fuel used (kL)	Assumptions/ source
Site vehicles	Diesel	LCV	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	489.6	GHG Assessment Workbook for Road Projects(June 2011) Table 5.3 Default Quantity Factors - Site offices and vehicles, assuming large project with 4 sites along road, each with 10 hilux utes, all diesel operated, over 36 construction months
Material delivery - dry bulk materials	Diesel	Articulated truck	30	m^3	54.6	70	330,000.0	m^3	11,000.0	770,000.0	420.4	*FBB Traffic and Transport Assessment* (AECOM 2012): Vehicle capacity, haulage quantity, number of trips
Material delivery - reinforcing steel	Diesel	Articulated truck	10	tonnes	54.6	70	5,320.0	t	532.0	37,240.0	20.3	*FBB Traffic and Transport Assessment* (AECOM 2012): Vehicle capacity, haulage quantity, number of trips

Transport category	Fuel type	Vehicle type	Vehicle load	Unit	Vehicle rate of fuel use* (L/100km)	Average trip distance (km)	Total haulage quantity	Unit	Number of trips	Total distance (km)	Fuel used (kL)	*Assumptions/ source*
Material delivery - pre-fabricated units	Diesel	Articulated truck	1	unit	54.6	200	205.0	units	205.0	41,000.0	22.4	*FBB Traffic and Transport Assessment* (AECOM 2012): Vehicle capacity, haulage quantity, number of trips
Equipment delivery	Diesel	Articulated truck	1	unit	54.6	70	38.0	units	38.0	2660.0	1.5	One return trip per equipment unit, by articulated truck
Earthworks	Diesel	Articulated truck	30	m^3	54.6	20	1,000,000.0	m3	33,333.3	666,666.7	364.0	*FBB Traffic and Transport Assessment* (AECOM 2012): Vehicle capacity, AECOM Quantity estimate update_120706_pavement and earthworks: haulage quantity
Spoil removal	Diesel	Articulated truck	30	m^3	54.6	70	150,000.0	m3	5,000.0	350,000.0	191.1	AECOM Quantity estimate update_120706_pavement and earthworks: Excess earthworks material
Veg removal	Diesel	Truck	10	tonnes	54.6	70	1270.6	t	127.1	8893.9	4.9	-

Table O-6: Emission source data: materials used in construction

Emission activity	Quantity	Unit	Material	Quantity	Unit
250 mm DGS40	53983.7	m^2	Aggregate	29,960.9	tonnes
150mm DGB20	51413.6	m^2	Aggregate	17,120.7	tonnes
275mm stabilised base	262,577.9	m^2	Aggregate	151,300.4	tonnes
7mm seal	262,577.9	m^2	Aggregate	8,139.9	tonnes
300mm DGB20	10,500.0	m^2	Aggregate	6,993.0	tonnes
300mm selected material zone	243,715.0	m^2	Aggregate	Sourced within project	-
Concrete medians and paths - 120mm DGS 20	2,500.0	m^2	Aggregate	666.0	tonnes
Truck stops - 300mm DGB 20	350.0	m^2	Aggregate	233.1	tonnes
7mm seal	262,577.9	m^2	Bitumen	525.2	tonnes
275mm stabilised base	266,088.0	m^2	Cement	6,304.2	tonnes
Pipework 1200 RCP C16	1,100.0	m	Concrete	701.7	m^3
525mm headwalls	44.0	No	Concrete	9.0	m^3
Noise barriers 4m	6,400.0	m^2	Concrete	83.6	m^3
Pits	518.0	No	Concrete	311.0	m^3
Pits - assume 900x900 type E (up to 525∅)	518.0	No	Concrete	234.2	m^3
Open drains	18,800.0	m	Concrete	780.0	m^3
Open drains	18,800.0	m	Concrete	4,032.0	m^3
Kerbing	14,400.0	m	Concrete	2,289.0	m^3
Kerbing	14,400.0	m	Concrete	566.0	m^3
3/3.0m x 2.4m RCBC - units	60.0	m	Concrete	100.2	m^3
3/3.0m x 2.4m RCBC - base slab 300mm	420.0	m^2	Concrete	126.0	m^3
5 cells @ 2.1h*2.4w RCBC - units	10.0	m	Concrete	64.7	m^3

