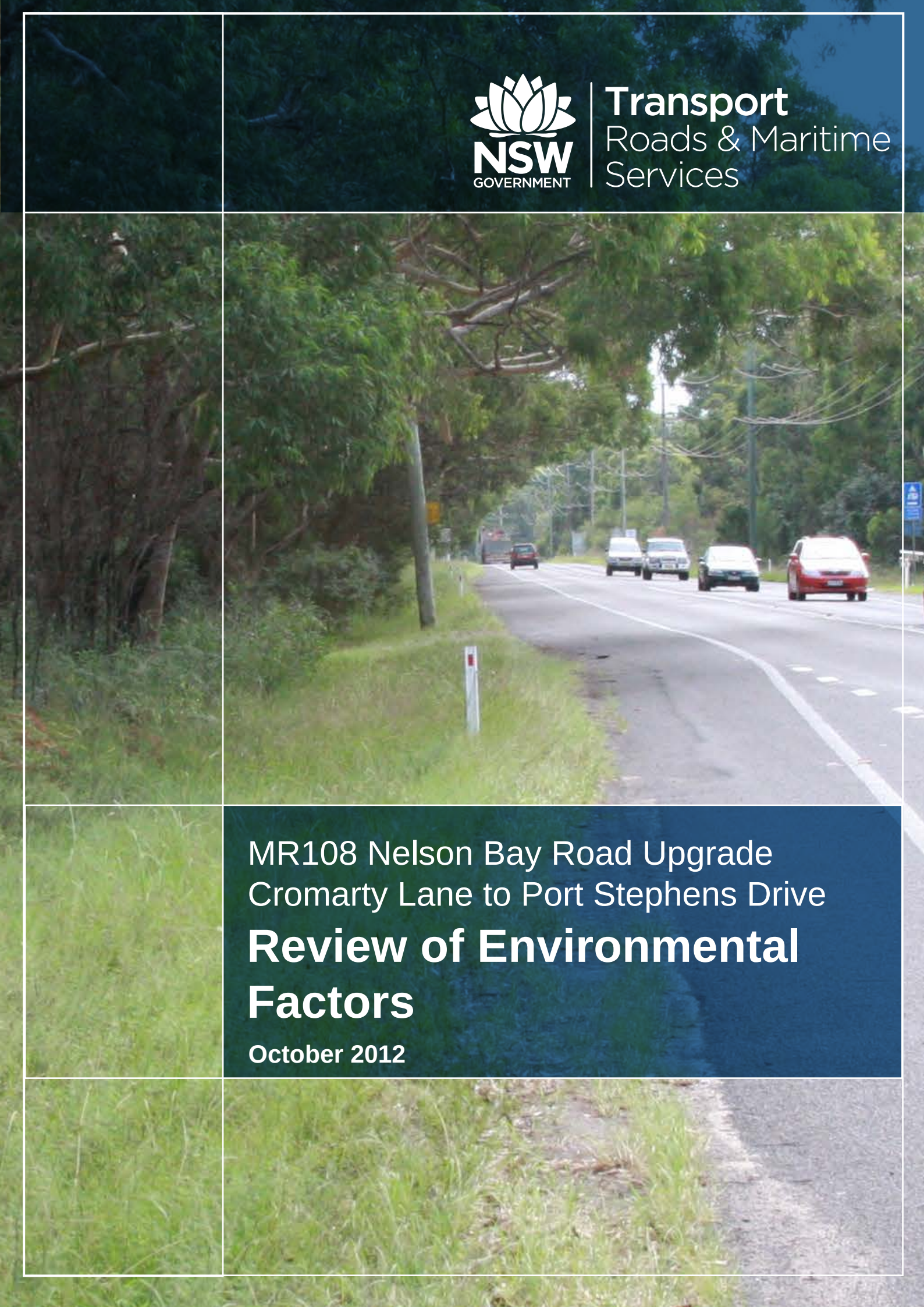

Transport
Roads & Maritime
Services

NSW GOVERNMENT

MR108 Nelson Bay Road Upgrade
Cromarty Lane to Port Stephens Drive

Review of Environmental Factors

October 2012

MR108 Nelson Bay Road Upgrade

Port Stephens Council Area

Bobs Farm to Anna Bay Stage 3
Cromarty Lane to Port Stephens Drive

Review of Environmental Factors

October 2012

PREPARED BY:

Hills Environmental
PO Box 6148
HAMMONDVILLE NSW 2170
T: 0414957376
Email: stuart@hillsenvironmental.com.au

PREPARED FOR:

Roads and Maritime Services
Hunter Region
59 Darby Street
NEWCASTLE NSW 2300

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Executive Summary

Roads and Maritime Services (RMS) is proposing to undertake construction of Stage 3 of the upgrade of Main Road 108 Nelson Bay Road from Bobs Farm to Anna Bay. It involves duplication along side the existing road to provide four lane divided carriageway. The design standard for Stage 3 is similar to that of the previous two stages of the Bobs Farm project (i.e. four lane divided carriageway). U-turn facilities are proposed at regular intervals and property accesses would be restricted to left-in, left-out.

The proposal is needed to improve road safety and efficiency for local road users and commuters, as well as to provide infrastructure to support the growing tourism industry on the Tomaree Peninsula.

The proposal is subject to assessment under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Accordingly, this Review of Environmental Factors (REF) has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

A number of potential environmental impacts from the proposal have been avoided or reduced during the community consultation and options assessment stages. The proposal as described in the REF best meets the project objectives but would still give rise to some potential impacts. These include:

- Potential for erosion, sedimentation and water pollution during construction.
- Traffic disruptions during construction.
- Loss of native vegetation and associated habitat.
- Potential for increase in wildlife injury / mortality due to wider road corridor.
- Noise impacts, primarily during construction.
- Removal of two trees with heritage significance at the former site of the Anna Bay Public School.
- Impacts on Aboriginal heritage.
- Restrictions on access for adjacent residences / businesses to / from the opposite carriageway.
- Visual impacts associated with streetscape vegetation loss.

Mitigation measures as detailed in this REF would ameliorate or minimise these potential impacts. An offset strategy for biodiversity impacts would also be prepared.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the EP&A Act.

The proposal is unlikely to significantly affect threatened species, populations or ecological communities or their habitats and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance.

On balance, the benefits derived from the proceeding with the proposal are considered to outweigh the potential impacts. It is therefore considered justified.

1
Introduction

1.1 Proposal identification

Roads and Maritime Services (RMS) is proposing to undertake Stage 3 of the upgrade of Main Road 108 Nelson Bay Road from Bobs Farm to Anna Bay (the Stage 3 upgrade).

Nelson Bay Road is a State Road and is the principal arterial link connecting Newcastle to Williamtown and the Tomaree Peninsula. It carries a large volume of locally based traffic and tourist traffic visiting the Nelson Bay area and is the only route servicing the Tomaree Peninsula and the various townships between Newcastle and Nelson Bay.

The section of Nelson Bay Road between Bobs Farm and Anna Bay was originally a single carriageway with existing sections of pavement in poor condition. There are no passing lanes and limited opportunities for overtaking due to high traffic volumes and insufficient overtaking sight distances. There are no public road alternative routes. There are distinct morning peaks for vehicles travelling into Newcastle, and corresponding afternoon peaks travelling away from Newcastle.

After extensive community consultation and planning the Minister for Roads announced on 5 March 1999 the upgrading of Nelson Bay Road between Bobs Farm and Anna Bay to four lanes along the existing alignment.

Stage 1 (1.4 kilometres) from the end of the existing dual carriageways at Sandhills to 550 metres south of Marsh Road was completed in July 2003 at a cost of $4.1 million.

Stage 2 (1.5 kilometres) from 550 metres south of Marsh Road to 300 metres south of Cromarty Lane was completed in August 2007 at a cost of $12 million.

The current project is Stage 3, between Bobs Farm and Port Stephens Drive, Anna Bay. It involves duplication alongside the existing road to provide four lane divided carriageway. The design standard for Stage 3 is similar to that of the previous two stages of the Bobs Farm project (i.e. four lane divided carriageway). U-turn facilities are proposed at regular intervals and property accesses would be restricted to left-in, left-out.

The proposal is within the RMS Hunter Region and within Port Stephens local government area. The location of the proposal is shown in Figure 1-1.

Figure 1-1 Location of the proposal

Base image source: nearmap.com.au used under licence.

The general landscape setting is predominantly of a rural character with rural housing and grazing, as well as significant pockets of dense bushland. Further beyond and to the east are the sand dunes of Birubi Beach, a popular recreational destination from where four-wheel drive tours can be undertaken. Towards the west there is farmland and the floodplains of the Tilligerry Creek.

Along the route, single storey buildings flank the road in a dispersed arrangement with varying setbacks. Numerous buildings are still original gable-roofed weatherboard cottages that, combined in some cases with sheds and barns, visually reinforce the rural setting. There are a number of commercial properties and interest points within this section of the road upgrade including accommodation, a plant nursery, a cemetery, churches and a chicken farm that sells fresh produce.

Figure 1-2 illustrates selected parts of the subject site and its surrounds. A detailed photographic record is provided as part of the landscape character and visual assessment included at Appendix I.

View east to the Port Stephens Drive intersection

View west to tie-ins with dual carriageways near Cromarty Lane

Figure 1-2 Images of the subject site

Subject to RMS determination of the REF and funding availability, works could commence in late 2012. This is a State funded project with a cost estimate of $63 million (out turn dollars). Works are expected to be complete by mid 2014.

1.2 Previous assessments

A Review of Environmental Factors (REF) for the upgrade (all stages) was completed on behalf of the then Roads and Traffic Authority (RTA) in March 2001 (ERM, 2001) and, after considering the likely impact on the environment, the RTA decided to proceed with the proposal, subject to the implementation of a range of safeguards and mitigation measures (RTA, 2001). In accordance with the provisions of Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), the RTA decided that neither an environmental impact statement (EIS) nor a species impact statement (SIS) was required. Consequently, the approval of the Minister for Planning under the now repealed Division 4 of Part 5 was also not required.

The RTA's decision as described above, was expressed to lapse after a period of five years from the date of the decision if construction works are not commenced. The decision was made on 12 July 2001.

In recognition of its ongoing statutory obligation and corporate commitment to consider the environmental impacts of its activities under Part 5 of the EPA&A Act, RMS has prepared a new REF Stage 3 works. The REF draws on previous assessments where relevant.

1.3 Purpose of the report

This REF has been prepared by Hills Environmental on behalf of RMS. For the purposes of these works, RMS is the proponent and the determining authority under Part 5 of the EP&A Act.

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail protective measures to be implemented.

The description of the proposed works and associated environmental impacts have been undertaken in context of Clause 228 of the Environmental Planning and Assessment Regulation 2000, the *Threatened Species Conservation Act, 1995* (TSC Act), the *Fisheries Management Act, 1994* (FM Act), and the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). In doing so, the REF helps to fulfil the requirements of Section 111 of the EP&A Act, that RMS examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and whether approval is required under Part 5.1 of the EP&A Act.
- The significance of any impact on threatened species as defined by the TSC Act and/or FM Act, in Section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement (SIS).
- The potential for the proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral for a decision by the Australian Government Minister for Sustainability, Environment, Water, Population and Communities on whether assessment and approval is required under the EPBC Act.

2
Need and options considered

2.1 Need for the proposal

The reasons for pursuing the proposal are associated with the need to improve road safety and efficiency for local road users and commuters, as well as the need to provide infrastructure to support the growing tourism industry on the Tomaree Peninsula.

Traffic growth

Nelson Bay Road carries a large volume of locally based traffic as well as tourist traffic visiting the Nelson Bay area. The nearest RMS permanent counter is about 500 metres to the east of the proposal at Anna Bay, west of Gan Gan Road. At that location annual average daily traffic was 8461 in 2008.

Version 14 of the Lower Hunter Traffic Model predicts two-way traffic volumes at this location to be 11,100 in 2016 and 11,700 in 2026. These numbers are however subject to variation based on factors such as the rate of future development.

Unlike other most other roads, traffic volumes for Nelson Bay Road do not steadily decrease as distance from Newcastle increases. This is due to the traffic from Tomaree Peninsula using Nelson Bay Road to access east-west routes such as Richardson Road (MR104) and Cabbage Tree Road (MR302) on route to Raymond Terrace, the Pacific Highway, the New England Highway and F3 Freeway.

Existing Road condition

The section of Nelson Bay Road between Bobs Farm and Anna Bay is currently a single carriageway with poor pavement condition. There are no passing lanes and limited opportunities for overtaking. This section represents a missing link in that upgrades have already occurred to the west and to the east.

Given the volume of traffic using Nelson Bay Road and the existing poor road condition, the proposed duplication and upgrade is necessary to improve safety and efficiency of this section of road.

Accident history

The accident history for the section of Nelson Bay Road between Bobs Farm and Anna Bay has been reviewed for the period July 2006 to June 2010 with a total of 42 accidents recorded during this period. The average number of accidents per year for this period was 8.4. Around 52 per cent of the accidents involved only one vehicle with the remaining 48 per cent recorded as multi vehicle crashes.

The proportions of accident types recorded were:

- 2.4 per cent fatal accidents.

- 50.0 per cent injury accidents.
- 47.6 per cent non-casualty accidents.

The overall average NSW accident statistics for a similar period (January 2006 to December 2010) period are as follows:

- 0.9 per cent fatal accidents.
- 43.9 per cent injury accidents.
- 55.2 per cent non-casualty accidents.

The accident types for this section of Nelson Bay Road have a similar range of severity to the accident statistics for NSW. The proportions of fatal and injury accidents are however higher for this section of Nelson Bay Road in comparison to the NSW statistics.

2.2 Proposal objectives

The objectives of the proposal are:

- To improve traffic efficiency by increasing capacity, improving the road alignment and increasing overtaking opportunities.
- To improve road safety by increasing passing opportunities, limiting access points, separating opposing traffic flows and providing facilities for buses, cyclists and pedestrians.
- To accommodate future traffic growth.
- To ensure appropriate landscape and high quality urban design outcomes.
- To minimise environmental impacts.

2.3 Alternatives and options considered

Methodology for the selection of a preferred option

A number of studies were undertaken in advance of selecting the preferred upgrade option. These included a route development study, a value management study, community consultation, road-user cost/benefit assessment and a preferred option report.

Following preliminary economic analysis, environmental assessment and community consultation, environmental assessment reports were completed two short listed options, IB and 2 (ERM Mitchell McCotter 1998a and 1998b). Both reports investigated key issues including planning and consultation, hydrology, soils, flora and fauna, land use, noise, archaeology and socio-economic impacts.

Both reports were placed on public exhibition for community and government authority comment.

Options considered

In addition to a 'do nothing' option, four main options were initially considered for the upgrade of this section of Nelson Bay Road[1]. These options were:

- Do nothing option
- Option 1A: upgrade of the existing Nelson Bay Road with some upgrading of horizontal curves to 100km/h design standard.
- Option IB: upgrading of the existing Nelson Bay Road following the existing alignment. Refer to Figure 2-1.
- Option 2: full deviation of the road through undeveloped land south of the existing road, following where possible an existing transmission line easement. Refer to Figure 2-1.
- Option 3: full deviation of the road at Bobs Farm along the same alignment as Option 2, before rejoining the existing Nelson Bay Road Trotters Lane.

Options evaluation

Following a value management process conducted in November 1997, Options 1A and Option 3 were discarded because they performed least well against the nominated assessment criteria – sand dune impact, road user safety, ecological impact, business impact, community impact and travel time.

The "do nothing" option was also discarded. Without major improvements to the road there would be higher accident rates, increased travel times and greater traffic congestion as traffic levels increase as a result of predicted population growth. The 'do nothing' option could result in general failure of the road to meet the transport needs of the local area, the region and the State. Future residential, industrial, commercial and tourism development in the Port Stephens area could be impeded.

ERM Mitchell McCotter was commissioned by Port Stephens Council to prepare a Selection of Preferred Options Report (ERM Mitchell McCotter 1998c) based on the environmental assessment, community consultation and economic analysis undertaken for the project.

The report recommended that Option 2 (full deviation) be adopted as the preferred option. However, it also stated that:

it is possible that ecological issues may be significant enough to prevent options 2 or 3 proceeding, in which case Option lB would be the most viable alternative. Additionally, if the area through which Options 2 and 3 pass is subject to a successful Aboriginal land claim, or becomes a National Park, Option lB is the recommended alternative.

[1] Note that the options development process considered that section of MR108 between Marsh Road at Bobs Farm and Port Stephens Drive. The current proposal (Stage 3) relates to part of that section.

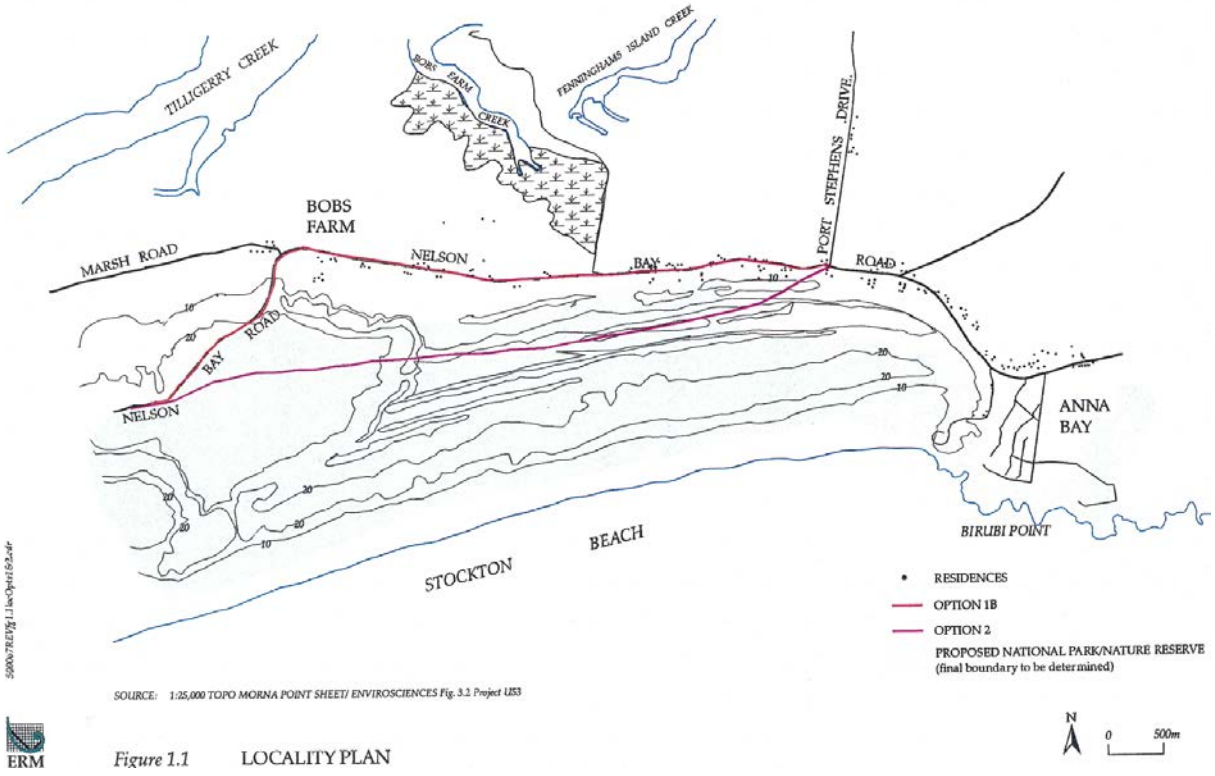


Figure 2-1 Short listed Option 1B and Option 2

Source: ERM (2001)

2.4 Selection of the preferred option

Option 1B involving the duplication and upgrade of the existing road, was announced by the Minister for Transport in March, 1999 as the preferred option for the upgrade of Nelson Bay Road between Bobs Farm and Anna Bay.