Emission activity	Quantity	Unit	Material	Quantity	Unit
5 cells @ 2.1h*2.4w RCBC - base slab 250mm	70.0	m^2	Concrete	17.5	m^3
2/2.4m x 1.5m RCBC - units	80.0	m	Concrete	78.3	m^3
2/2.4m x 1.5m RCBC - base slab 250mm	448.0	m^2	Concrete	112.0	m^3
Headwalls	6.0	No	Concrete	6.0	m^3
Bridge B1 (short span<20m, 10.5m wide plank) and Bridge B2 (Medium span <35m, 10.5m wide Super T)	-	m^2	Concrete	29,850.0	m^3
Concrete medians and paths	2,500.0	m^2	Concrete	315.0	m^3
Type F barrier	400.0	m	Concrete	274.8	m^3
Wire rope barrier	21,300.0	m	Concrete	1,446.3	m^3
3m x 3m culvert	100.0	m	Concrete	216.0	m^3
Longitudinal pipework - 525mm RCP (average size) pipe class 3	22,800.0	m	Concrete	2,214.2	m^3
RSS wall (approx 5m height)	1,400.0	m^2	Concrete	280.0	m^3
Truck cleaning facilities	6.0	No	Gravel	600.0	tonnes
50mm AC	48965	m^2	Hot mix asphalt	5,631.0	tonnes
135mm AC20	247,714.6	m^2	Hot mix asphalt	76,915.4	tonnes
50mm AC	240,500.0	m^2	Hot mix asphalt	27,657.5	tonnes
50mm AC Overlay	1,593.0	tonnes	Hot mix asphalt	1,593.0	tonnes
50mm AC	10,000.0	m^2	Hot mix asphalt	1,150.0	tonnes
Truck stops - 100mm AC	86.0	tonnes	Hot mix asphalt	86.0	tonnes
300mmm selected material zone	266,088.0	m^2	Lime	2,547.7	tonnes
Longitudinal pipework - 525mm RCP (average size)	22,800.0	m	Sand	18,240.0	tonnes
Pipework	1,100.0	m	Sand	5,500.0	tonnes
500mm drainage layer	20,000.0	m^2	Sand	22,000.0	tonnes
Guardrail and barriers - Armco Guardrail	8,500.0	m	Steel	198.1	tonnes

Emission activity	Quantity	Unit	Material	Quantity	Unit
pipework 1200 RCP C16	1,100.0	m	Steel	70.2	tonnes
525mm headwalls	44.0	No	Steel	0.9	tonnes
Longitudinal pipework - 525mm RCP (average size) pipe class 3	22,800.0	m	Steel	221.4	tonnes
RSS wall (approx 5m height)	1,400.0	m^2	Steel	28.0	tonnes
3/3.0m x 2.4m RCBC - units	60.0	m	Steel	10.0	tonnes
3/3.0m x 2.4m RCBC - base slab 300mm	420.0	m^2	Steel	12.6	tonnes
5 cells @ 2.1h*2.4w RCBC - units	10.0	m	Steel	6.5	tonnes
5 cells @ 2.1h*2.4w RCBC - base slab 250mm	70.0	m^2	Steel	1.8	tonnes
2/2.4m x 1.5m RCBC - units	80.0	m	Steel	7.8	tonnes
2/2.4m x 1.5m RCBC - base slab 250mm	448.0	m^2	Steel	11.2	tonnes
3m x 3m culvert	100.0	m	steel	21.6	tonnes
Concrete medians and paths - steel mesh	2,500.0	m^2	Steel reinforcement	5.5	tonnes
Type F barrier	400.0	m	Steel reinforcement	5.0	tonnes
Wire rope barrier	21,300.0	m	steel	225.8	tonnes
Bridge B1 (short span<20m, 10.5m wide plank) and Bridge B2 (medium span <35m, 10.5m wide Super T)	-	m^2	Steel structural	13,900.0	tonnes