Although the Selection of Preferred Option Report (ERM Mitchell McCotter 1998c) recommended Option 2 (full deviation) be adopted as the preferred route, there were a number of factors which rendered the viability and approval of Option 2 uncertain at the time.

One of the key issues for consideration in the final selection process was the likelihood of the area through which Option 2 would pass, being declared as a National Park or Nature Reserve. The NSW National Parks and Wildlife Service (NPWS) also expressed strong opposition to Option 2 and flora and fauna investigations had identified that Option 2 had the potential to disrupt the life cycle of the squirrel glider.

Given the uncertainties associated with Option 2, Option 1 B was finally selected as the preferred option.

It is noted that in February 2007 the Worimi National Park was gazetted and includes lands immediately to the south of the Nelson Bay Road, in the vicinity of Trotter Road.

3
Description of the proposal

3.1 The proposal

RMS proposes to upgrade MR108 Nelson Bay Road, between Bobs Farm and Port Stephens Drive at Anna Bay. This would involve duplication alongside the existing road to provide a four lane divided carriageway. The proposal is to construct about four kilometres of new 2-lane carriageway commencing at the eastern end of the Stage 2 works (200 metres east of Cromarty Lane Ch 38.550 kilometres) and ending at the roundabout at Port Stephens Drive (Ch 42.600 kilometres). The existing road will be utilised wherever possible as part of the final carriageway configuration. Adjustment to line marking on the previously completed construction will be required from about Ch 38.200 kilometres, 300 metres west of Cromarty Lane.

The design standard for Stage 3 will be similar to that of the previous two stages of the Bobs Farm project (i.e. four lane divided carriageway); but with a raised concrete landscaped median to separate opposing traffic. U-turn facilities will be provided at regular intervals and property accesses will be restricted to left-in, left-out.

Key features of the upgrade are:

- Demolition of structures on acquired land (including Lot 1 DP 350117 Dwelling; Pt D DP 363976 Dwelling; Pt E DP 363976 Shed; Lot 346 DP 753204 Dwelling; Lot 375 DP 753204 Dwelling).
- Provision of dual two-lane carriageways divided by a central raised concrete median planted with low growing, low maintenance ground cover or shrubs.
- U-turn facilities along the alignment (at Ch 39650, 41760 and 41780).
- Reconstruction and realignment of the intersection with Binder Road (Ch 39870) including the provision of a left turn in deceleration lane, right turn in bay and U-turn facility.
- Reconstruction and realignment of the intersection with Trotter Road (Ch 40600) including the provision of a left turn in deceleration lane, the provision of a Seagull intersection treatment and U-turn facility.
- Reconstruction of the intersection with the mine access road at Ch 40880, including a right-turn in bay, left-turn deceleration lane and provision for left-in and left-out movements.
- Reconstruction of the intersection with the side road accessing the cemetery at Ch 41180, including a right-turn in bay, left-turn deceleration lane and provision for left-in and left-out movements.

- Pedestrian refuges (gaps in the concrete median at Ch 39160, 39770, 40740, 41,630 and 42380).
- Installation of guard rail and / or wire rope safety barriers including terminals.
- New or relocated bus shelters at Ch 39120 (W/B), 39180 (E/B), 39730 (W/B), 39800 (E/B), 40720 (W/B), 40770 (E/B), 41580 (W/B), 41660 (E/B), 42360 (W/B) and 42420 (E/B).
- Installation of fencing.
- Installation of a floodgate to limit water from the adjacent drainage channel backing up onto Lot 6 DP729986, near the eastern extent of the proposal. This element arose from property adjustment negotiations.
- Longitudinal and transverse drainage works including reconstruction, removal, extension and construction of culverts where required as well as inlet and outlet treatments. Also cleaning existing formed drainage, both existing culverts and reeds/ weeds in drainage channels.
- Reconstruction of property accesses.

Key elements of the proposal are shown by Figure 3-1. The construction footprint of the proposal is shown by Figure 3-2 through to Figure 3-7.

3.2 Design criteria

The main design criteria for the proposal are documented in Table 3-1.

Table 3-1 Key design parameters

Parameter	Value	Description
Posted speed	80 km/h	Retention of the current posted speed is proposed.
Length of Project	4.4 kilometres	-
Length of new on-road cycleway	4.10 kilometres	From Cromarty Lane 2 metre shoulders in each direction
Length of new dual carriageway	4.40 kilometres	-
Minimum radius curves (current)	240 metres	-
Minimum radius curves (proposed)	900 metres	Not including roundabout approach

The proposal would be designed consistent with RMS design criteria and other specifications including requirements of this document. Key reference documentation is the RMS updates issued for use in conjunction with the *Austroads Guide to Road Design*.

Other relevant documents include:

- RMS Road Design Guide.
- Austroads Guide to Traffic Engineering Practice.
- Austroads Road Safety Audit Manual.

3.3 Engineering constraints

The proposal has the following identified constraints:

- Restriction of the road alignment to duplication on existing alignment.
- Requirement to maintain two-lane traffic as far as practicable during construction.
- Requirement to minimise impact of flooding on road as far as practicable.
- Requirement that road construction not increase impact of flooding on properties.
- Requirement that road construction not increase impact of flooding on structures or properties (with the exception of limited afflux in open areas).

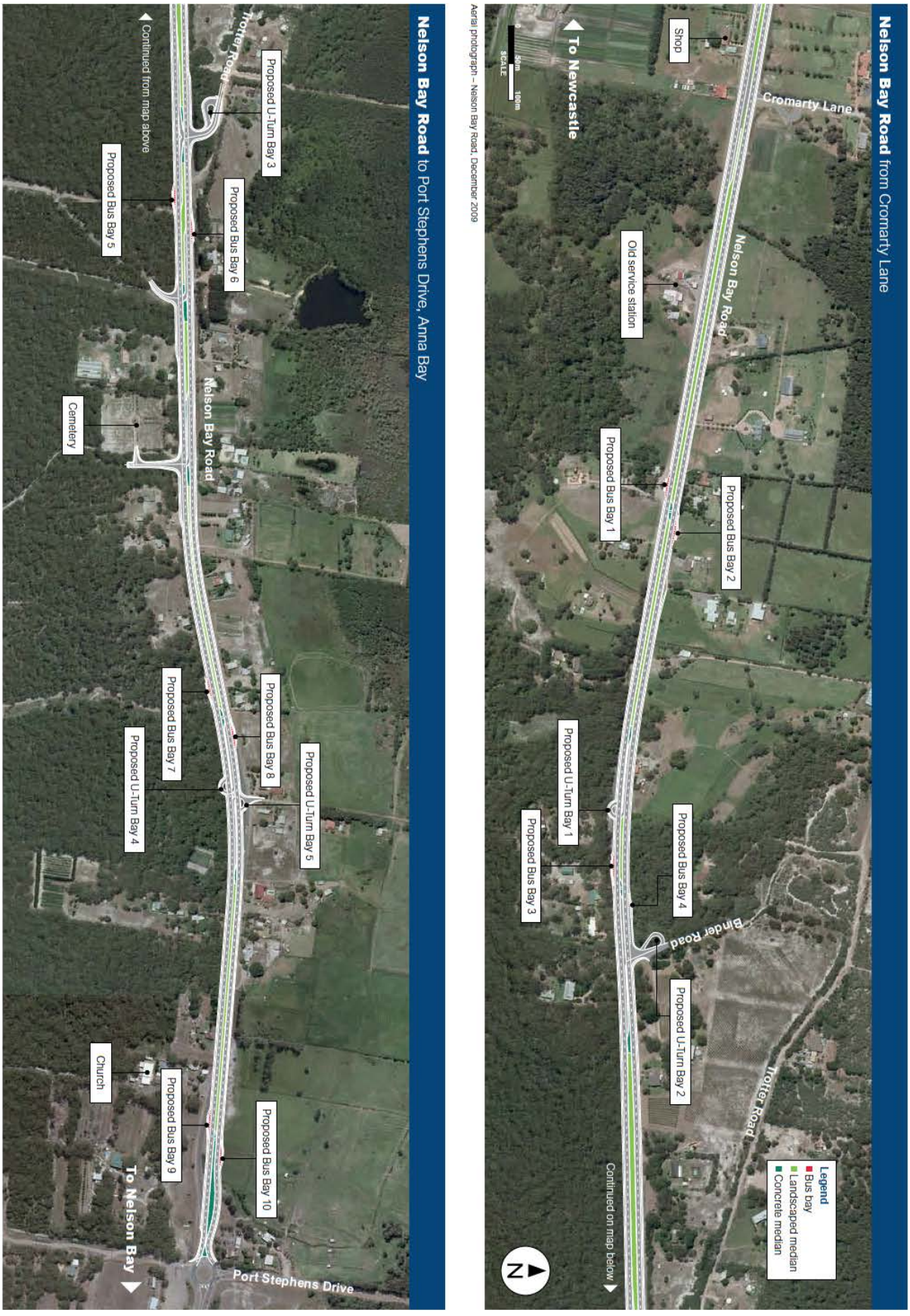


Figure 3-1 Key elements of the proposal

Source RMS.

Figure 3-2 Proposal construction footprint (A)

Source RMS.

Figure 3-3 Proposal construction footprint (B)

Source RMS.

Figure 3-4 Proposal construction footprint (C)

Source RMS.

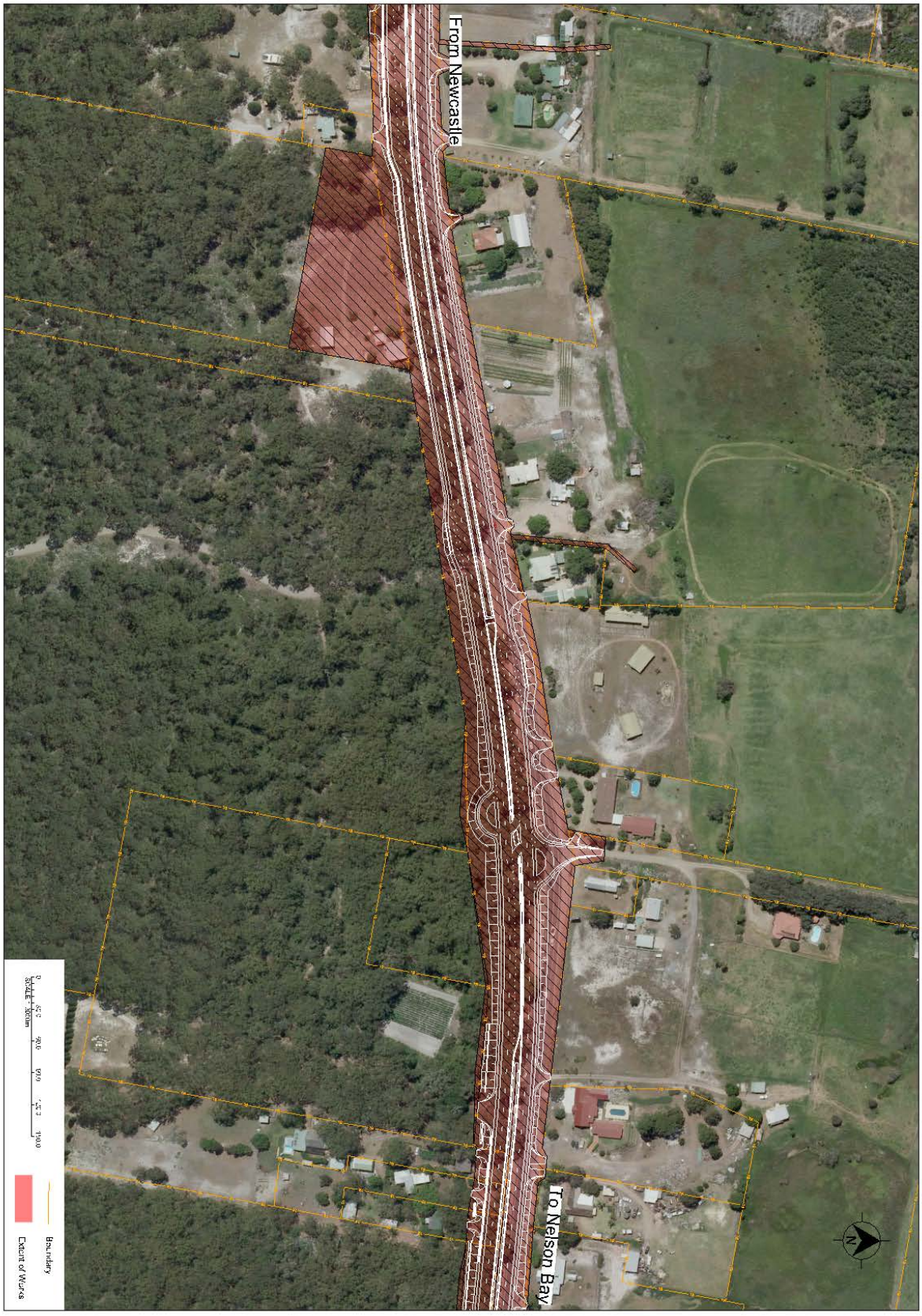


Figure 3-5 Proposal construction footprint (D)

Source RMS.

Figure 3-6 Proposal construction footprint (E)

Source RMS.

Figure 3-7 Proposal construction footprint (F)

Source RMS.

3.4 Construction activities

Construction activities and methodology

The following provides a description of the anticipated construction processes for the proposal, which would occur over a 100-week period (including preliminary relocation of utility assets). However, it should be noted that detailed methodologies would be determined during construction planning in conjunction with the construction contractor selected to complete the proposed works.

The works would initially require clearing of some vegetation on the site to allow construction of access tracks and utility relocation. Road base material would be imported to provide all weather access to the site and compound areas.

Given that the existing road will be utilised wherever possible as part of the final carriageway configuration, relocations of Ausgrid power poles supporting 33 kV, 11 kV and low voltage electrical cables and Telstra and Optus communications conduits are proposed prior to commencement of the road construction contractor on site. Adjustments to the Hunter Water Corporation water main will be undertaken during road construction due to the requirement to raise valves and hydrants to the new road level.

Using the existing road formation for the new carriageways requires the implementation of traffic staging. It is expected that staging would first see construction of the second carriageway, then diversion of two-lane two-way traffic onto the new carriageway, then reconstruction/overlay of the existing carriageway.

The construction sequence would be generally as follows:

- Mark out the limit of works on site. Property adjustments as required.
- Installation of geotechnical instrumentation to monitor settlements.
- Erection of temporary sediment control structures such as sediment fencing and establishment of site compound and facilities (such as satellite offices, sheds and the like).
- Temporary works as required to facilitate construction (e.g. access tracks with the disturbance footprint and / or beyond the disturbance footprint where no clearing is required).
- Installation / relocation of utilities.
- Removal of existing concrete kerbs and structures and establishment of traffic management measures.
- Demolition of structures on acquired land (including Lot 1 DP 350117 Dwelling; Pt D DP 363976 Dwelling; Pt E DP 363976 Shed; Lot 346 DP 753204 Dwelling; Lot 375 DP 753204 Dwelling).
- Removal of trees and installation of protection fencing for trees within the works footprint.
- Stripping and stockpiling of topsoil by bulldozers, graders, scrapers, loaders and trucks.

- Reconstruction, removal, extension and construction of culverts where required including inlet and outlet treatments.
- Cleaning existing formed drainage, both existing culverts and reeds/ weeds in drainage channels.
- Construct new carriageway including cut and fill works, import and placement of road base and compaction by rollers and vibrating compactors with trimming by graders or profilers.
- Application of wearing surface by pavers and rollers.
- Divert traffic from existing carriageway to new carriageway.
- Removal of existing road surface as required for reconstruction of existing carriageway.
- Recycling of suitable excavated material and incorporation of unsuitable material in earthworks within the road reserve where possible.
- Forming of new kerbs, gutters, medians and other structures such as signs and bus bays.
- Installation of guard rail and / or wire rope safety barriers including terminals.
- Installation of fencing and removal of old fences.
- Landscaping, including median planting.
- Line marking and removal of temporary protection measures;
- Stabilisation/grassing of batters, open drains and other peripheral areas.
- Site clean up and disposal of all surplus waste materials.
- Removal of protective fencing and temporary sediment control structures.
- Removal of construction traffic management and opening of new works to traffic.

Plant and equipment

The Proposal would require the use of a range of equipment including:

- Excavators
- Graders
- Rollers
- Loaders
- Rotor mill
- Bitumen sprayer
- Concrete Truck
- Backhoe
- Scrapers
- Fencing installation equipment
- Generator
- Water cart
- Chainsaws and wood chipper
- Line-marking equipment
- Trucks
- Hand held plant
- Rock cutting saw
- Bulldozer
- Paving plant

Earthworks

Indicative earthworks volumes for the road works are provided in Table 3-2.

Table 3-2 Indicative earthwork volumes

Item	Amount
General earthworks	Excavation 17,600 cubic metres Imported fill 108,300 cubic metres Imported select 27,200 cubic metres
Excavation for stormwater structures	4200 cubic metres
Excavation for trench drains	9300 cubic metres
Indicative total	166,600 cubic metres

Source and quantity of materials

The proposal would require moderate quantities of materials including concrete, select fill, asphalt, pavement marking material, reflective pavement markers and steel (signposting etc.). These materials would be sourced from local suppliers where possible. An on-site batching plant is not proposed.

Traffic management and access

Traffic would be managed in accordance the RMS *Traffic Control at Worksites Manual*, an approved traffic control plan and a Road Occupancy Permit issued by RMS.

For the majority of the construction period, approximately 400 additional vehicle movements per day would be required for the movement of crew and materials. Work vehicles would access the site in accordance with an approved vehicle movement plan.