Table O-7: Emission source data: materials used in maintenance

Pavement type	Pavement area (m^2)	Material	Material component	Thickness (mm)	Component material quantity (tonnes)	Assumption
Pavement Type 1 - local roads	48,965.0	50mm AC wearing course	Hot mix asphalt	50	5,631.0	One major rehabilitation with top 150mm replaced, once every 50 years
Pavement Type 1 - local roads	51,413.6	150 mm DGB20 Base	Aggregate	100	11,413.8	
Pavement Type 2 - flexible	240,500.0	50mm AC wearing course	Hot mix asphalt	50	27,657.5	
Pavement Type 2 - flexible	247,714.6	135mm AC20	Hot mix asphalt	100	56,974.3	
Pavement Type 2 - flexible	262,577.9	2 coat, spray seal	Aggregate	N/A	8139.913768	
Pavement Type 2 - flexible	262,577.9	2 coat, spray seal	Bitumen	N/A	525.155727	
Truck stops - 300mm DGB 20	350.0	300mm DGB 20	Aggregate	150	116.55	
Concrete medians and paths	2,500.0	120mm DGS 20	Aggregate	120	666	
50mm AC wearing course	2,448.3	50mm AC wearing course	Hot mix asphalt	50	281.5	5% of road replaced over 50 year period for patching/repair
150mm DGB20 base	2,570.7	150mm DGB20 Base	Aggregate	150	856.0	
250 mm DGS40 sub-base	2,699.2	250 mm DGS40 sub-base	Aggregate	250	1498.0	
50mm AC wearing course	12,025.0	50mm AC wearing course	Hot mix asphalt	50	1382.9	
135mm AC20	12,385.7	135mm AC20	Hot mix asphalt	135	3845.8	
275mm stabilised base	13,128.9	275mm stabilised base	Cement	275	315.2	
275mm stabilised base	13,128.9	275mm stabilised base	Aggregate	275	7565.0	
300mm selected material zone	13,128.9	300mm selected material zone	Lime	300	127.4	
300mm selected material zone	12,025.0	300mm selected material zone	Aggregate	300	7661.6	

Pavement type	Pavement area (m^2)	Material	Material component	Thickness (mm)	Component material quantity (tonnes)	Assumption
2 coat, spray seal	13,128.9	2 coat, spray seal	Aggregate	N/A	407.0	
2 coat, spray seal	13,128.9	2 coat, spray seal	Bitumen	N/A	26.3	
300mm DGB 20	17.5	300mm DGB 20	Aggregate	300	11.7	
120mm DGS 20	125.0	120mm DGS 20	Aggregate	120	33.3	

GHG calculation methodology

The following steps were taken in estimating the GHG emissions associated with the construction and operation of the project (as per the procedure outlined in **Figure 8-6** of the environmental assessment):

- The GHG emissions relevant to the stages of project construction, operation and maintenance were identified.
- The GHG inventory boundary was determined, which defines the emissions sources to be considered in the assessment and those to be excluded (as given in **Tables 8-1** and **8-2** in the environmental assessment).
- The emissions sources were quantified (as detailed in the section above).
- For the different emissions sources and sinks, emissions factors were established and the emissions calculated. This section provides the methodology used for calculating GHG emissions from fuel use, electricity use, vegetation removal, material use and from the use of the road by traffic post construction.
- Opportunities for mitigation were identified, as detailed in Section 8.5.4 of the environmental assessment.

Fuel

The method used to calculate the Scope 1 GHG emissions from the combustion of liquid fuels, for transport energy purposes is given by the formula below, as given by the *National Greenhouse Accounts* (*NGA) Factors 2011*:

GHG emissions (t CO_2-e) = ((Q x ECF) / 1000) x (EF_{CO2} + EF_{CH4} + EF_{N2O})

Where: Q is the quantity of fuel (in kL).

ECF is the relevant energy content factor (in GJ/kL).

EF_{CO2} is the relevant Carbon dioxide (CO_2) emission factor (in kg $CO_{2\text{-}e}$/GJ).

EF_{CH4} is the relevant Methane (CH_4) emission factor (in kg $CO_{2\text{-}e}$/GJ).

EF_{N2O} is the relevant Nitrous oxide (N_2O) emission factor (in kg $CO_{2\text{-}e}$/GJ).

The method used for calculating the Scope 3 GHG emissions from the combustion of liquid fuels, for transport energy purposes is given by the formula below, as given by the *NGA Factors 2011*:

GHG emissions (t CO_2-e) = (Q x ECF x $EF_{for\ scope\ 3}$) / 1000

Where: Q is the quantity of fuel (in kL).

ECF is the relevant energy content factor (in GJ/kL).

$EF_{for\ scope\ 3}$ is the relevant emission factor (in kg $CO_{2\text{-}e}$/GJ).

The Scope 1 and Scope 3 emission factors for diesel (post 2004 vehicles) are given in **Table O-8**.