Two-way through traffic along Nelson Bay Road would be maintained via the staging of construction (refer to *Construction activities and methodology* section above). There may be short periods where traffic control is deployed to implement a single lane arrangement. This would only occur outside of peak periods.

Access to adjacent properties would be maintained.

Workforce and working hours

The workforce is anticipated to comprise up to 100 personnel during peak periods.

Construction works would primarily occur during standard hours as follows:

- Monday to Friday: 7:00am to 6:00pm
- Saturday: 8:00am to 1:00pm
- Sunday: No work
- Public holidays: No work

The need for the evening and night works would be necessary for some activities, such as laying asphalt, to minimise inconvenience to road users during peak travel times. This would

be determined having regard to road occupancy requirements and the safety imperative associated with the completion of the work.

For works required outside the “standard” hours outlined above, the procedure contained in the Environmental Noise Management Manual (RTA 2001) Practice Note vii – Roadworks Outside Normal Working Hours would be followed.

Timing and construction duration

Subject to determination of the REF and funding availability, construction could commence in late 2012. Weather permitting, construction duration is expected to be about 60 weeks.

3.5 Stockpile and compound sites

The following stockpile and site accommodation locations are under consideration and have been incorporated into the proposed construction footprint (refer Figure 3-2 through to Figure 3-7).

- Compound site on RMS land Ch 41.360 – Ch 41.480 (Lot 346 DP 753204) (Figure 3-8).
- RMS land on northwest corner of Trotter Road Lot 1 DP 62229 (Figure 3-9).
- Crown road reserves.

Figure 3-8 Compound / Stockpile at Lot 1 DP62229

Base image source: nearmap.com.au used under licence. Data overlay Hills Environmental.

Figure 3-9 Compound / Stockpile Lot 346 DP753204

Base image source: nearmap.com.au used under licence. Data overlay Hills Environmental.

Once the new Trotter Road intersection is reconstructed to the west of the existing, the old road formation can also be used as a stockpile site.

Clearing of native vegetation would not be required for the establishment and operation of stockpile/ compound sites. Those sites used for stockpiling would be established, operated and decommissioned consistent with the requirements of the RMS *Stockpile Site Management Guideline* (RTA 2011). That guideline includes the following recommended work practices:

- The perimeter of the stockpile site should be delineated with a bund (made out of earth or RAP or other type of fencing or barrier).
- Materials should be stockpiled at least five metres away from trees or native vegetation and never pushed up around the base of trees.
- All activities on the site including vehicle traffic and parking should be outside drip line of trees.
- Stockpile materials should be no greater than two metres in height and have batters with a maximum slope of 2:I. This would be implemented where practicable.
- Erosion and sedimentation controls should be installed and maintained to manage the impact of any runoff from each stockpile and the site in general.

- Stormwater should be diverted around the site and be prevented from entering the site.
- Stockpile sites should be checked regularly to ensure all environmental management measures, security and illegal dumping issues are managed or maintained.
- Stockpile sites should be kept in a clean and tidy state when not in use.
- Excess aggregate, select or fill materials should be reused or recycled wherever possible.

3.6 Public utility adjustment

RMS is consulting Telstra, Ausgrid and Hunter Water Corporation regarding the impact of the proposal on their infrastructure and requirements for protection and/or relocation of assets.

Required relocations included Telstra / Optus conduits, a Hunter Water Corporation main and overhead and/or underground Ausgrid 33 kV and 11 kV and low voltage network assets. These relocations are part of the proposal and have been accounted for in the total project disturbance footprint.

3.7 Property acquisition

The proposed upgrade would result in the part or full acquisition of several private properties. It would occur adjacent to but would not encroach on the Worimi National Park. Refer below Figure 3-10 below.

Figure 3-10 NPW Act reserved land and property acquisition plan

Base image source: nearmap.com.au used under licence. Data overlay by Hills Environmental using NPWS and RMS data.

Acquisition of privately owned property would be in accordance with the RMS Land Acquisition Policy that outlines the procedures and guidelines for the transfer of land between the RMS and affected property owners. It would be consistent with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

4
Statutory and planning framework

The EP&A Act establishes the statutory framework for planning and environmental assessment in New South Wales. Implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils.

The EP&A Act contains three parts which impose requirements for planning approval:

- Part 4 generally provides for the control of local development that requires development consent from the local Council.
- Part 5 provides for the control of 'activities' that do not require development consent and are undertaken or approved by a determining authority.
- Part 5.1 which provides processes for the assessment and approval of "State significant infrastructure".

The applicable approval process is generally determined by reference to the relevant environmental planning instruments and other controls. These include local environmental plans (LEPs) and State Environmental Planning Policies (SEPPs). Pursuant to section 36 of the EP&A Act there is a general presumption that a SEPP prevails over a LEP in the event of an inconsistency.

4.1 Local environmental plans

The proposal is located within the Port Stephens LGA. Port Stephens Council regulates land use within this area of the LGA primarily through the Port Stephens Local Environmental Plan 2000.

The subject site traverses or adjoins land within the following zones[2]:

- Zone 1(a) Rural Agriculture
- Zone 6(a) General Recreation

In these zones development for the purposes of roads is permissible with development consent.

As noted in section 4.2 below, SEPP provisions remove otherwise applicable consent requirements and/or prohibitions.

[2] As per maps on Port Stephens Council website (31/10/2012). May not reflect recent spot rezonings.

4.2 State environmental planning policies

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of Infrastructure SEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

The proposal is appropriately characterised as development for the purposes of a road. Its individual elements have no independent purpose. Provided Part 3A of the EPA&A Act is not triggered, the proposal can be assessed under Part 5. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act, 1974* and does not affect land or development regulated by State Environmental Planning Policy No. 14 - Coastal Wetlands, State Environmental Planning Policy No. 26 - Littoral Rainforests or State Environmental Planning Policy (Major Development) 2005.

Part 2 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by Infrastructure SEPP (where applicable), is discussed in Chapter 3 of this REF.

State Environmental Planning Policy No.44 – Koala Habitat Protection

State Environmental Planning Policy No.44 (SEPP 44) aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. SEPP 44 applies to a range of LGAs including Port Stephens.

Part 2 of SEPP 44 regulates impact on koala habitats. While it strictly only applies to proposals being assessed under Part 4 of the EP&A Act, as a matter of practice RMS considers SEPP 44 as part of the Part 5 assessment process – see section 6.5.

Deemed state environmental planning polices

Since 1 July 2009, regional environmental plans (REPs) have not been part of the hierarchy of environmental planning instruments in NSW. All remaining REPs (that were not repealed as part of the reform) are now deemed SEPPs.

There are no deemed SEPPs directly relevant to the proposal.

4.3 Other relevant legislation

Protection of the Environment Operations Act, 1997

Section 120 of the *Protection of the Environment Operations Act 1997* (POEO Act) prohibits the pollution of waters. The proposal includes measures to address the risk of water pollution - see sections 6.1 and 6.2.

Part 3.2 of the POEO Act requires an Environmental Protection Licence for scheduled development work and the carrying out of scheduled activities. One of the scheduled activities is road construction, as defined below.

35 Road construction

(1) This clause applies to road construction, meaning the construction, widening or re-routing of roads, but does not apply to the maintenance or operation of any such road.

(2) The activity to which this clause applies is declared to be a scheduled activity if it results in the existence of 4 or more traffic lanes (other than bicycle lanes or lanes used for entry or exit) for at least:

(a) where the road is classified, or proposed to be classified, as a freeway or tollway under the Roads Act 1993:

(i) 1 kilometre of their length in the metropolitan area, or

(ii) 5 kilometres of their length in any other area, or

(b) where the road is classified, or proposed to be classified, as a main road (but not a freeway or tollway) under the Roads Act 1993:

(i) 3 kilometres of their length in the metropolitan area, or

(ii) 5 kilometres of their length in any other area.

The proposal is not within the metropolitan area and is less than five kilometres in length. It therefore does not constitute scheduled road construction.

National Parks and Wildlife Act, 1974

The harming or desecrating of Aboriginal objects or places is an offence under section 86 of the *National Parks and Wildlife Act 1979*. Under section 90, an Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons.

An Aboriginal Heritage Impact Permit (AHIP) was obtained for test excavation of a Potential Archaeological Deposit (PAD). A further AHIP will be sought prior to construction for salvage. Refer to section 6.6 for further detail.

All native birds, reptiles, amphibians and mammals, except the dingo, are protected in NSW under the NPW Act. The harming of protected fauna is prohibited under the NPW Act, but an exemption applies in relation to things that are essential to the carrying out of an activity to which Part 5 of the EP&A Act applies and where the determining authority has complied with the provisions of that part. Potential impacts on protected fauna are considered in section 6.5.

Certain native plants are identified as protected under schedule 13 of the NPW Act. Potential impacts on protected native plants are considered in section 6.5.

Heritage Act, 1977

An excavation permit is required to disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a

relic being discovered, exposed, moved, damaged or destroyed. A permit is also required to disturb or excavate any land on which the person has discovered or exposed a relic. However, Section 134(4) of the *Heritage Act 1977* makes provision for the issuing of an exception in certain prescribed circumstances.

An excavation permit is not required for the proposal– refer section 6.7.

Roads Act, 1993

The *Roads Act, 1993* sets out rights of members of the public to pass along public roads, establishes procedures for opening and closing a public road, and provides for the classification of roads. It also provides for declaration of RMS and other public authorities as roads authorities for both classified and unclassified roads, and confers certain functions (in particular, the function of carrying out roadwork) on RMS and other roads authorities. The RMS proposes to carry out the project pursuant to powers conferred by the *Roads Act, 1993*.

Threatened Species Conservation Act, 1995

The TSC Act is directed at conserving threatened species, populations and ecological communities of animals and plants.

Certain species of animals or plants are identified as endangered species, populations or communities or vulnerable species under the Act. Areas of land comprising the habitats of listed endangered species may also be declared critical habitat under the Act.

By operation of associated EP&A Act provisions, activities that are likely to have a significant impact on listed threatened species, populations, endangered ecological communities or their habitats must be the subject of a species impact statement and require the concurrence of the Director-General of the Office of Environment and Heritage (OEH). Likely impacts on threatened species have been considered in section 6.5.

Section 91 of the TSC Act provides for the granting of licences to, amongst other things, harm or pick threatened species, populations or ecological communities or damage habitat. The corresponding offence is outlined in section 118A of the NPW Act. Importantly, several defences are expressly recognised by the NPW Act including where the action taken was essential to the carrying out of an activity to which Part 5 of the EP&A Act applies and where the determining authority has complied with the provisions of that part. In this context it can be noted that that full compliance with Part 5 of the EP&A Act is being pursued.

Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* provides for the identification, classification and control of noxious weeds. Requirements in relation to noxious weeds are considered in section 6.5.

4.4 Commonwealth legislation

Under the EPBC Act, a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These matters are considered in Chapter 6 and Appendix B of the REF.

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant

impact on relevant Commonwealth matters. Accordingly, the proposal has not been referred to the Australian Government Department of Sustainability, Environment, Water, Population and Communities.

4.5 Confirmation of statutory position

The proposal has been assessed as permissible without consent under the relevant environmental planning instruments. That position is established by reference to the applicable local environmental planning instruments and clause 94 of the Infrastructure SEPP.

The proposal is within the definition of activity set by Section 110 of the EP&A Act and is being proposed by a public authority. Assessment under Part 5 of the EP&A Act is therefore required.

The matters prescribed by clause 228 of the Environmental Planning and Assessment Regulation 2000, for consideration by assessments under Part 5, are reviewed at Appendix B.

No requirement for a referral under the EPBC Act has been identified.

5
Stakeholder and community consultation

5.1 Community involvement

Extensive community consultation was undertaken during the option selection process (documented in ERM (2001)). This included workshops with residents, business owners and environmental groups as well as direct discussions with potentially affected landowners.

A community update for the proposal was distributed broadly within the Bobs Farm locality in January 2012. It was also made available on the RMS website. The community update advised that funding had been allocated for pre-construction activities, including property acquisition and utility adjustments.

Throughout 2012 liaison with affected property owners has continued.

5.2 Aboriginal community involvement

The proposal has been considered against the requirements of the RMS *Procedure for Aboriginal Cultural Heritage Consultation and Investigation (2011)* (PACHCI). This procedure is generally consistent with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010). An outline of the procedure is presented in Table 5-1.

Table 5-1 RMS Procedure for Aboriginal Cultural Heritage Consultation and Investigation

Stage	Description
Stage 1	**Initial RMS assessment.** Desktop assessment to determine whether an RMS project is likely to harm Aboriginal cultural heritage, and whether further assessment or investigation is required.
Stage 2	**Desktop assessment and site survey.** Further assessment and a survey with specific Aboriginal stakeholders and an archaeologist to assess whether a project would impact Aboriginal cultural heritage.
Stage 3	**Formal consultation and preparation of cultural heritage assessment report.** Aboriginal parties must be involved in the preparation of these reports in accordance with legislative requirements and the OEH *Aboriginal cultural heritage consultation requirements for proponents 2010.*
Stage 4	**Implement project mitigation measures.** Undertake salvage and/or project implementation in accordance with an AHIP and/or a Part 5.1/Part 4 approval or Part 5 determination obtained under the

In this case, the proposal has proceeded to stage 4 of the PACHCI and has involved consultation with registered Aboriginal stakeholders. This has included involvement in the test excavation of a PAD. Consultation with Aboriginal stakeholders will continue during construction. Aboriginal cultural heritage is considered further in section 6.6.

5.3 Government agency and stakeholder involvement

Extensive agency consultation was undertaken during the option selection process (documented in ERM (2001)). Port Stephens Council has been involved in the design development process.

5.4 Infrastructure SEPP consultation

The consultation requirements at clauses 13-16 of the Infrastructure SEPP have been reviewed and it is considered that consultation with Port Stephens Council and OEH is required. Specifically, it is noted that excavation of council managed roads (or parts thereof) may be such that the work cannot reasonably be characterised as minor or inconsequential (see clause 13 of the Infrastructure SEPP). It is also noted that the proposal is located adjacent to the Worimi National Park.

Infrastructure SEPP consultation requirements are reviewed in Table 5-2.

Table 5-2 Infrastructure SEPP consultation requirements

Consultation trigger	Application to proposal / response
Clause 13(1)(a) will have substantial impact on stormwater management services provided by a council	Stormwater management services provided by council would not be affected by the proposal.
Clause 13(1)(b) is likely to generate traffic to an extent that will strain the capacity of the road system in a local government area	Traffic generated during construction or operation is not likely to strain the capacity of council managed roads.
Clause 13(1)(c) involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council	The proposal would not affect any adversely affect a council managed sewerage system.
Clause 13(1)(d) involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council	Water use associated with the proposal from council systems would be minimal.
Clause 13(1)(e) involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential	The proposal would not affect public places under Council control.

Consultation trigger	Application to proposal / response
Clause 13(1)(f) involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the *Roads Act 1993* (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath)	Council managed roads would be affected by the proposal. Consultation required. Correspondence seeking comment was sent to Council on 3 October 2012. At the time of writing no response has been received.
Clause 14 is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area	There are a number of local heritage items in the locality. Direct or indirect impacts on listed items are not expected. While the two Hoop Pines on the former site of the Anna Bay Public School have been identified as having local heritage significance, they are not listed items and fall outside the definition of local heritage item provided by the Infrastructure SEPP.
Clause 15 will change flood patterns other than to a minor extent	Flooding patterns would not be significantly altered by the proposal. Refer to section 6.2.
Clause 16(2)(a) development adjacent to land reserved under the *National Parks and Wildlife Act 1974*	The site located near Worimi National Park. Consultation required. Correspondence seeking comment was sent to OEH on 3 October 2012. OEH responded to the letter noting the presence of an adjacent Permissive Occupancy (PO). The PO is for sand extraction by Metro Mix and OEH is in the process of issuing a license for access. RMS will resolve this matters during the course of further discussions with OEH and relevant parties.
Clause 16(2)(b) development adjacent to a marine park declared under the *Marine Parks Act 1997*	The site is not located near a marine park.
Clause 16(2)(c) development adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994*	The site is not located near an aquatic reserve.
Clause 16(2)(d) development in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998*	The site is not located in the foreshore area as defined by the *Sydney Harbour Foreshore Authority Act 1998.*
Clause 16(2)(e) development comprising a fixed or floating	The site is not located in or over navigable waters.

Consultation trigger	Application to proposal / response
structure in or over navigable waters	
Clause 16(2)(f) development for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land	The proposal does not involve any of the named purposes.

5.5 Future and ongoing consultation

RMS proposes to issue an update to affected landowners/occupiers prior to the commencement of construction.

Ongoing consultation would occur during the construction phase with contact details of the Works Supervisor to be made publicly available (via a letterbox drop and / or internet website). This would allow construction phase issues to be raised and addressed.

Consultation with Aboriginal stakeholders will continue during construction.

6
Environmental assessment

6.1 Landform, geology and soils

Existing environment

Landform and soil landscapes

Soil landscape mapping for Port Stephens (Murphy, 1995) shows that the area of the proposed road upgrade is characterised by uniform and organic soil associations. The soil landscape map describes four landscape units along the proposed road upgrade, namely Hawks Nest, Bobs Farm, Shoal Bay and Lower Pindimar as shown by Figure 6-1. These landscape units consist of different soil types that are positioned within the unit area according to topography. Details of the soil landscapes are provided in Table 6-1.

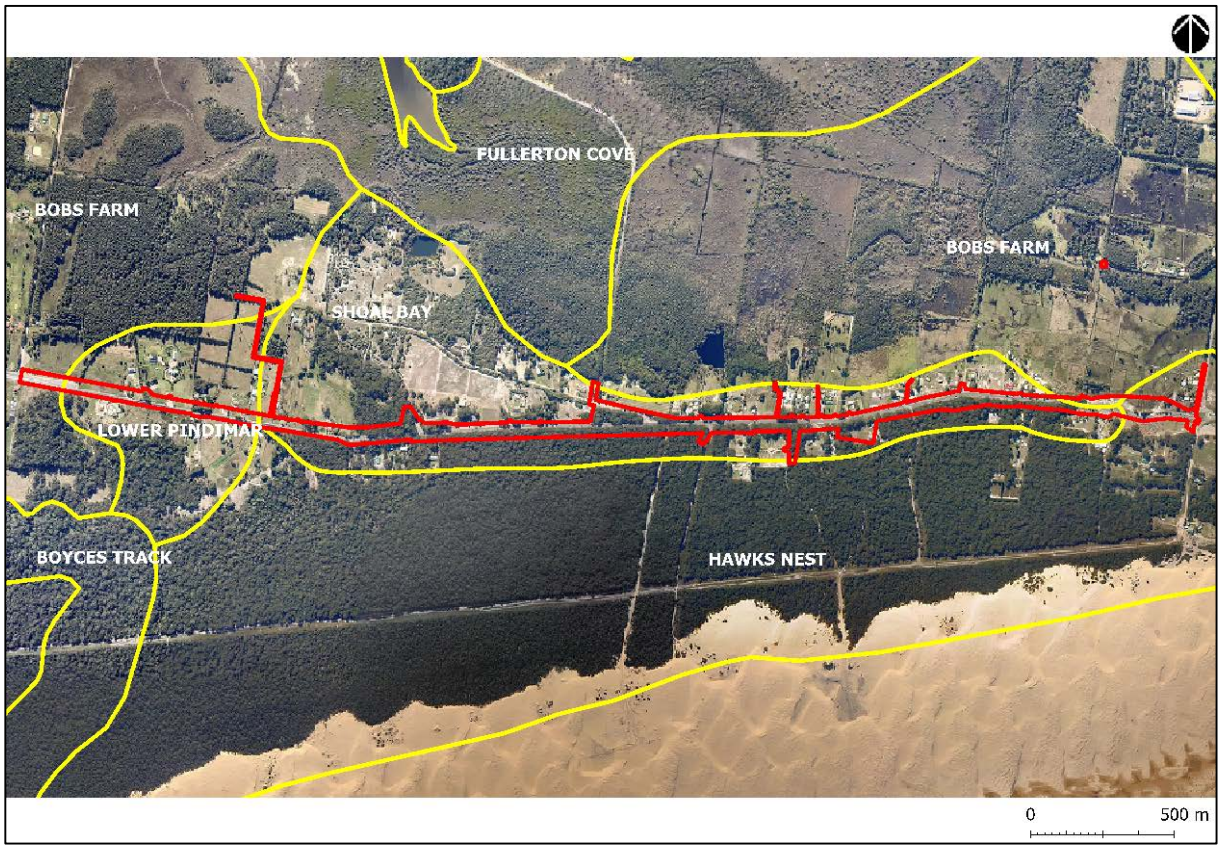


Figure 6-1 Soil landscapes

Podzolic soils occur in the Hawks Nest and Shoal Bay units and are generally well drained sand sheets and dunes. The podzols are uniform in nature with deep profiles ranging from loamy sand topsoil overlying sandy subsoils. The single-grained sandy structure of the soils

results in a high to extreme wind erosion hazard with very low fertility. This soil type has severe limitations for urban development and cultivation and grazing activities

Table 6-1 Landform, geology and soils

Landscape	Landform	Geology	Soils	Erosion
Hawks Nest	Stable, gentle undulating, Holocene sand sheets and beach ridges	Holocene quartz and sand sheets beach ridges	Well-drained podzols on dunes, minor Acid Peats/Siliceous Sands in swampy swales.	Moderate to extreme wind erosion.
Bobs Farm	Broad, flat, swampy, Holocene estuarine plain	Silt clay, estuarine swamp deposits	Poorly drained humic gleys.	Moderate to extreme wind erosion.
Shoal Bay	Gently inclined, well-drained Pleistocene sand sheets to rolling very low dunes.	Pleistocene Aeolian sand sheets and low dunes composed of quartz sands.	Well-drained podzols.	Moderate to extreme wind erosion.
Lower Pindimar	Poorly drained Holocene sand sheets.	Holocene quartz sand sheets which overlie estuarine sediments.	Imperfectly drained humus podzols on sandy rises and poorly drained siliceous sands on low-lying, poorly drained areas.	High to very high wind erosion.

Humus podzols occur in the Lower Pindimar landscape unit on sandy rises. Humus Podzols are uniform in nature and ranging from sand to loamy sand throughout the profile. As with podzols, the single-grained nature of the soils result in the potential for wind erosion to occur. Urban and rural limitations exist due to seasonal waterlogging and high water tables. Potential acid sulfate soils may occur in this soil unit at depth.

Siliceous sands occur in the Lower Pindimar unit and in minor amounts in the Hawks Nest unit in low-lying, poorly drained areas. The Siliceous sands of these units consist of single-grained loamy sand overlying Holocene estuarine sediments. Limitations with this soil type include the high erodibility of the soil and seasonal waterlogging.

Acid peats occur in swampy swales of the Hawks Nest unit with up to 100 centimetres of fibrous peat and root mat overlying a mottled siliceous sand intergrade or organic mud. These areas are very poorly drained, permanently waterlogged and regularly inundated with water. Potential acid sulfate soils are an important consideration in these soil types. These characteristics have severe limitations for urban development, cultivation and grazing activities.

Humic gleys occur in the Bobs Farm soil landscape unit. The area of humic gleys along the proposed road upgrade occurs in the Bobs Farm area east of Marsh Road. Humic gleys are deep, poorly drained soils with seasonal waterlogging. The texture of these soils ranges from organic-rich sandy clays in the upper layers with light to heavy clays with a high silt content underlying this and permanently saturated sandy clay loams below this. The occurrence of acid sulfate soils is an important consideration in this soil unit. These flooding, waterlogging and acid sulfate soils characteristics have high limitations for urban and agricultural activities.

Acid sulfate soils

Acid sulfate soils contain iron sulphides (mainly iron pyrite). They are generally found at an elevation below 10 metres above mean sea level. If these materials are exposed to air, oxidation of the pyrite occurs. If the soil does not have the capacity to neutralise the acidity, sulphuric acid is formed, and iron and aluminium are leached out of the soil. Also, the salinity of the soil is increased.

Acid sulfate soil potential of the proposed road upgrade has been assessed by consulting the Department of Land and Water Conservation's (DLWC) Acid Sulfate Risk mapping. Figure 6-2 shows the acid sulfate potential of soils surrounding the proposed road upgrade and indicates a high probability of acid sulfate occurrence at the western end of the proposed upgrade.

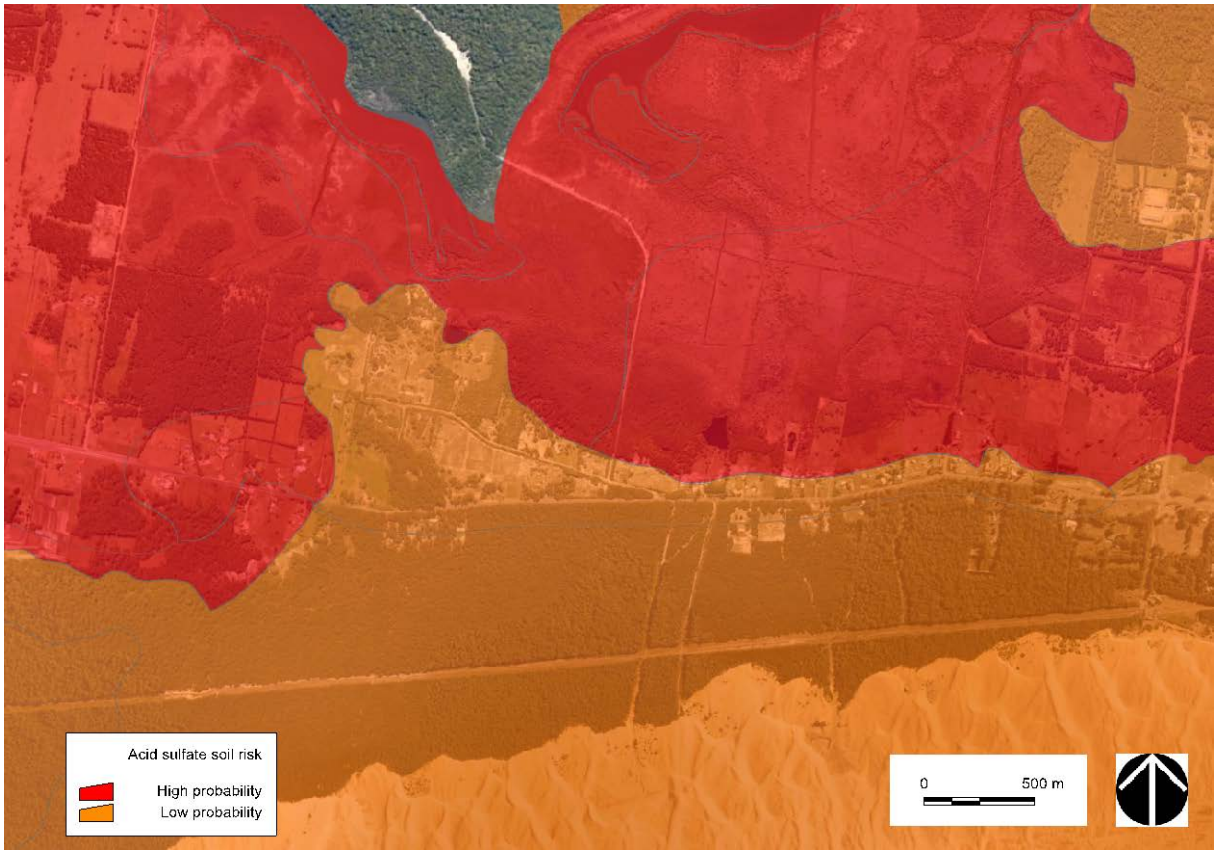


Figure 6-2 Acid sulfate soil probability

Contaminated land and materials

A search of the Environment Protection Authority (EPA) contaminated land record of notices returned no records for the Port Stephens LGA.

The site is not known to have been previously used for purposes commonly associated with contamination – industrial, intensive agriculture, defence uses. The proposal does involve development of an existing road reserve. In this context the occurrence of elevated lead levels attributable to lead petrol emissions is possible.

There is the potential for asbestos or asbestos containing materials to be present in some of the buildings identified for demolition or in the Ausgrid assets that require relocation.

Organochlorine pesticide (OCP) may be present in Ausgrid power poles and the immediately adjacent soils.

Potential impacts

The proposal would have a minor effect on landform with the new road formation constructed on fill embankments.

The proposal has the potential to generate sediment during rainfall events due to ground disturbance, including excavation and vegetation removal. In this context it is noted that the proposal would be constructed primarily on podzols (deep sands) which have a very high wind erosion hazard. Erosion hazard from concentrated flows may also be high. Sediment mobilisation from soil deposited on the road pavement during works is a further potential impact.

The erosion and sedimentation risk of the project was assessed in accordance with the RMS *Erosion and Sedimentation Risk Assessment Procedure* (RTA 2004) and was not considered to be high. The main reasons for this are:

- Large areas of land would not be disturbed.
- It is possible to appropriately manage erosion and sedimentation control through the implementation of management measures (refer below and to section 6.2).

In the western section of the proposal there is high probability of acid sulfate soil occurrence. Disturbance of these areas may result in acid sulfate generation. The consequences of acid sulfate generation are increases in the salinity and acidity of surface waters, which is detrimental to ecosystems. Acid sulfate materials are also highly corrosive to concrete and steel structures.

For the eastern half of the alignment there is a low probability of encountering acid sulfate material within 3 or 4 metres of the ground surface. This area is slightly elevated and the majority of this landform is not expected to contain acid sulfate material.

Disturbance of contaminated land / materials is generally not expected, however the potential presence of asbestos in buildings to be demolished and the potential presence of OCP in Ausgrid assets represents a management issue for the project. Any excess spoil would be disposed of at an appropriately licensed facility in accordance with its classification.

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Erosion and sedimentation	• A Soil and Water Management Plan (SWMP) would be developed for the works. It would be prepared in accordance with RTA specification *G38 Soil and Water Management (Soil and Water Management Plan)* and would be consistent with the *Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines* (the Blue Book) (Landcom 2004): Requirements would include: - The prompt completion of works relating to drainage and sediment control to minimise exposure time of disturbed area. - Provision of bunding or similar measures to prevent pavement runoff from entering drainage related excavation. - The provision of sediment and filter traps, in advance of and in conjunction with earthworks operations, to prevent contaminated run-off leaving the site. - The adoption of a dewatering procedure that is consistent with the RMS *Construction Dewatering Guidelines*.	Contractor	Pre-Construction
	• The SWMP would identify areas for stockpiling of material or transportation offsite, storage of plant and equipment and compound areas. It would be forwarded to a Regional Environmental Officer for review at least 10 working days prior to the commencement of works.	Contractor	Pre-Construction
	• An Acid Sulfate Soils Management Plan would be prepared for the proposal. The Plan would outline the appropriate trenching, stockpiling and removal methods for soil so to minimise the risk of PASS to the surrounding environment The management plan would be prepared in accordance with the Acid Sulfate Soil Management Advisory Committee's Acid Sulfate Soil Planning Guidelines (Stone & Hopkins 1998) and the RTA publication *Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze* (RTA, 2005).	Contractor	Pre-Construction

Impact	Environmental safeguards	Responsibility	Timing
	• Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request	Works Supervisor	Construction
	• Erosion and sediment control measures are not to be removed until the works are complete or areas are stabilised.	Works Supervisor	Construction
	• Disturbed areas would be progressively stabilised and rehabilitated during the works.	Works Supervisor	Construction
	• Asbestos waste would be managed in accordance with Work Health and Safety Regulation 2011, the document *Working with asbestos* (Workcover 2008) and the *Code of Practice for the Safe Removal of Asbestos*, 2nd Edition (NOHSC 2005).	Works Supervisor	Construction
	• The relocation of utility poles would be managed consistent with the document *Protocols for recycling redundant utility poles and bridge timbers in New South Wales* (OEH 2011).	Works Supervisor	Construction

6.2 Hydrology, flooding and water quality

Existing environment

Hydrology

The hydrology of the area between Bobs Farm and Anna Bay is closely linked to the geology of the area. The eastern part of this section of Nelson Bay Road consists of predominantly sandy soils, which promote rapid infiltration of surface water. As a result there are no defined drainage lines for surface flow in the dune area. To the north of Nelson Bay Road a number of artificial drainage lines connect to Bobs Farm Creek, Fenninghams Island Creek and Wallis Creek which are all tributaries of Tilligerry Creek.

Under present day conditions, overland flows from the local catchment on the southern side of the road cross the route via a series of cross drainage pipes and drain to Tilligerry Creek and Bobs Farm Creek (Nelson Bay Estuary) on its northern side.

Tilligerry Creek is a prominent drainage line running west to east in a depression between the inner and outer dunal barrier system. Whereas the soil in the barrier dunes consists of sand deposits, the interbarrier depression of Tilligerry Creek is underlain by clay. The infiltration in this area is very low and the water table is close to the surface. Runoff can exit this system through Fullerton Cove to the west or Tilligerry Estuary to the east. A system of floodgates, drains and levees occur along the drainage network from Fullerton Cove to Tilligerry Creek. This system was installed to restrict fluctuating levels of salt water from Port Stephens and to assist the escape of surface water runoff in the area.

Flooding

The main risk of flooding and waterlogging in the Bobs Farm area is primarily due to poor infiltration of the soils in the Tilligerry Creek depression during localized rain, in addition to high water table levels and the tidal levels experienced in Port Stephens.

Port Stephens Council has identified the western section of the proposal as flood prone land (Port Stephens Council 2009).

An RMS commissioned flood study undertaken for the proposal by Lyall and Associates (refer to Appendix C) identified that under present day conditions the road has a relatively low hydrologic security against overtopping due to flooding from the catchment on its southern side. The study notes that the current road would be flooded by 10 year Annual Recurrence Interval (ARI) storms and that during major floods extensive areas on both the northern and southern sides of the road would be inundated.

Water quality

The groundwater flow direction in the study area is in a northerly direction towards Tilligerry Creek. The aquifer beneath the road is unconfined and is therefore prone to contamination. The base of the aquifer is approximately 30 metres below sea level (Golders & Associates, 1997).

Potential impacts

During construction, the disturbance of soils would create the potential for the mobilisation of sediment. The potential for accidental spills and leaks are a further issue. These potential impacts are considered manageable and have been addressed through the proposed safeguards and mitigation measures.

Roads and other areas of pavement concentrate rainfall and alter the direction of runoff. This has the potential to change the recharge ability of the groundwater aquifer.

The upgrade of Nelson Bay Road would contribute small amounts of oil-based contaminants and heavy metals to the groundwater system in road runoff. The potential for impact on groundwater quality already exists as a result of the road in its existing condition and urban and industrial activities occurring in the catchment. The extent of impacts on groundwater quality from the proposed road upgrade is not considered significant.

The proposed cross drainage strategy raises the hydrologic security of the road to 100 year ARI. It does not increase flood levels in developed areas adjacent to the road corridor, apart from minor increases of between 20 and 150 millimetres on the northern side of the road in the existing easement G1 (refer to Figure 6-5) and between 10 and 20 millimetres in the existing watercourse north of cross drain I1 (Figure 6-6).

No increases in hydraulic capacity by increasing waterway dimensions is proposed in existing drainage channels downstream of cross drainage culverts E1, F1 and G1 are proposed (refer to Figure 6-3 through 6-5). A clean out of reeds and weeds in these channels is proposed.

Existing pipelines on the northern side of the road downstream of cross drains J1, K1 and L1 would be upgraded so as to convey major flood flows up to 100 year ARI and mitigate

flooding in developed areas bordering the road (refer to Figures 6-7 though 6-9). The pipelines would be continued to discharge to existing outfall locations in undeveloped areas of the floodplain. Flow from cross drain M1 after appropriate channel works and energy dissipation would be discharged to an existing drainage line (refer to Figure 6-10).