Table O-8: Scope 1 and Scope 3 emission factors for diesel (post 2004 vehicles) (Source: NGA Factors 2011 Tables 4 and 38)

Fuel	Energy content factor (GJ per kL)	Scope 1 emission factor (kg CO_2-e/GJ)			Scope 3 emission factor (kg CO_2-e/GJ)	Emissions per unit quantity (t CO2-e per kL)		
		CO_2	CH_4	N_2O		Scope 1	Scope 2	Scope 3
Diesel - transport - post 2004 vehicles	38.6	69.2	0.01	0.6	5.3	2.6947	0	0.2046

Electricity

The method used to calculate the Scope 1 and Scope 3 GHG emissions from the consumption of purchased electricity is given by the formula below, as given by the *NGA Factors 2011*:

GHG emissions (t CO_2-e) = Q x ($EF_{for\ scope}$ /1000)

Where: Q is the quantity of purchased electricity (in kWh).
$EF_{for\ scope}$ is the scope 2 or 3 emissions factor for NSW (in kg CO_2-e/kWh).

The emission factors for the consumption of purchased electricity are given in **Table O-9**.

Table O-9: Scope 2 and Scope 3 emission factors for the use of purchased electricity (Source: NGA Factors 2011 Table 39)

Fuel	Emissions per unit quantity		Units
	Scope 2	Scope 3	
Electricity	0.00089	0.00017	t CO_2-e per kWh

Vegetation removal

The GHG emissions associated with the loss of CO_2 sequestration potential through the removal of vegetation were calculated according to the default method given in the Workbook. The simple method given therein is for use in cases where relevant local data is not available. The method has been established based on the National Carbon Accounting System (NCAS) and FullCAM model. The method involved the following steps:

The mean annual rainfall (mm) for the road project was identified using the Bureau of Meteorology website and is presented in **Table O-10**.

1. The total area of vegetation to be removed that has not been disturbed by human activity and the total area of vegetation to be removed that has been previously disturbed by human activity were determined.
2. Estimated the t CO_2 per hectare sequestered in the vegetation by:
    a. Multiplying the mean annual rainfall (millimetres) by 0.49 if the vegetation has not previously been disturbed by human activity.
    b. Multiplying the mean annual rainfall (millimetres) by 0.09 if the vegetation has previously been disturbed by human activity.
3. The GHG emissions associated with the loss of CO_2 sequestration potential were estimated by multiplying the area of vegetation to be cleared (hectare) by the relevant emission factor (t CO_2 per hectare) to determine.

Table O-10: Mean rainfall (at Bureau of Meteorology station 068003 Berry Masonic Village, statistics calculated over all years of data) (mm)

Month	Rainfall (mm)
January	135.8
February	154.2
March	156.8
April	133.9
May	126.6
June	135.4
July	97
August	84.1
September	79.7
October	103.4
November	102.5
December	111.5
Total annual	**1420.9**

Materials

Indirect Scope 3 GHG emissions from the use of materials have been calculated according to the formula below:

GHG emissions (t CO_2-e) = Q (t) x EF (tCO_2-e/t)

Where: Q is the quantity of material (in tonnes).
EF is the relevant Emission Factor (in t CO_2-e per tonne of material).

Material emission factors have been sourced from the Workbook and are given in **Table O-11**.

Table O-11: Material Emission Factors (TAGG 2011)

Material	Emission factor (t CO_2-e/t)
Aggregate (crushed rock)	0.004
Concrete (30 MPa concrete 1:2:4)[1]	0.127
Portland cement	0.82
Sand	0.003
Structural steel	1.05
Hot mix asphalt (400MJ/t)	0.058
Bitumen	0.63
Lime	1.09

[1] *Note that all concrete has been assumed to be 30MPa (1:2:4), in the absence of information on concrete types for the different structural elements – to be refined if more information on concrete types can be made available*

Road use

To assess the Indirect Scope 3 GHG emissions from traffic use of the project post construction, road use in two scenarios was considered:

1. Do nothing - No upgrade of the Princes Highway between Gerringong and Bomaderry. This represents the consequence of no action environmental assessment measure.
2. Do minimum - Construction of only the Gerringong upgrade and Foxground and Berry bypass. This represents the operational impacts environmental assessment measure.

The analysis is based on the Vehicle Kilometres Travelled (VKT) and average speed values in the opening year 2017 and the design year 2037, for the traffic impact footprint and involved the following steps:

1. Average speed by road type

   For both scenarios, for the opening year (2017) and the design year (2037), the average speed by road type was sourced from the Traffic *and Transport Assessment Technical Paper* (AECOM, 2012), for the traffic impact footprint. **Table O-12** gives the projected average speeds for the different road sections within the traffic impact footprint, including respective road section lengths.