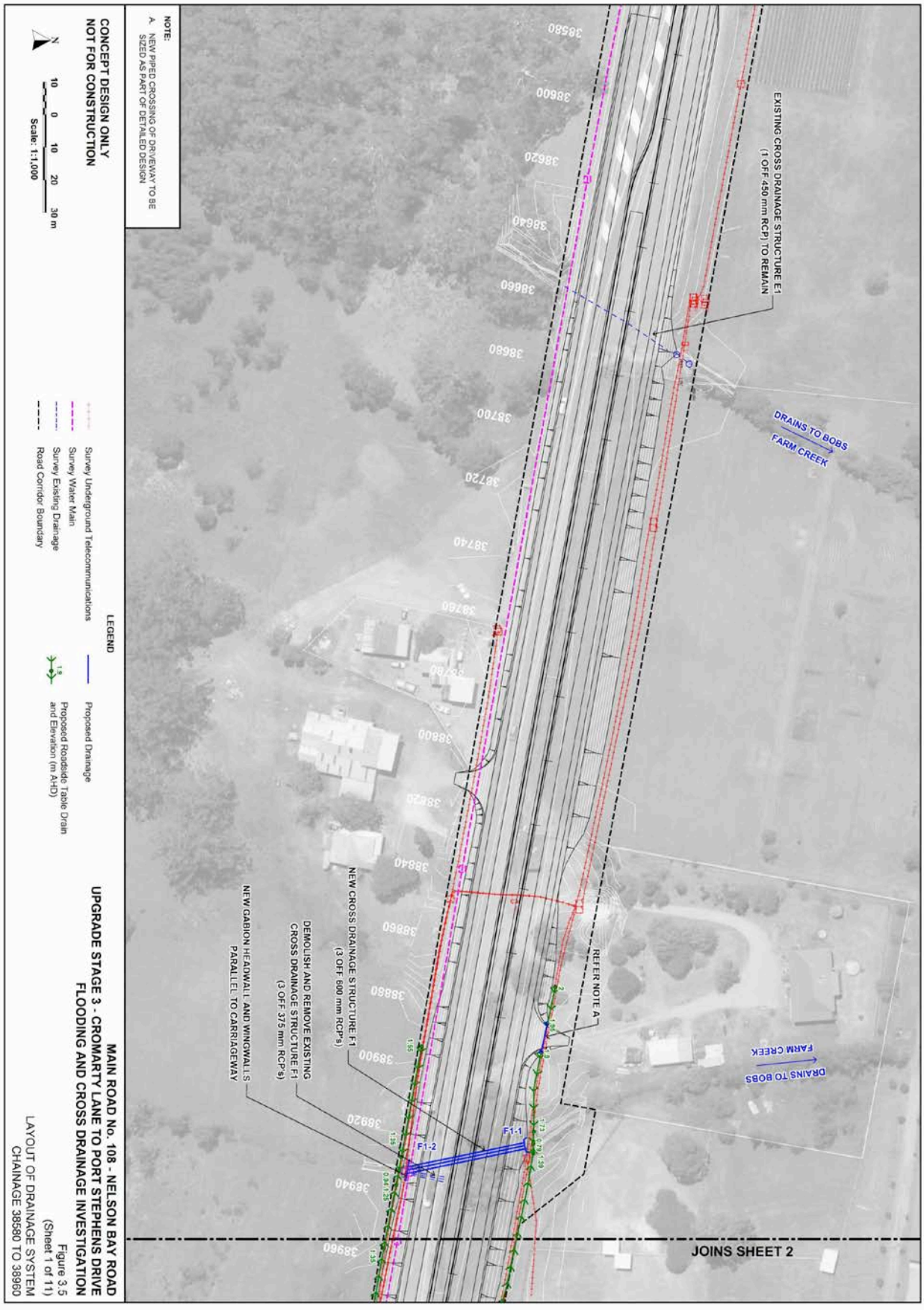


Figure 6-3 Cross drainage (A)

Source: Lyall and Associates

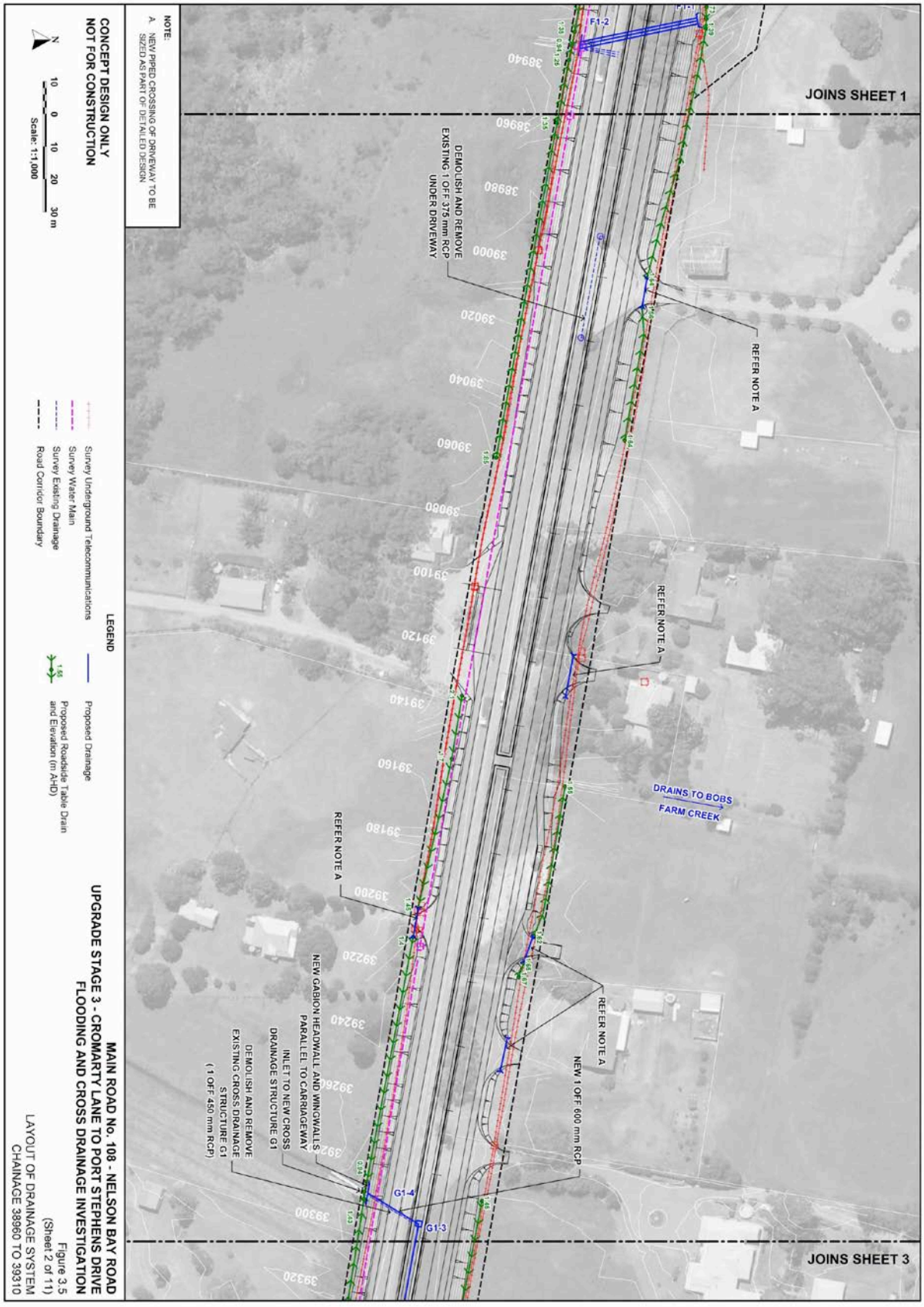


Figure 6-4 Cross drainage (B)

Source: Lyall and Associates

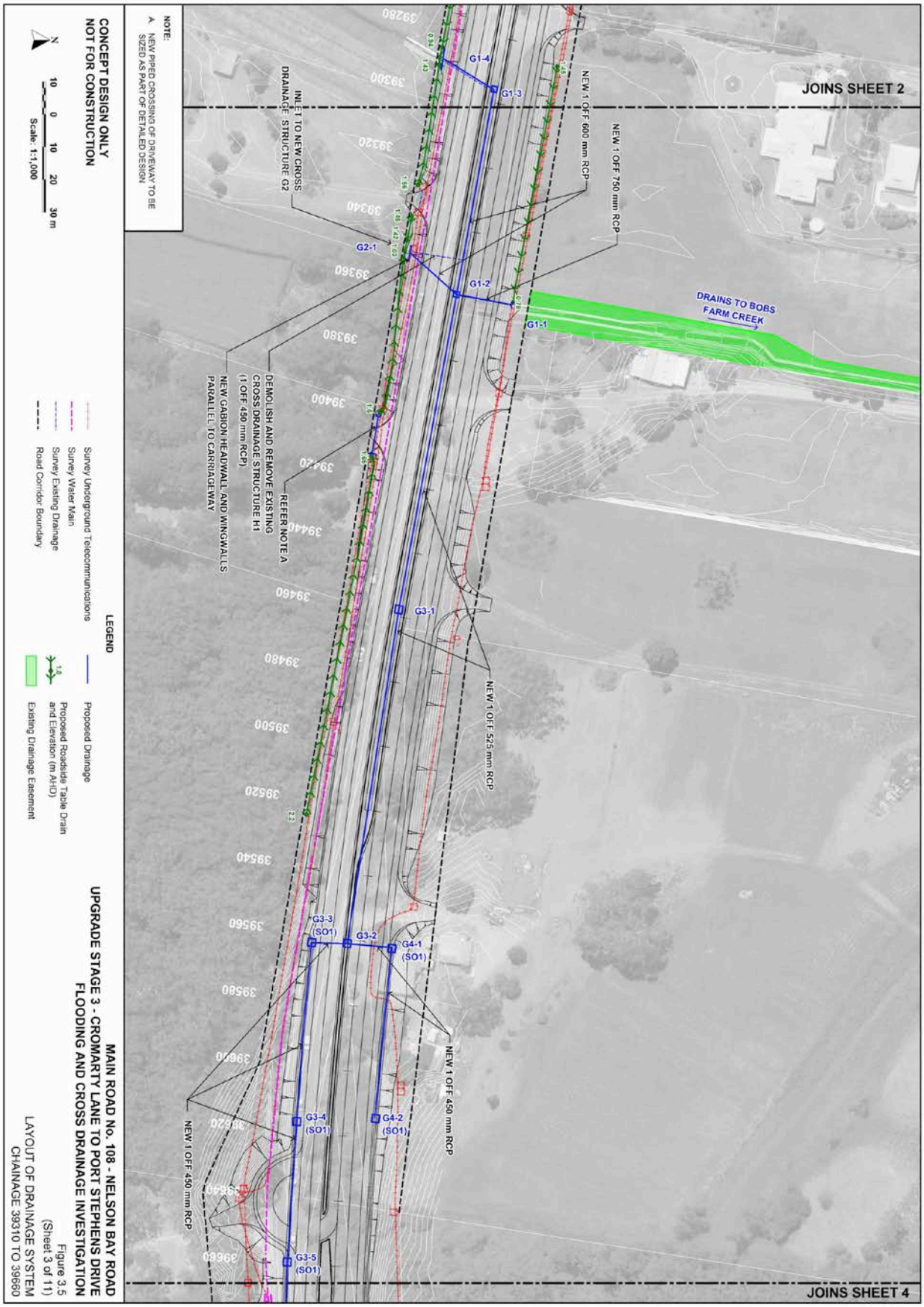


Figure 6-5 Cross drainage (C)

Source: Lyall and Associates

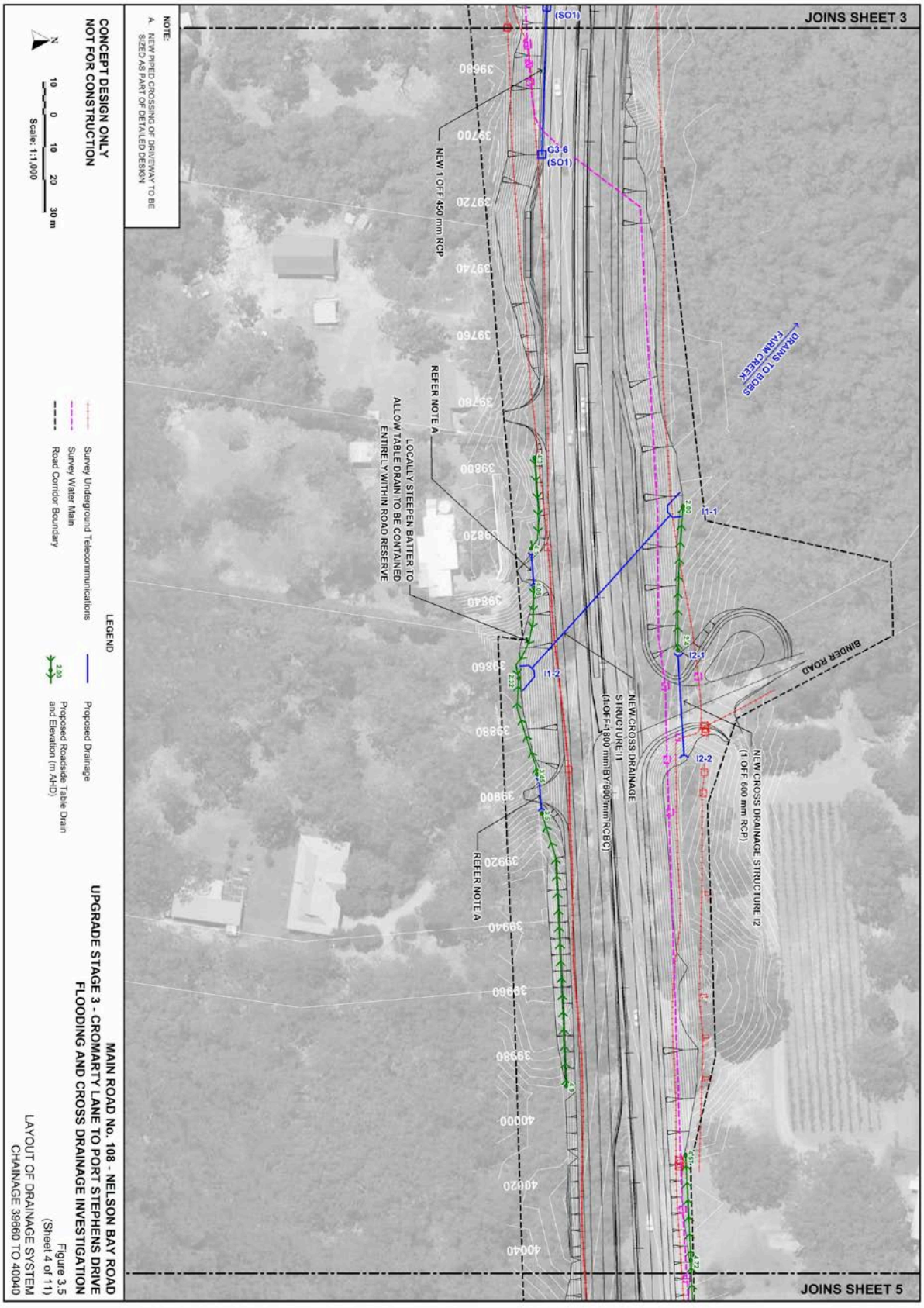


Figure 6-6 Cross drainage (D)

Source: Lyall and Associates

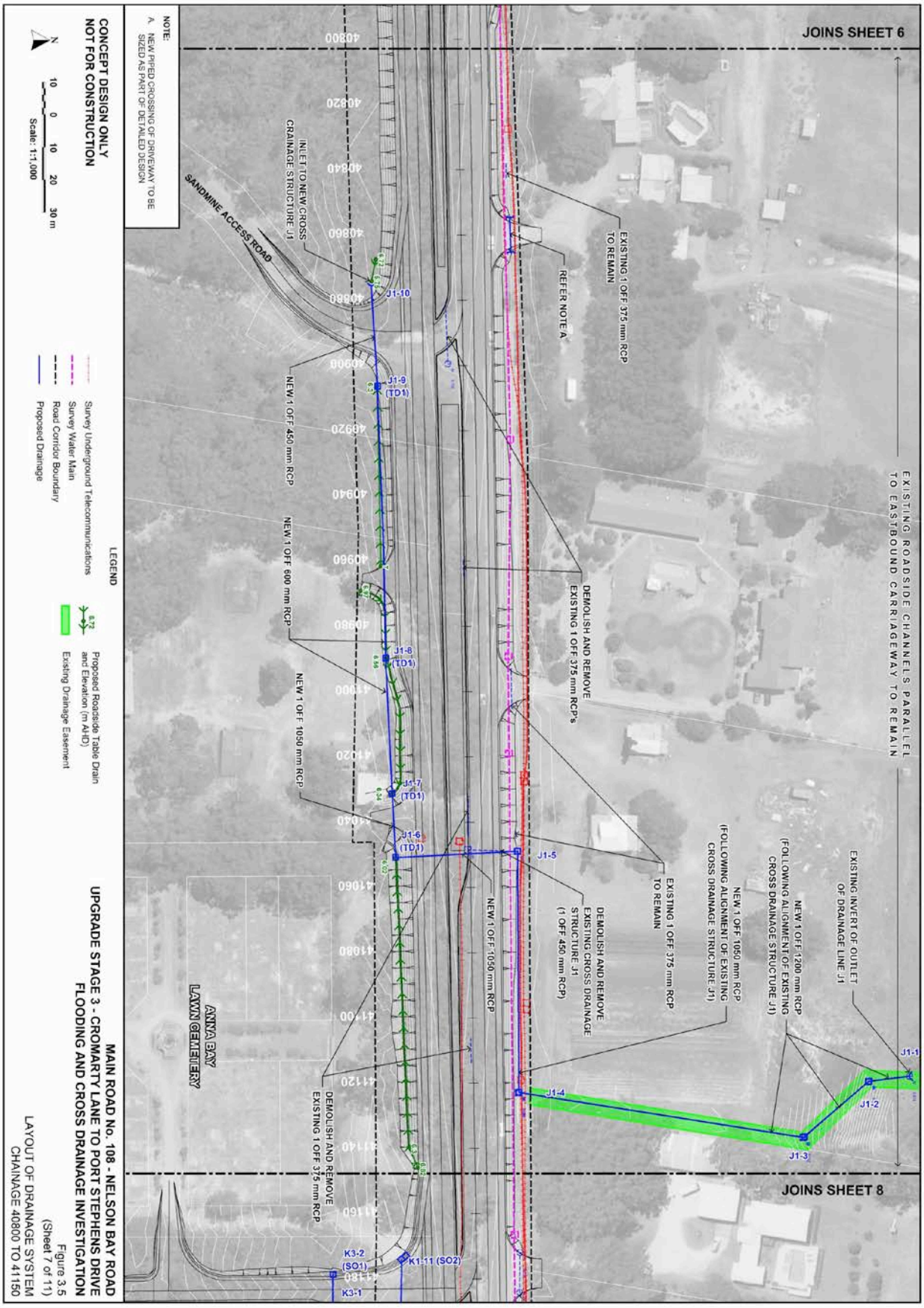


Figure 6-7 Cross Drainage (E)

Source: Lyall and Associates

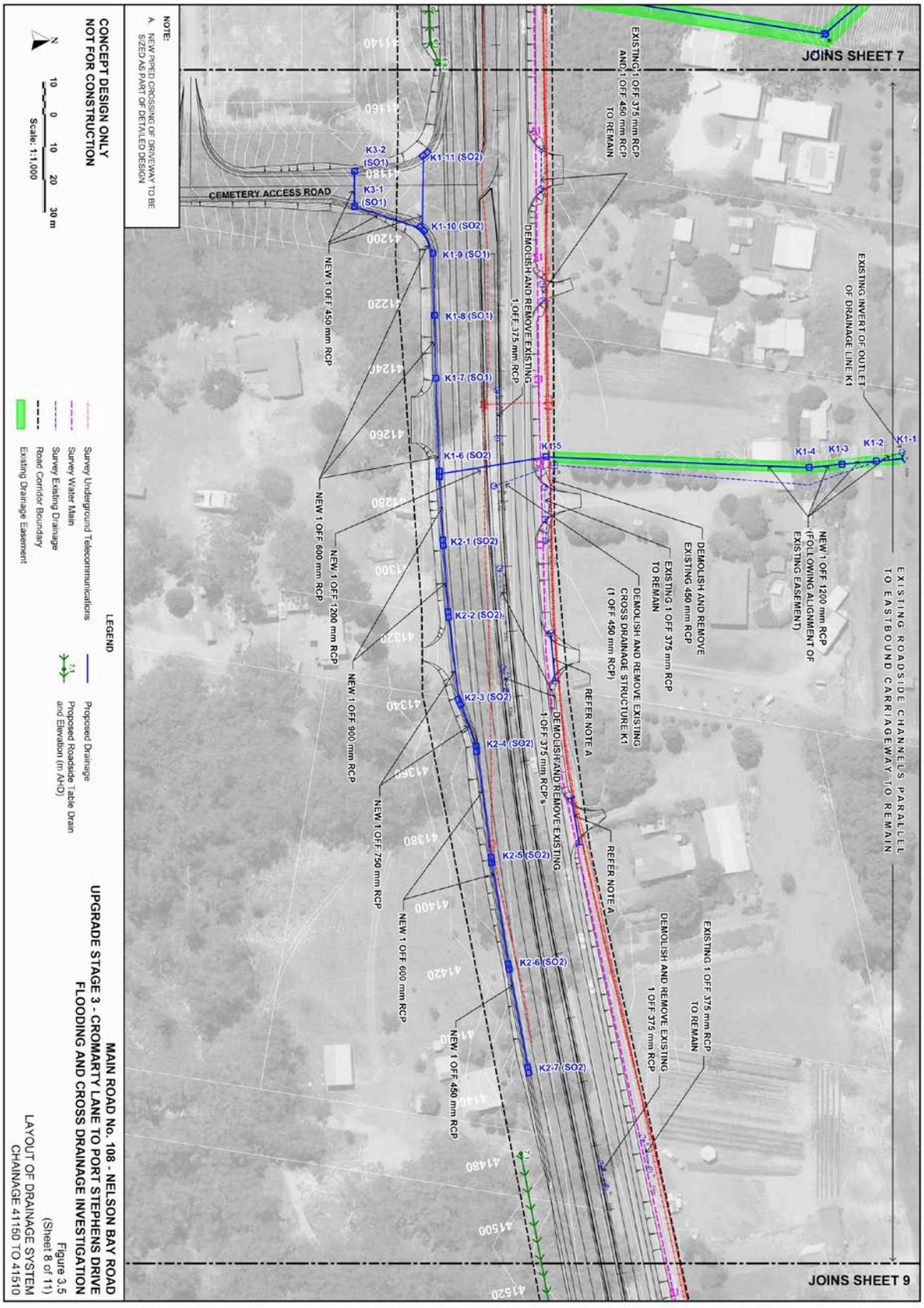


Figure 6-8 Cross drainage (F)

Source: Lyall and Associates

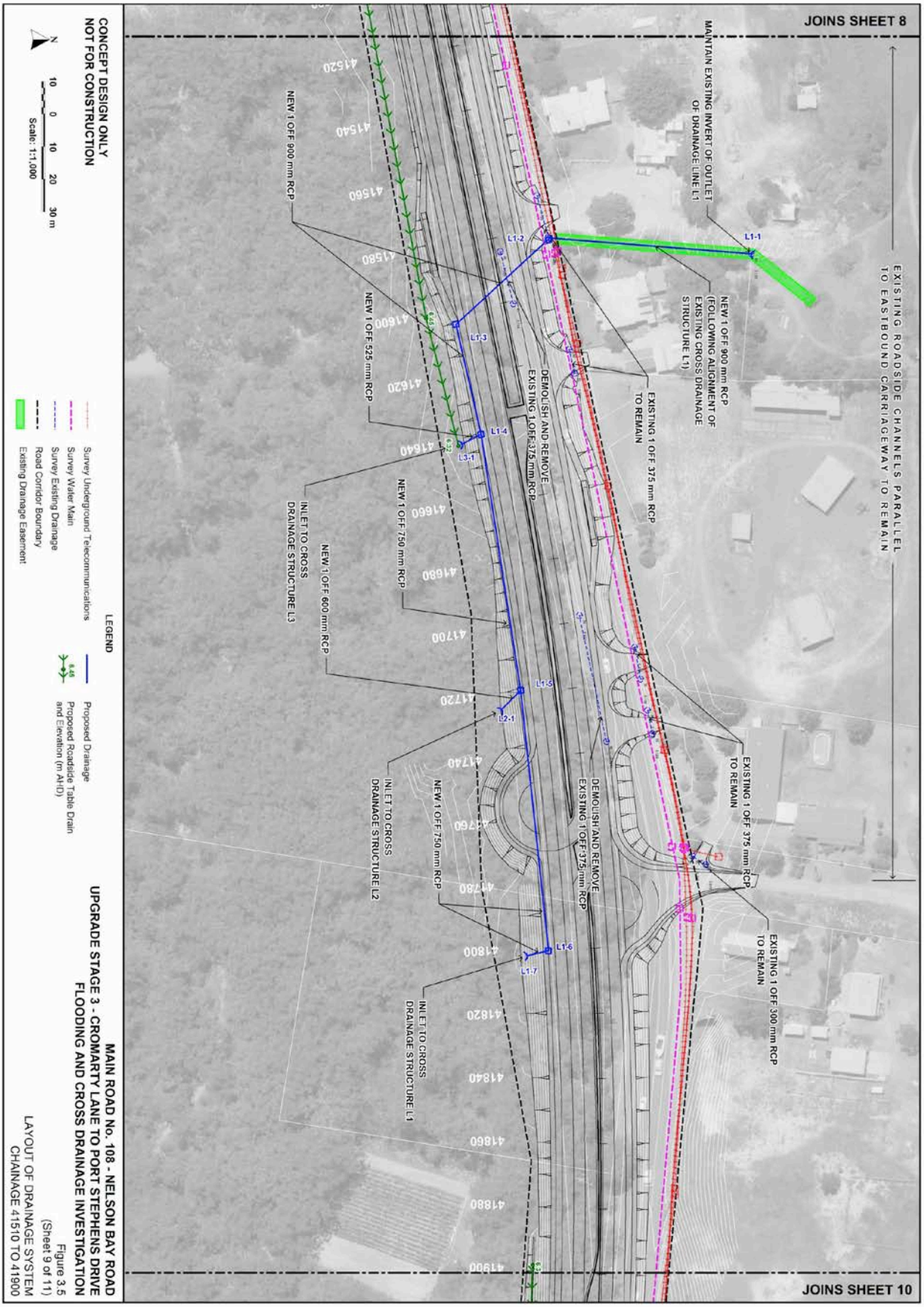


Figure 6-9 Cross drainage (G)

Source: Lyall and Associates

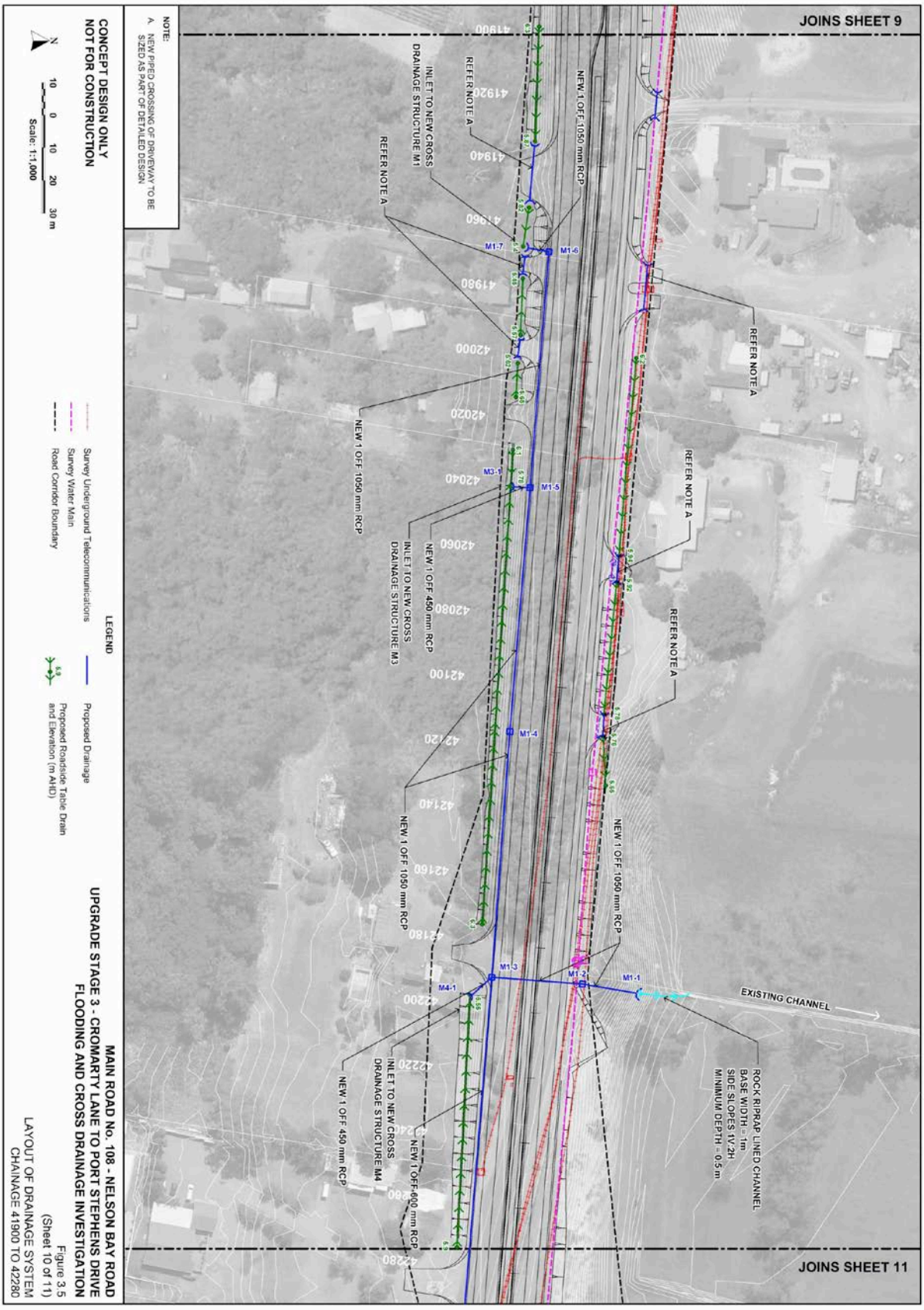


Figure 6-10 Cross drainage (H)

Source: Lyall and Associates

Safeguards and management measures

Note that the preparation of a SWMP has been proposed in Section 6.1

Impact	Environmental safeguards	Responsibility	Timing
Water pollution	• Water quality control measures would be used to prevent any materials (eg. concrete, grout, sediment etc) entering drain inlets or waterways.	Works Supervisor	Construction
Spills	• All fuels, chemicals and liquids would be stored in an impervious bunded area a minimum of 50 metres away from: - Rivers, creeks or any areas of concentrated water flow. - Flooded or poorly drained areas. - Slopes above 10 per cent.	Works Supervisor	Construction
	• Refuelling of plant and equipment outside the site compound would be avoided wherever practicable. Where this is not practicable, refuelling of plant and equipment would occur on relatively level ground at least 50 metres from waterways, drainage lines and sensitive areas, with spill containment measures in place.	Works Supervisor	Construction
	• Vehicles and plant would be properly maintained and regularly inspected for fluid leaks.	Works Supervisor	Construction
	• An emergency spill kit would be kept on site at all times. All staff would be made aware of the location of the spill kit and trained in its use. If a spill occurs, the RMS *Environmental Incident Classification and Management Procedure* is to be followed and the RMS Contract Manager notified immediately.	Works Supervisor	Construction

6.3 Air quality

Existing environment

The subject site is located in a semi rural area with some nearby residential uses. A National Pollution Inventory (2010/11 data) search indicates that local air quality is influenced mainly by diffuse source emissions including, motor vehicles, architectural surface coatings, domestic/commercial solvents and solid fuel burning.

The most commonly reported diffuse air emissions are:

- Total volatile organic compounds
- Toluene (methylbenzene)
- Xylenes

- Benzene
- Cyclohexane

There is no OEH air quality monitoring station near the subject site.

Air quality criteria

Table 6-2 presents the OEH impact assessment goals for dust fallout, showing the allowable maximum and the allowable dust deposition concentrations over the ambient level.

Table 6-2 OEH goals for allowable dust deposition

Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Annual	2g/m^2/month	4g/m^2/month

Source: Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW, NSW EPA, 2001

Potential impacts

Potential impacts associated with the proposal include minor emissions from machinery (eg delivery vehicles, construction plant) and dust.

Emissions from construction vehicles/equipment would be minor and short term.

Dust would be generated from earthworks associated with the construction of the proposal. 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 major sources of dust associated with the construction of the proposal would be the use of excavators and wind erosion of the exposed surfaces. It is noted that the wind erosion hazard for soils in the area has been mapped as moderate to high (see section 6.1).

Nuisance dust can be expected to impact on residential and commercial areas when annual average dust deposition levels exceed 4g/m^2/month. The mobilisation of dust associated with the proposal is expected to be below nuisance levels through the implementation of appropriate mitigation measures.

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Emissions from equipment	• Construction equipment would be properly maintained to ensure exhaust emissions are minimised.	Works Supervisor	Construction
Dust	• Measures (including watering or covering exposed areas) would be used to minimise or prevent air pollution and dust.	Works Supervisor	Construction
	• Works would not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely.	Works Supervisor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	• Vehicles transporting waste or other materials that may produce odours or dust would be covered during transportation.	Works Supervisor	Construction
	• Any soil or mud deposited on public roads by construction activities and vehicle movements would be removed at the end of each day and disposed of appropriately.	Works Supervisor	Construction
Other emissions	• Vegetation or other materials would not be burnt on site.	Works Supervisor	Construction

6.4 Climate change

Policy setting

The NSW Government is currently in the process of developing a Climate Action Plan, which will replace the existing NSW Greenhouse Plan. The NSW Greenhouse Plan was released in November 2005 and provides a strategic approach to combating climate change in NSW. It emphasises awareness raising, climate change adaption and reductions in greenhouse gas emissions.

Potential impacts

Climate change

Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS) (2009) has prepared a climate profile for the Port Stephens LGA.

Relevant projections in the climate profile include:

- Warmer average minimum temperatures during Autumn and Winter, with Summer minimums expected to decrease along with a slight decrease during spring. Projected increases during autumn and winter are greater than the projected decreases for summer and spring and thus an overall increase in annual average minimum temperatures is projected.
- Maximum temperatures are projected to continue to increase in the Port Stephens LGA during Autumn and Winter. Similar or slightly cooler average maximum temperatures are projected to occur during Summer and Spring.
- Average annual rainfall patterns for the Port Stephens LGA are projected to stay within the boundaries of existing known natural variability.
- Increased frequency of extreme storms during Autumn and Winter.
- Increased frequency of high rainfall events during Summer and Autumn. This is matched by a decrease during Winter and Spring to produce no overall annual change.
- Increased frequency of extreme heat days during Summer and Autumn.
- No change in winter frost events projected.

The impacts of climate change may be managed by adapting design standards where considered necessary to reduce the vulnerability of infrastructure to predicted effects. In this case the design parameters are relatively fixed and guided by the existing infrastructure and its characteristics.

Greenhouse gases

Greenhouse gas emissions attributable to the proposal would be confined to the construction stage. Sources of contribution to emissions would include:

- Fuel used by vehicles, generators and other equipment.
- Embodied energy in materials, such as concrete.
- Upstream emissions from fuel and electricity supply. For all uses of energy, there are a number of sources of upstream emissions associated with supply. For transport fuels, these include emissions associated with extraction, production and transport of the specified fuel. For electricity use, these include both the emissions from the extraction, production and transport of fuels used in the production of the purchased electricity; and also emissions associated with the electricity lost in transmission and distribution on the way to the consumer.

Given the nature and scale of the proposal, likely greenhouse gas emissions are expected to be relatively minor.

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Greenhouse Gas emissions	• Vehicles and construction equipment would be properly maintained so as to achieve optimum fuel efficiency.	Works Supervisor	Construction
	• Plant and equipment would be switched off when not in use.	Works Supervisor	Construction

6.5 Biodiversity

An ecological assessment was undertaken for the proposal by LesryK Environmental Consultants (Appendix D). The following is a summary of the main findings of that assessment.

Methodology

The ecological assessment was based on a field survey of the study area, a literature review of previous studies undertaken in the region and the review of relevant databases and the consideration of relevant legislation and statutory instruments.

Previous investigations

In March 2011, a risk assessment was completed in relation to this project (LesryK Environmental Consultants 2011). The risk assessment identified one ecological community and twelve fauna species listed by the EPBC Act and/or TSC Act that were not assessed or considered during the earlier ecological studies for the project.

As part of the 2011 risk assessment, limited field surveys were undertaken within and adjacent to the section of Nelson Bay Road proposed to be upgraded. These surveys, which were primarily aimed at determining the habitats and vegetation communities present, were carried out to identify whether there had been any significant changes to the environments present following the completion of the 2001 investigation.

The consideration of previous studies, coupled with database searches, ensures that the results from surveys conducted during different climatic, seasonal and date periods are drawn upon as required. This approach increases the probability of considering the presence of all known and likely native species, particularly any plants and animals that are of regional, state and/or national conservation concern. It avoids issues inherent with a one off "snap shot" study.

Field survey

Field investigations of the study area were undertaken during 2011 and 2012. The survey methods employed during the field investigations were:

- The identification of all plants within the areas of likely disturbance, including both direct and indirect impacts.
- The identification of the structure of those vegetation communities and fauna habitats present.
- The direct observation [including early morning bird surveys] of any fauna species present within, or adjacent to, the project area.
- Diurnal and nocturnal call identifications of fauna species, with all calls being identified in the field.
- Call playbacks targeting the Wallum Froglet (*Crinia tinnula*).
- Spotlighting.
- Echolocation detection targeting insectivorous bats (*microchiropterans*).
- The identification of any indirect evidence such as tracks / scratchings that would suggest the presence of any fauna species; and
- Ground debris, leaf litter and tree bark searches for sheltering reptiles and frogs.

Existing environment

Flora and vegetation communities

Five vegetation communities were identified in the study area, these being:

- Grassland/Disturbed Environment.
- Blackbutt-Smooth-barked Apple Open Forest.
- Swamp Mahogany- Flooded Gum - Paperbark Open Forest.
- Swamp Oak Woodland.
- Rushland / Reedland

The location of vegetation communities in the study area is shown by Figure 6-11.