Table O-12 Average speeds and section length estimates

Route	Section start	Section end	Length (km) 'Do nothing'	Length (km) 'Do something'	Average speed (km/h) 'Do nothing'	Average speed (km/h) 'Do something'
Princes Highway	Rose Valley Road	Belinda Street	3.8	3.8	77.8	97.5
	Belinda Street	Toolijooa Road	3.2	3.0	77.8	97.5
	Toolijooa Road	East of Berry	9.5	8.1	51.9	98.5
	East of Berry	Kangaroo Valley Road	2.0	1.9	51.9	98.5
	Kangaroo Valley Road	Schofields Lane	1.1	1.2	51.9	98.5
	Schofields Lane	Bolong Road	13.6	13.6	64.0	68.9
The 'Sandtrack'	Princes Highway | Rose Valley Road	Crooked River Road | Dooley's Road	8.7	8.7	50.3	50.5
	Crooked River Road | Dooley's Road	Bolong Road | Shoalhaven Heads Road	9.9	9.9	78.2	79.0
	Bolong Road | Shoalhaven Heads Road	Princes Highway | Bolong Road	13.8	13.8	71.2	72.4

2. Vehicle kilometres travelled

   For both scenarios, for the opening year (2017) and the design year (2037), the Average Annual Daily Traffic (AADT) and vehicle kilometres travelled (VKT), for light and heavy vehicles, were sourced from the Traffic *and Transport Assessment Technical Paper* (AECOM, 2012) , for the traffic impact footprint, as given in **Table O-13** below.

Table O-13: AADT Estimates (LV = Light Vehicles, HV = Heavy Vehicles)

			'Do Nothing'				'Do Something'			
			2017 Opening Year AADT		2037 Design Year AADT		2017 Opening Year AADT		2037 Design Year AADT	
Route	Section Start	Section End	LV, 2-way	HV, 2-way	LV, 2-way	HV, 2-way	LV, 2-way	HV, 2-way	LV, 2-way	HV, 2-way
Princes Highway	Rose Valley Road	Belinda Street	13,057	1,680	19,710	2,537	15,229	1,707	31,631	2,774
	Belinda Street	Toolijooa Road	11,528	1,605	17,420	2,425	13,373	1,605	30,088	2,650
	Toolijooa Road	East of Berry	11,150	1,552	16,850	2,345	12,862	1,543	28,938	2,549
	East of Berry	Kangaroo Valley Road	12,563	1,680	18,933	2,532	11,895	1,436	25,632	2,552
	Kangaroo Valley Road	Schofields Lane	13,976	1,808	21,015	2,719	14,981	1,808	29,781	2,965
	Schofields Lane	Bolong Road	13,976	1,808	21,015	2,719	14,981	1,808	29,781	2,965
The 'Sandtrack'	Princes Highway | Rose Valley Road	Crooked River Road | Dooley's Road	10,401	346	15,371	511	8,451	346	5,463	553
	Crooked River Road | Dooley's Road	Bolong Road | Shoalhaven Heads Road	10,078	384	14,845	565	7,823	384	4,759	610
	Bolong Road | Shoalhaven Heads Road	Princes Highway | Bolong Road	9,754	421	14,319	618	7,195	421	4,055	667

Table O-14: VKT Estimates (LV = Light Vehicles, HV = Heavy Vehicles)