Grassland/Disturbed Environment

The Grassland/Disturbed Environment community describes those parts of the study area that have been cleared of native vegetation and have subsequently been colonised by introduced grasses and shrubs or planted with pasture or ornamental/horticultural species. It also includes areas where there are remnant native trees with introduced grasses or weeds below. Generally, the road verge is cleared to a five metre width from the pavement edge and Torpedo Grass (*Panicum repens*), Paspalum (*Paspalum dilatatum*), Couch (*Cynodon dactylon*), Pigeon Grass (*Setaria sp*) and Asteraceous (Daisy family) herbs dominate. This is also the case in the vicinity of dwellings, side-road edges, bush tracks and grazing areas. The Grassland/Disturbed Environment community is of no conservation significance.

Blackbutt – Smooth-barked Apple Open Forest

Blackbutt – Smooth-barked Apple Open Forest occurs on old dunes adjacent to the road. The canopy reaches a height of 20 metres and has a projective foliage cover of around 30 per cent, this being dominated by Blackbutt (*Eucalyptus pilularis*) and occasionally Smooth-barked Apple (*Angophora costata*). There is a generally sparse, though occasionally mid-dense, tall shrub/small tree layer 4 metres to 8 metres tall of Saw Banksia (*Banksia serrata*), Broom Heath (*Monotoca elliptica*) and Cheese Tree. Lower shrubs include Breynia (*Breynia oblongfolia*), Sydney Golden Wattle (*Acacia longifolia*), Lance-leaf Geebung (*Persoonia lanceolata*), Velvet Leaf (*Clerodendrum tomentosum*) and the noxious weed Bitou (*Chrysanthemoides monilifera* subsp. *rotundata*). The groundcover to 1metre is sparse and dominated by Bladey Grass (*Imperata cylindrica*), Bracken (*Pteridium esculentum*), Mat-rush (*Lomandra longifolia*), Stinkweed (*Opercularia aspera*) and roadside weeds.

At a regional scale, Blackbutt – Smooth-barked Apple Open Forest is mapped as, and conforms to, Coastal Sand Apple - Blackbutt Forest by NPWS (2000). At a state scale, Coastal Sand Apple - Blackbutt Forest belongs to the Coastal Dune Dry Sclerophyll Forest of Keith (2004). It does not conform to any endangered ecological community listed by the TSC Act or EPBC Act.

Swamp Mahogany – Flooded Gum – Paperbark Open Forest

Swamp Mahogany – Flooded Gum – Paperbark Open Forest occurs in small patches on occasionally inundated land in the western half of the study area. The largest of these patches is on the north side of the road between station 39660 and Binder Road. This remnant is dominated by Swamp Mahogany (*Eucalyptus robusta*) to 20 metres tall with lower Cabbage Tree Palm (*Livistona australis*) and Swamp Oak (*Casuarina glauca*) also present. Flooded Gum (*Eucalyptus grandis*) to 35 metres becomes the dominant canopy species on better drained soil in the north of the remnant. The understorey includes tall shrubs such as Bleeding Heart (*Omolanthus populifolius*), *Duboisia myoporoides* and Blueberry Ash (*Elaeocarpus reticulatis*). Near Nelson Bay Road, in the west of the remnant, there is dense Lantana (*Lantana camara*) to 3 metres tall. The groundcover varies depending on drainage with Native Reed (*Phragmites australis*) and Saw Sedge (*Gahnia clarkei*) reaching 2 metres in height in standing water while better drained areas consist of Bungwahl (*Blechnum*

indicum), Rainbow Fern (*Calochlaena dubia*) and Harsh Ground Fern (*Hypolepis muelleri*) to 1 metres in height. Twiners such as Native Grape (*Cissus hypoglauca*) and Monkey Vine (*Parsonsia straminea*) are also present.

On the south side of Nelson Bay Road opposite frequent slashing has modified this community. Swamp Mahogany and Paperbark (*Melaleuca quinquenervia*) trees remain.

A somewhat more intact remnant of Swamp Mahogany – Flooded Gum – Paperbark Open Forest occurs further west on the south side of Nelson Bay Road between Stations 39300 and 39540 where there is Swamp Mahogany and Paperbark above Bungwahl, Saw Sedge and Rainbow Fern.

Between Stations 38520 and 38700 is another stand of Flooded Gum to 30 metres tall with lower Swamp Oak, Paperbark, Cabbage Tree Palm and Cheese Tree plants being present. Patches of Lantana are also present. Bracken and Bladey Grass dominate the groundcover.

Swamp Mahogany – Paperbark Swamp Forest is part of the TSC Act listed endangered ecological community Swamp Sclerophyll Forest on Coastal Floodplains.

Swamp Oak Woodland

Patches of woodland dominated by Swamp Oak (*Casuarina glauca*) are extensive on the low lying land north of Nelson Bay Road including in the vicinity of the proposed drainage works sites. These woodlands have been used for grazing for some time and the groundcover is characterised by a dense cover of pasture grasses such as Buffalo Grass (*Stenotaphrum secundatum*) and Couch (*Cynodon dactylon*) with introduced herbs such as Catsear (*Hypochaeris radicata*), Dock (*Rumex crispus*), Fireweed (*Senecio madagascariensis*) and Kurnell Curse (*Hydrocotyle bonariensis*) also common. Lantana (*Lantana camara*) is often the only shrub present.

This community is part of the TSC Act listed endangered ecological community, Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions (hereafter referred to as Swamp Oak Floodplain Forest).

Reedland / Rushland

Some sections of artificial drainage lines north of Nelson Bay Road have been colonised by dense growth of reeds rushes and sedges to two metres tall. Common species are Cumbungi (*Typha orientalis*), Native Reed (*Phragmites australis*), *Lepironia articulata* and *Schoenoplectus validus*. The aquatic herb Spotted Knotweed (*Persicaria lapathifolia*) is also common. This community is not considered to have conservation significance as it is composed of opportunistic, aquatic plant species that have colonised artificial habitats created by previous drainage works.

Flora species

During the course of field investigations, one plant species listed as vulnerable under both the EPBC Act and TSC Act was recorded, this being the Rough or Newcastle Doubletail (*Diuris praecox*). This species is a terrestrial orchid that is only apparent during its July to early September flowering period. It has two or three linear leaves, 15 centimetres to 35

centimetres long, and nodding, yellow flowers, which are about 2.5 centimetres across, with a few dark brown markings at the base of the dorsal sepal and labellum.

Diuris praecox is endemic to central-eastern NSW between Ourimbah and Nelson Bay. It inhabits open heathy forests on hills and slopes in near-coastal districts that have a grassy to moderately dense understory on well-drained sandy soil. Threats to *Diuris praecox* are loss and fragmentation of habitat through clearing for urban development; weed invasion; uncontrolled track expansion; and impacts from recreational use (Threatened Species Scientific Committee [TSSC] 2008, OEH 2011b, Jones 2006).

During the August 2011 survey three individuals of this species were found within the road reserve between Chainages 41160 and 41240. All of these plants were found on the south side of the existing carriageway in the vicinity of the north-eastern boundary of Port Stephens Cemetery. Subsequently, during the September 2012 survey these plants were not relocated. Clearing and soil disturbance associated with the construction of a petrol station east of the cemetery has resulted in the plants being removed and the species' habitat rendered unsuitable. The remainder of the project area was also checked for Diuris praecox during the September 2012 survey and none were found. However, flowering Diuris praecox were observed concurrently in Worimi National Park indicating that if the species was present in the project area it would have been apparent.

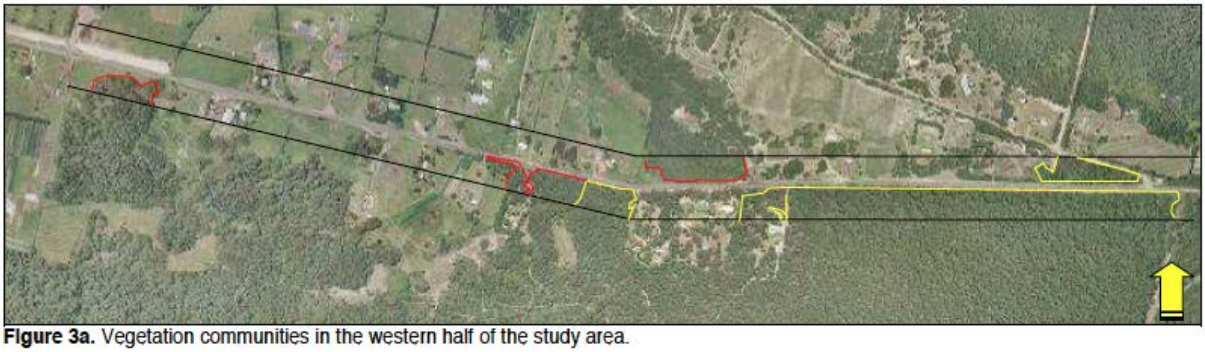


Figure 3a. Vegetation communities in the western half of the study area.

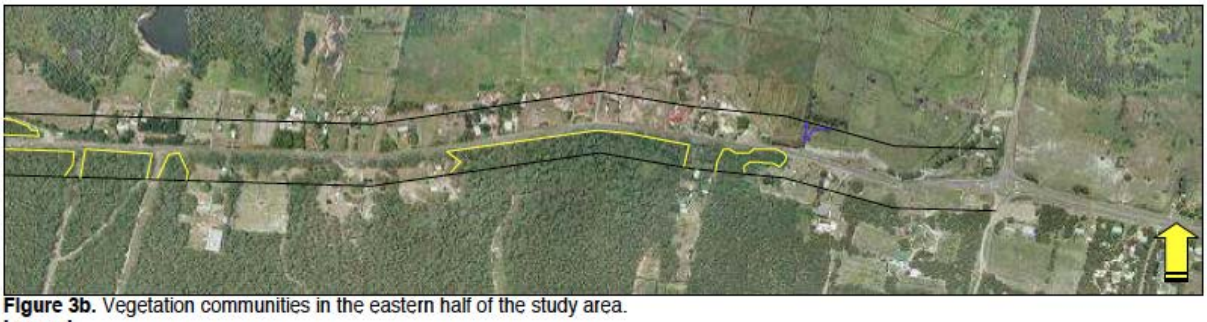


Figure 3b. Vegetation communities in the eastern half of the study area.

Legend

Blackbutt – Smooth-barked Apple Open Forest

Swamp Oak Woodland

Swamp Mahogany – Paperbark Open Forest

Remainder = Grassland/Disturbed Environment

Source: © Department Lands (2012).
Not to scale.

Figure 6-11 Vegetation communities within the study area

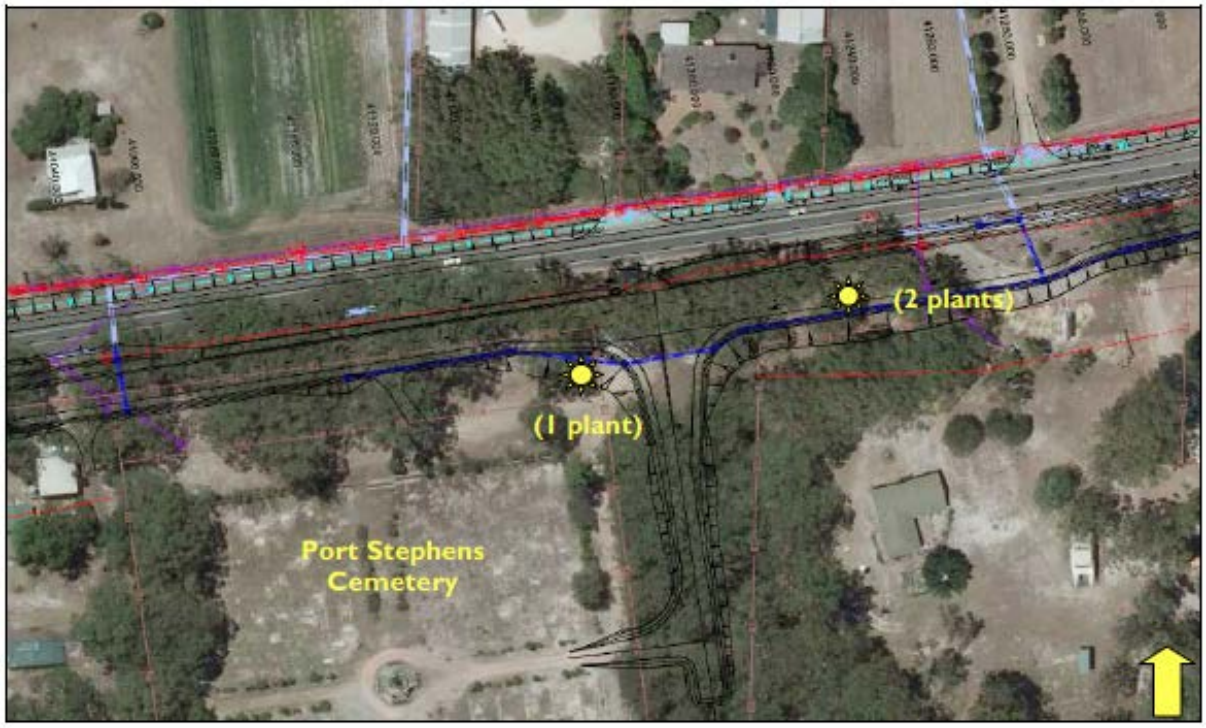


Figure 6-12 Location of Diuris praecox identified during field surveys

Point records for the species on the Atlas of NSW Wildlife (OEH 2011c) indicate that within 1 kilometre of the study area there are 17 separate records of *Diuris praecox*, with counts totalling at least 352 individuals. Of these, 325 individuals are from within the adjacent Worimi National Park. It also appears from the point records that the plants found during the current survey have not been recorded previously. The point records also indicate that, during September 2004, the species was identified within the study area approximately 500 metres east of the plants recorded during this survey. However, the record has no location description and is only accurate to 250 metres meaning it could also have been found within Worimi National Park.

Noxious weeds

By the completion of the field investigations, three plants listed as Noxious Weeds for the Port Stephens LGA under the *Noxious Weeds Act 1993* were found in the study area, these being:

- Annual Ragweed (*Ambrosia artemisiifolia*);
- Bitou Bush (*Chrysanthemoides monilifera* subspecies *rotundata*).
- Lantana (*Lantana camara*).

Annual Ragweed is a Class 5 weed that under the Act requires that “The requirements in the *Noxious Weeds Act 1993* for a notifiable weed must be complied with”.

Bitou Bush and Lantana are Class 4 weeds requiring that “The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority”

Fauna species

During the course of the field investigations 49 native birds, seven native mammals, three amphibians and one reptile were recorded within, or beyond the limits of, the study area. A number of introduced animals, were also observed.

Of those native species recorded, one, the Cattle Egret, is listed as Migratory under the EPBC Act, while three are listed as Vulnerable under the TSC Act, these being:

- Greater Broad-nosed Bat (Scoteanax rueppellii).
- Little Bentwing Bat (*Miniopterus australis*)
- Eastern Bentwing Bat (*Miniopterus (schreibersii) orianae oceanensis*).

Of those species recorded, four, the Australian Wood Duck (*Chenonetta jubata*), Pacific Black Duck (*Anas superciliosa*), Masked Lapwing (*Vanellus miles*) and Grey Goshawk (*Accipiter novaehollandiae*), are listed as occurring within a Family (Families as in the Taxonomic classification system) of birds listed as migratory under the EPBC Act. Although listed as occurring within a Family of migratory birds, these species are not considered to be migratory within Australia.

Fauna habitat

The modified environment that comprises Nelson Bay Road itself, pathways, street lights, power lines, fences and adjacent semi-rural properties offer limited to no resources for those native fauna species recorded or expected. Cattle Egrets were observed foraging in this modified environment during field investigations however, it is not considered that this species would be reliant upon this habitat.

Eucalypt woodland dominates the vegetated portion of the study area, however a *melaleuca* woodland is also present.

The eucalypt woodland contains a canopy of Eucalypts that reaches 20 metres in height with a generally continuous canopy. It is noted that some of those older trees present support hollows (>250 millimetres diameter). The understorey consists of native shrubs and saplings that reach between 2 metres and 6 metres in height, while the density varies between medium and sparse. The groundcover is composed primarily of a high density layer of native grasses, ferns and seedlings that are to 0.5 metres high, though exotic species were also observed. Accumulations of leaf litter and ground debris are common.

No caves, exfoliated rock material or rock outcrops that contain crevices or ledges, were observed in association with this environment.

The Melaleuca woodland contains a canopy that consists primarily of Melaleucas, however as it abuts the eucalypt woodland a number of eucalypts are also present. The overstorey is of a high density and reaches 20 metres to 25 metres in height. No obvious hollows were observed within this portion of the woodland. The understorey consists of native shrubs and trees that reach 6 metres, whilst the groundcover consists of native ferns, herbs and forbs that reach 1 metre in height and are of a medium to high density. It is noted that vines extend through to the upper strata.

Given the presence of hollow-bearing trees observed within the woodland habitat, there is a high likelihood that those hollow-dependent microchiropterans would be present. It is also

noted that all microchiropterans and threatened birds have the potential to forage within this habitat type. Highly tolerant native species such as the Swamp Wallaby and various Honeyeaters (*Anthochaera* spp., *Lichenostomus* spp. *Phylidonryis* spp.) as well as some reptile species are also considered likely to traverse this area.

Two aquatic environments were recorded within the study area, these being a swamp and drainage swales.

The swamp area is considered to be a permanent water body within the study area and is present in association with the Melaleuca woodland. This area contained water at the time of the field investigation, this being approximately 10 centimetres deep. The substrate of this area is earthen. The riparian vegetation conforms to the Melaleuca woodland habitat as previously described, while emergent aquatic vegetation between 1 metre and 2 metres is present, this being of a medium to high density.

A number of drainage swales are present within the road reserve and were observed to support water to a depth of 15 centimetres. Emergent aquatic vegetation to 1 metre high and of a medium to high density is present, whilst the banks are of earthen material. The riparian vegetation is generally composed of exotic grassland. A small wetland is also present which was observed to support water to a depth of 20 centimetres

The aquatic environment has the potential to be utilised by the Wallum Froglet (*Crinia tinnula*). While this species was targeted during the field investigation none responded to those call playbacks undertaken. The Wallum Froglet is not expected to be solely reliant upon this resource.

Potential impacts

Loss of vegetation / habitat

Table 6-3 summarises the amount of each vegetation community that would be removed by the proposal and their representation at catchment and locality levels.