			'Do Nothing'			'Do Something'				
			2017 Opening Year VKT	2037 Design Year VKT		2017 Opening Year VKT		2037 Design Year VKT		
Route	Section Start	Section End	LV, 2-way	HV, 2-way	LV, 2-way	HV, 2-way	LV, 2-way	HV, 2-way	LV, 2-way	HV, 2-way
Princes Highway	Rose Valley Road	Belinda Street	18,110,059	2,330,160	27,337,770	3,518,819	21,122,623	2,367,609	43,872,197	3,847,538
	Belinda Street	Toolijooa Road	13,464,704	1,874,640	20,346,560	2,832,400	14,643,435	1,757,475	32,946,360	2,901,750
	Toolijooa Road	East of Berry	38,662,625	5,381,560	58,427,375	8,131,288	38,026,503	4,561,880	85,555,197	7,536,119
	East of Berry	Kangaroo Valley Road	9,170,990	1,226,400	13,820,725	1,848,360	8,249,183	995,866	17,775,792	1,769,812
	Kangaroo Valley Road	Schofields Lane	5,611,364	725,912	8,437,523	1,091,679	6,561,678	791,904	13,044,078	1,298,670
	Schofields Lane	Bolong Road	69,376,864	8,974,912	104,318,460	13,497,116	74,365,684	8,974,912	147,832,884	14,718,260
The 'Sandtrack'	Princes Highway | Rose Valley Road	Crooked River Road | Dooley's Road	33,028,376	1,098,723	48,810,611	1,622,681	26,836,151	1,098,723	17,347,757	1,756,052
	Crooked River Road | Dooley's Road	Bolong Road | Shoalhaven Heads Road	36,415,046	1,385,777	53,642,408	2,039,821	28,268,411	1,385,777	17,196,647	2,204,235
	Bolong Road | Shoalhaven Heads Road	Princes Highway | Bolong Road	49,130,898	2,120,577	72,124,803	3,112,866	36,241,215	2,120,577	20,425,035	3,359,679

3. Rate of fuel consumption

The rate of fuel consumption was calculated for each road type within the traffic impact footprint, using the basic fuel-speed formula given below (Equation 1 in Austroads Guide to Project Evaluation Part 4: Project Evaluation Data part 6):

$$Fuel\ Consumption\ (L/100km) = A + (B/V) + (CxV) + (DxV^2)$$

Where: A, B, C and D are the Fuel consumption parameter values given in **Table O-15**.
V is the all day average link speed in km/h

Table O-15: Fuel consumption parameter values on freeways - litres/100 km (Austroads Guide to Project Evaluation Part 4: Project Evaluation Data Table 6.3)

Vehicle type	A	B	C	D
Cars	-18.433	1306.02	0.15477	0.0003203
Light commercial vehicle (LCV)	-27.456	2060.5	0.1911	0.000851
Rigid trucks	-65.056	4156.75	0.49681	0.0006798
Articulated vehicles	-80	6342.8	0.48496	0.0020895
Buses	-80	5131.63	0.60539	0.0015775

As the GHG emissions from road use were assessed for two vehicle categories, light vehicles and heavy vehicles, weighted average fuel consumption parameters were applied for each vehicle category, according to the likely proportional makeup of vehicle types within each category, based on Australian Bureau of Statistics NSW Registration vehicle type data for the year 2011 (given in **Table O-16**). The likely proportional makeup of cars and LCV's within the category of 'light vehicles' and the likely proportional makeup of rigid trucks, articulated vehicles and buses within the category 'heavy vehicles' are given in **Table O-17**. The weighted average fuel consumption parameters applied for calculation of the fuel consumption rate of light and heavy vehicles are given in **Table O-18**.

Table O-16: Australian Bureau of Statistics NSW Registration vehicle type data for calculating weighted average fuel consumption parameters for light and heavy vehicles

Category	2011 NSW registrations	Proportion total	Heavy/ Light	Sub-classification according to fuel consumption parameters	Proportion heavy/light
Articulated trucks	18578	0.39%	H	Articulated vehicles	0.11
Buses	23390	0.49%	H	Buses	0.14
Heavy rigid trucks	84401	1.77%	H	Rigid trucks	0.50
Light rigid trucks	39460	0.83%	H	Rigid trucks	0.23
Non-freight carrying trucks	3320	0.07%	H	Rigid trucks	0.02
Total	**169149**				1.00
Campervans	10537	0.22%	L	Cars	0.00
Light commercial vehicles	675152	14.13%	L	LCV	0.15
Motor cycles	181107	3.79%	L	Cars	0.04
Passenger vehicles	3742476	78.32%	L	Cars	0.81
Total	**4609272**				1.00

Table O-17: Estimated proportional makeup of light and heavy vehicles according to vehicle type

Category	Cars	LCV	Rigid Trucks	Articulated vehicles	Buses
Light Vehicles	0.85	0.15	0	0	0
Heavy Vehicles	0	0	0.75	0.11	0.14

Table O-18: Fuel consumption parameter values on freeways for light and heavy vehicles - litres/100 km (adapted from Austroads Guide to Project Evaluation Part 4: Project Evaluation Data Table 6.3)

Vehicle category	A	B	C	D
Light	-19.7546613	1416.5339122	0.1600915	0.0003980
Heavy	-68.7637949	4531.6554390	0.5105230	0.0009588

Rates of fuel consumption calculated according to Equation 1 are applicable at the year of 2008 (year of publication of Austroads Guide to Project Evaluation). Annual rates of fuel efficiency improvement were applied to calculate rates of fuel consumption, for light and heavy vehicles, in the years 2017 and 2037, according to road transport fuel intensity projections by vehicle type, given by SKM (2011) in Australian Transport Emissions Projections to 2050 (**Table O-19**), as follows:

- Rates of fuel consumption for the years 2017 and 2020 were calculated by applying the annual percentage change in fuel intensity for 2008-2020, given in **Table O-19**, to the rate of fuel consumption in the year 2008.
- Rates of fuel consumption in the year 2037 were calculated by applying the annual percentage change in fuel intensity for 2020-2030, given in **Table O-19**, to the rate of fuel consumption in the year 2020.

Table O-19: Estimated fuel intensity projections by road type

Vehicle Type	Annual % Fuel Intensity Change (2008-2020)[1]	Annual % Fuel Intensity Change (2020-2030)[1]	Heavy/Light	Annual % Fuel Intensity Change (2008-2020) (based on vehicle proportions)	Annual % Fuel Intensity Change (2020-2030) (based on vehicle proportions)
Passenger	-1.1	-1.4	Light	-0.97	-1.37
Motorcycles	1	-0.8			
LCV	0.2	-1.2			
Buses	0.4	0.3	Heavy	-0.40	-0.53
Rigid	-0.5	-0.6			
Articulated	-0.7	-1.1			

SKM (2011) Australian transport emissions projections to 2050

4. Total fuel quantity combusted

   For both scenarios, for the opening year (2017) and the design year (2037), VKT was factored by the rate of fuel consumption, for each road type to determine the total quantity of fuel consumed in each scenario.

5. Fuel quantity combusted by fuel type

   The analysis considered three fuels, petrol, diesel and LPG. The total quantity of fuel combusted in each scenario, for the opening year (2017) and the design year (2037), was apportioned according to fuel type, based on Australian Bureau of Statistics Survey of Motor Vehicle Use for 12 Months to 31 October 2010. Estimates of the proportional makeup of light and heavy vehicles, by fuel type, are given in **Table O-20** below.

Table O-20: Fuel type proportions for light and heavy vehicles (calculated from data in ABS Survey of Motor Vehicle Use 9208.0 for the 12 months ending 31 October 2010)

Vehicle category	Fuel type	Estimated proportion
Light Vehicles	Petrol	84.1
	Diesel	8.4
	LPG/CNG/dual fuel/hybrid (assume LPG)	7.5
Heavy Vehicles	Petrol	0.8
	Diesel	97.3
	LPG/CNG/dual fuel/hybrid (assume LPG)	1.9

The estimated total quantities of each fuel type used in each scenario, for the opening year (2017) and the design year (2037) are given in **Table O-21** below.

Table O-21: Fuel quantity estimates by fuel type

Route	Section Start	Section End	'Do Nothing'						'Do Something'					
			2017 – Fuel Quantities (kL)			2037 – Fuel Quantities (kL)			2017 – Fuel Quantities (kL)			2037 – Fuel Quantities (kL)		
			Petrol	Diesel	LPG	Petrol	Diesel	LPG	Petrol	Diesel	LPG	Petrol	Diesel	LPG
Princes Highway	Rose Valley Road	Belinda Street	1864.2	951.3	181.2	2162.8	1259.0	213.2	2311.8	1043.7	222.1	3687.4	1560.6	352.3
	Belinda Street	Toolijooa Road	1386.4	754.0	135.6	1610.2	1000.4	159.9	1603.0	763.4	154.8	2769.2	1175.8	264.6
	Toolijooa Road	East of Berry	5058.9	2909.3	498.0	5876.2	3865.8	587.7	4189.4	1994.2	404.5	7236.9	3072.6	691.6
	East of Berry	Kangaroo Valley Road	1199.8	667.7	117.7	1389.8	884.1	138.4	908.8	434.8	87.8	1504.1	702.1	145.0
	Kangaroo Valley Road	Schofields Lane	734.0	397.6	71.8	848.3	524.9	84.2	722.9	345.7	69.8	1103.7	515.2	106.4
	Schofields Lane	Bolong Road	7645.0	4016.3	745.3	8835.1	5298.2	873.8	7887.7	3879.8	763.9	12,043.0	5780.1	1163.6
The 'Sandtrack'	Princes Highway / Rose Valley Road	Crooked River Road / Dooley Road	4453.1	954.7	407.7	5055.7	1184.8	464.8	3600.5	866.5	331.4	1791.6	910.4	174.1
	Crooked River Road / Dooley Road	Bolong Road / Shoalhaven Heads Road	3738.6	827.9	342.8	4230.9	1026.5	389.6	2901.8	743.6	268.0	1359.4	787.4	133.9
	Bolong Road / Shoalhaven Heads Road	Princes / Bolong Road	5137.1	1230.8	472.8	5793.7	1529.7	535.9	3771.5	1088.9	350.6	1638.4	1182.4	165.9

6. The GHG emission calculation

The Scope 3 GHG emissions associated with the use of petrol, diesel and LPG, in both scenarios, for the opening year (2017) and the design year (2037) were calculated according to the formula below, as given by the *NGA Factors 2011*:

GHG emissions (t CO_2-e) = (Q x $EF_{full\ fuel\ cycle}$) / 1000

Where: Q is the quantity of fuel (in kL).
$EF_{full\ fuel\ cycle}$ is the relevant emission factor (in kg $CO_{2\text{-}e}$/kL).

The emission factor applied represents the full fuel cycle, which is the sum of Scope 1 and Scope 3 emissions. The emission factors for petrol, diesel and LPG are given in **Table O-22**.

Table O-22: Scope 1, Scope 3 and full fuel cycle emission factors for (post 2004 vehicles) (Source: NGA Factors 2011 Tables 4 and 38)

Fuel	Energy content factor (GJ per kL)	Scope 1 emission factor (kg CO_2-e/GJ)			Scope 3 emission factor (kg CO_2-e/GJ)	Emissions per unit quantity (t CO_2-e per kL)			Full fuel cycle (t CO_2-e per kL)
		CO_2	CH_4	N_2O		Scope 1	Scope 2	Scope 3	
Petrol - gasoline	34.2	66.7	0.6	2.3	5.3	2.38032	-	0.18126	2.56158
Diesel oil	38.6	69.2	0.2	0.5	5.3	2.69814	-	0.20458	2.90272
Liquid petroleum gas (LPG)	26.2	59.6	0.6	0.6	5	1.59296	-	0.131	1.72396

The estimated GHG emissions from the use of fuel in each scenario, for the opening year (2017) and the design year (2037) are given in **Table O-23** below.

Table O-23: GHG emission estimates

Route	Section Start	Section End	'Do Nothing'		'Do Something'		Difference 'Do Something' – 'Do Nothing'	
			GHG Emissions (t CO2-e)- opening year 2017	GHG Emissions (t CO2-e)- design year 2037	GHG Emissions (t CO2-e)- opening year 2017	GHG Emissions (t CO2-e)- design year 2037	GHG Emissions (t CO2-e)- opening year 2017	GHG Emissions (t CO2-e)- design year 2037
Princes Highway	Rose Valley Road	Belinda Street	7849.1	9562.2	9334.4	14,583.0	1485.4	5020.8
	Belinda Street	Toolijooa Road	5973.9	7304.1	6589.2	10,962.7	615.2	3658.6
	Toolijooa Road	East of Berry	22,262.1	27,287.0	17,217.4	28,649.3	-5044.8	1362.3
	East of Berry	Kangaroo Valley Road	5214.4	6365.0	3741.4	6140.8	-1473.0	-224.3
	Kangaroo Valley Road	Schofields Lane	3158.1	3842.0	2975.8	4506.1	-182.4	664.2
	Schofields Lane	Bolong Road	32,526.4	39,517.4	32,783.9	49,632.9	257.5	10,115.5
The 'Sandtrack'	Princes Highway/ Rose Valley Road	Crooked River Road/| Dooley Road	14,880.9	17,190.9	12,309.4	7531.9	-2571.5	-9659.0
	Crooked River Road/| Dooley Road	Bolong Road/ Shoalhaven Heads Road	12,570.7	14,489.1	10,053.5	5998.7	-2517.2	-8490.3
	Bolong Road/ Shoalhaven Heads Road	Princes Highway/ Bolong Road	17,546.6	20,205.2	13,426.4	7914.9	-4120.3	-12,290.3
		Totals	121,982.2	145,763.0	108,431.3	135,920.4	**-13,550.9**	**-9,842.6**