Table 6-3 Summary of vegetation loss and wider representation

Community	TSC Act	EPBC Act	Site	Local Catchment	Locality	% catchment loss
Blackbutt-Smoothbarked Apple Open Forest	-	-	4.1 ha	581	5118	0.71
Swamp Mahogany-Flooded Gum - Paperbark Open Forest	E	-	0.7 ha	684	1507	0.11
Swamp Oak Woodland	E	-	0.06 ha	38	110	0.16
TOTAL			**4.85 ha**	**1767#**	**12,227#**	**0.27**

Total of all native vegetation communities derived from NPWS (2000) mapping.

E – TSC Act endangered ecological community.

By the completion of field investigations, the woodland habitat was observed to contain 79 mature trees that contained hollows. Coordinates of these trees are included in Appendix D.

In total, these 79 trees were observed to contain a cumulative total of 224 hollows of varying sizes

It should be noted that the woodland adjacent to the study area, and within the wider region, contains similar resources. During the field investigations a number of mature trees with well-developed hollows were identified well beyond the footprint of works proposed.

Koala habitat

State Environmental Planning Policy No.44 – Koala Habitat Protection (SEPP 44) seeks to encourage the proper conservation and management of areas that provide habitat for Koalas. The Port Stephens Council LGA is listed under Schedule 1 – Local Government Areas of SEPP 44.

Within the study area, one eucalypt species listed under Schedule 2 of SEPP 44 as Koala Feed Tree was recorded, this being Swamp Mahogany (*Eucalyptus robusta*). This feed tree constitutes more than 15 per cent of the trees present in the subject site's Swamp Mahogany Paperbark Open Forest. Therefore, in accordance with the definitions provided under SEPP 44, the subject site is considered to constitute Potential Koala habitat.

No Koalas were detected or indicated (ie. scats or characteristic scratchings) during the current and previous (ERM 2001, ERM 2004) spotlight sessions and investigations. It is considered that there is not a resident Koala population in this locality and the subject site therefore does not constitute Core Koala habitat.

With reference to Council's Comprehensive Koala Plan of Management (CKPoM) (Port Stephens Council 2002) the majority of the study area has been mapped as "mainly cleared". However, a small portion is mapped as either "unknown habitat quality" or "supplementary koala habitat", the latter being dominant to the south of Nelson Bay Road and extending east and west well beyond the extent of works proposed.

Following the listing of the Koala under the EPBC Act, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities released the document *Interim koala referral advice for proponents* (DSEWPC 2012). With reference to this document, it is noted that no important populations are considered to rely upon the habitat present within the study area. Similarly, the study area is not considered to contain any areas of critical habitat for this species. It is not considered that the amount of habitat to be affected as a result of the proposal is essential to the dispersal of Koalas between those forest or woodland habitats present within the Port Stephens LGA. Accordingly, further assessment in regards to the Koala or its habitat was not considered necessary.

Wildlife connectivity and habitat fragmentation

The establishment of Nelson Bay Road and the semi-rural properties, vineyards and cleared properties on the north side of the road have created a barrier to the north-south movement of fauna species and reproductive material between populations of flora, more so the latter. While this is the case, two possible areas for the movement of fauna exist, these being the Hellanvale Lane and Trotters Road intersections. At both these locations on the north side of Nelson Bay Road a stand of mature eucalypt woodland is present that extends, albeit fragmented, in a northerly direction where it joins with extant vegetation including wetlands.

Ground traversing species that are tolerant of crossing open space areas (e.g. the Eastern Grey Kangaroo (*Macropus giganteus*) and some reptiles/frogs) may be affected by the proposed road works. Whilst this is the case, if present within the study region, given the current barrier situation, it is expected that the majority of these animals would be "tolerant" of the existing network of roads and urban infrastructure. As such, these animals are likely to adapt to the conditions presented by the proposed upgrade and road widening works.

Given the scope of works proposed any animals currently traversing along the identified corridor are also expected to do so post-construction. Therefore the proposed road works are not considered to present an extension of the barrier that already exists to the movement patterns of any native fauna, thereby isolating or further fragmenting their habitat areas.

Similarly the proposed upgrade and road widening works would not isolate any populations that are currently interbreeding. The proposed road works are not considered to have an adverse cumulative impact when associated with the existing situation.

Injury and mortality

As there are large and intact areas of native vegetation on both sides of Nelson Bay Road containing highly diverse and abundant fauna assemblages, combined with high vehicle usage (including heavy vehicles and night traffic), the probability of vehicle-animal collisions is high.

While no roadkill were observed during field investigations, the current road situation is expected to be causing injury and mortality to fauna species.

In relation to the Koala, vehicle strikes are a major factor threatening this species. As such, Port Stephen's Council's CKPoM identifies a number of black spots within the LGA (Port Stephens Council 2002). With reference to this document it is acknowledged that the section of Nelson Bay Road being upgraded is identified as consisting of a number of 'potential problem areas'.

With the increase in width of the road corridor the mortality rate of native fauna, including Koalas should they traverse the project area, is expected to increase.

Given the presence of those hollow-bearing trees and the potential for animals to be roosting within these trees, there is the potential for some animals to be injured, displaced and/or killed.

Aquatic impacts

Whilst an aquatic environment is present, the proposed works are not expected to result in the net loss of this habitat. There would be some temporary impacts but all of the amphibians recorded during the field investigation, and any other aquatic dependent species likely to occur (i.e. eels), are all expected to be present post-road works.

Relevant key threatening processes

Clearing of native vegetation

Given the scale of works proposed in comparison to the amount of protected bushland present within the adjacent Worimi National Park, the amount of vegetation to be removed is

not considered to be significant. With reference to the NSW Scientific Committee's determination for "clearing of native vegetation", the works are not considered to adversely affect two or more threatened species, populations or ecological communities or cause species, populations or ecological communities that are not threatened to become threatened. Accordingly the proposed works are not expected to contribute to this Key Threatening Process.

Invasion, establishment and spread of Lantana

The proposal is not expected to result in the introduction of Lantana. This species is present in disturbed lands adjacent to Nelson Bay Road. However, with the implementation of appropriate management measures the proposal is not expected to contribute to this Key Threatening Process.

Invasion of native plant communities by Chrysanthemoides monilifera (Bitou Bush)

The proposed works are not expected to result in the introduction of Bitou Bush. This species is present in disturbed lands adjacent to Nelson Bay Road. However, with the implementation of appropriate management measures the proposal is not expected to contribute to this Key Threatening Process.

Invasion of native plant communities by exotic perennial grasses

Exotic perennial grasses and other weeds have colonised the disturbed road edges adjacent to this section of Nelson Bay Road. It is likely that such species would colonise the new road edges. As such, the proposed works are expected to contribute to this Key Threatening Process.

Loss of hollow-bearing trees

Those hollow-bearing trees present could potentially be utilised by some of those National and/or State listed fauna previously recorded within the wider region, namely those hollow dependant microchiropterans and/or birds. Based on the detection of a hollow dependent bat during the current field investigations, it is considered highly likely that this microchiropteran is roosting within the, or in close proximity to, the study area. As such, the proposed road works are expected to contribute to this Key Threatening Process.

While this is the case, extant areas of well-developed woodland containing numerous hollow bearing trees suitable for the roosting and sheltering needs of these species are present adjacent to the study area within the Worimi National Park. Giving consideration to this and provided that the works are undertaken in compliance with those mitigation measures proposed, the proposal would not be expected to contribute significantly to this Key Threatening Process.

Cumulative impacts

The recent establishment of the service station, to the east of the cemetery, is thought to have resulted in the removal of those *Diuris praecox* individuals that were recorded in August 2011. Apart from the completed service station no other major developments or land clearances are known to be taking place adjacent to, or in close proximity to, this section of Nelson Bay Road. Given the scale of works proposed it is not considered that any cumulative

impact is likely to occur such that the local viability of any native flora or fauna species would be adversely affected.

Legislative considerations

EP&A Act, TSC Act and EPBC Act

With reference to the criteria provided by the EPBC Act Significant Impact Guidelines, it is considered that the proposal would not have a significant impact on Commonwealth listed threatened and/or migratory species. A referral of the proposal to the Federal Minister for Sustainability, Environment, Water, Population and Communities is therefore not considered necessary.

With reference to the assessment criteria provided by Section 5A of the EP&A Act it is not considered likely that the proposal would have a significant impact on TSC Act listed threatened species. Accordingly, a Species Impact Statement to further consider the impacts of the proposal on threatened species, populations, endangered ecological communities or their habitats is not required.

A summary of the assessment outcomes is provided in Table 6-4. The full assessments are included in Appendix D.

Table 6-4 Threatened fauna assessment

Species / Community	Conservation status	Assessment
Endangered ecological communities		
Swamp Sclerophyll Forest	TSC Act EEC	The proposal would result in the removal of approximately 7000m^2 of Swamp Sclerophyll Forest and the likely modification of a further 2500m^2. Given the small amount of habitat affected relative to the broader area and its disturbed state, it is considered that the proposed road upgrade is unlikely to have a significant effect on the community, or its habitat.
Swamp Oak Floodplain Forest	TSC Act EEC	The proposal would result in the removal of approximately 600m^2 of degraded Swamp Oak Floodplain Forest. Given the small amount of habitat affected and its disturbed state, it is considered that the proposed road upgrade is unlikely to have a significant effect on the community, or its habitat.
Threatened flora		
Diuris praecox	EPBC Act vulnerable TSC Act vulnerable	The proposed action would not result in the loss of any *Diuris praecox* individuals. No individuals are likely to be present in the proposed works area. In relation to potential habitat for the species, approximately 4.1ha would be affected (the total of the Blackbutt – Smooth-barked Apple Forest that would be removed) However, the potential for the

Species / Community	Conservation status	Assessment
		species to occur in this habitat has been severely reduced by weed invasion and over-frequent cool fires. Many hundreds of hectares of habitat would remain unaffected to the south of the subject site, much of which is conserved within Worimi National Park. Significant impact not expected.
Threatened fauna		
Cattle Egret (*Ardea ibis*)	EPBC Act migratory	No significant impact. Would not rely on proposal area for life cycle requirements. No breeding sites were recorded.
Grey-headed Flying-fox (*Pteropus poliocephalus*)	EPBC Act vulnerable TSC Act vulnerable	No significant impact. No known roosting/breeding camps present within, or near, the proposal area. The proposal would result in the loss of approximately 4.8 hectares of potential foraging habitat. When compared to the amount of similar bushland/vegetation present within the adjacent Worimi National Park, this is not considered to constitute a significant loss.
Hollow-dependent Microchiropterans	TSC Act vulnerable	No significant impact. Proposal would not result in the significant loss of hollow-bearing trees, or any major occurrences of any insect attracting plants. With well developed stands of bushland that support hollow-bearing trees adjacent to the study area, the local presence of those hollow dependent microchiropterans recorded or previously detected in the study region is ensured.
Cave-dependent Microchiropterans	TSC Act vulnerable	No significant impact. Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of any cave-dependent threatened microchiropterans. Proposal would not result in the removal of, or modification to, caves or suitable cave substitutes, or any major occurrences of any insect attracting plants.
Threatened parrots	TSC Act Vulnerable / Endangered	No significant impact. Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Little Lorikeet or Swift Parrot. The works would not remove any significant portions of these birds' foraging or nesting habitats, nor would it present a barrier to their dispersal or movement patterns.
Varied Sittella	TSC Act vulnerable	No significant impact. Proposal would not disturb, remove, modify or fragment any

Species / Community	Conservation status	Assessment
		habitats critical to the life cycle requirements of the Varied Sittella. While 4.8 hectares of woodland habitat is to be removed, similar resources present within the adjacent Worimi National Park.

National Parks and Wildlife Act 1974

Native fauna species that may traverse the site would be protected species under the *National Parks and Wildlife Act 1974*. They are however likely to be common to abundant throughout the surrounding region. It is unlikely they would be solely reliant upon those habitats observed adjacent to the existing road such that the removal or further disturbance of these would threaten their local or regional occurrence.

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Removal and disturbance of native vegetation and associated habitat	• The extent of clearing would be minimised. It would be shown on drawings kept on site and would be communicated to personnel during inductions.	Works Supervisor	Construction
	• Exclusion zones that identify the limits of clearing and environmentally sensitive areas would be established prior to the commencement of construction and would be in accordance with the RMS *Biodiversity Guidelines*.	Works Supervisor	Construction
	• Any dead wood to be removed as part of the proposal should be retained and placed elsewhere in those portions of the site that are to be retained.	Works Supervisor	Construction
	• Where possible, hollows from those trees to be removed would be cut from the tree and placed in adjacent woodland areas where they can serve as habitat. A nest box strategy would also be investigated as part of the biodiversity offset strategy.	Works Supervisor / RMS Project Manager	Construction
Impacts on Koala	• Should Port Stephens Council observe an increase in Koala mortality within the project area or revise and upgrade the status of the area from 'potential problem areas' to 'conflict areas' or 'black spots', RMS would implement the actions put forward in Chapter 8 of the Comprehensive Koala Plan of Management.	RMS Project Manager	Construction Operation
Injury to wildlife	• A qualified ecologist is to undertake a preclearing survey of trees and any underscrub. Any wildlife found must be	Works Supervisor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	relocated to a predetermined safe location.		
	• Clearing must follow staged habitat removal process as outlined in RMS *Biodiversity Guidelines*.	Works Supervisor	Construction
Threatened species impacts	• A biodiversity offset strategy would be prepared by a suitably qualified an experienced ecologist and would be reviewed by the RMS Biodiversity Specialist and the RMS regional environmental officer. The strategy would be in accordance with the RMS *Guidelines for biodiversity offsets* (RMS 2011).	RMS Project Manager	Pre-operation
Noxious weed proliferation	• Any noxious weeds would be managed in accordance with the RMS Biodiversity Guidelines and in consultation with Port Stephens Council.	Works Supervisor	Construction

6.6 Aboriginal heritage

McCardle Cultural Heritage undertook archaeological investigations for the proposal in consultation with registered Aboriginal stakeholders (refer to Appendix E). The main findings are summarised below.

Existing environment

A search of the OEH Aboriginal Heritage Information Management System (AHIMS) register identified 116 previously recorded Aboriginal sites within five kilometres of the study area. Two shell middens and a low density artifact scatter were identified within the study area during a previous survey by Worimi Local Aboriginal Land Council (LALC) undertaken in November 2011.

Based on the previously recorded site data it was predicted that within the study area there was a high potential for shell middens, artefacts scatters and isolated finds to be located on the Holocene dunes.

The Aboriginal Heritage Impact Assessment (MCH 2012) identified three sites (NBR3/1 – NBR3/3) within the study area all on the Holocene dunes and within ten metres of the interbarrier depression. Further investigations identified that site NBR3/2 and site NBR3/3 are the one site and hence they were combined into NBR3/2. One PAD (NBR3/PAD1) was also identified to the far north on the Holocene dune. Following this, an archaeological subsurface testing program was recommended for the site to determine whether subsurface cultural material exists.

Stage one test excavation works has now been completed in accordance with Aboriginal Heritage Impact Permit #1131869. The results indicate a focal point of past occupation activities within the PAD and a background scattering of cultural materials around this focal point. All stone and shell artefact recovered are typical of both the local and regional archaeology. The PAD remains relatively undisturbed with disturbances along the road

boundary as evidenced through road base material. Pits down slope form the crest were also disturbed through erosion. The focal point of past activity remains relatively in situ with bioturbation (reworking of soils and sediments by animals or plants) appearing to be the only disturbance.

NBR3/PAD1 (that is associated with NBR 3/2) is of high significance to the registered stakeholders as it forms part of the history and a link to their past. Salvage of this site is now proposed and an AHIP for this purpose will be sought.

Potential impacts

A summary of the extent on impacts on identified sites is provided in Table 6-5.

Table 6-5 Summary of Aboriginal site impacts

Site	Site type	Harm type	Harm degree	Consequence of harm	Representative	Integrity	Research potential	Scientific significance
NBR3/1	Shell midden	Direct	Total	Total loss	Well represented	Very poor	Low	Low
NBR3/2	Artefact scatter	Direct	Total	Total loss	Well represented	Very poor	Low	Low
NBR3/ PAD1#	Open site / shell midden	Direct	Total	Total loss	Well represented	Good	Low to moderate	Low to moderate

Associated with site NBR3/2

The results of the assessment indicate that the two sites and PAD would be directly affected by the proposal. The sites, shell middens and an artefact scatter are located on a Holocene dune overlooking the interbarrier depression. NBR3/1 is well represented both locally and regionally and is highly disturbed with little to no research or scientific potential. Site NBR3/2 (and associated PAD NBR3/ PAD1) is relatively undisturbed and investigations have indicated a focal point of past occupation. Salvage of this site is now proposed and an AHIP for this purpose will be sought.

The cumulative impact to Aboriginal heritage have been identified as limited given:

- The net development footprint is small and does not affect a high proportion of any particular landform present within the region.
- A comparable suite of landforms (Holocene and Pleistocene dunes) that are expected to, and do contain a similar archaeological resource occur in multiple contexts both within the local area and throughout the wider region.
- The PAD and identified focal point of past occupation within the PAD has been subject to minimal disturbances and as a consequence of these disturbances the representative value of the archaeological resource is increased.

- The placement of the development within this area, in particular along the majority of the proposed road the land has been greatly disturbed, ensures the cumulative impacts are focused in the areas of lower potential and therefore are kept to a minimum.

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Impacts on Aboriginal cultural heritage	• Investigation / salvage of NBR3/ PAD1 (associated with NBR 3/2) will continue in accordance with relevant Aboriginal Heritage Impact Permits.	RMS Project Manager	Pre-Construction
	• An Aboriginal Heritage Impact Permit would be sought for remaining sites and the project as a whole, in consultation with registered Aboriginal stakeholders	RMS Project Manager	Pre-Construction
	• A cultural heritage awareness program would be developed in consultation with registered Aboriginal stakeholders and would be included as part of the site induction.	Contractor	Pre-Construction
	• All personnel working on site would receive training in their responsibilities under the *National Parks and Wildlife Act, 1974*.	Contractor	Construction
	• Should Aboriginal heritage items outside the scope of applicable Aboriginal Heritage Impacts Permits be uncovered during works, all works in the vicinity of the find would cease and the RMS Aboriginal Cultural and Heritage Advisor and Regional Environmental Officer Hunter Region would be contacted. Works would not recommence until appropriate clearance has been received. The steps outlined in the Roads and Maritime Services Unexpected Archaeological Finds Procedure would be followed.	Works Supervisor	Construction

6.7 Non-Aboriginal heritage

Existing environment

A search of the State Heritage Inventory for the Port Stephens local government area returned a total of 55 records, however none were identified as being within the immediate vicinity of the proposal area.

A search of the Commonwealth Heritage Database was also conducted. It returned 43 records. The nearest record is for the Tilligerry Creek Area, which is identified as an

indicative place on the Register of the National Estate[3]. This area would not be directly affected by the proposal.

Previous investigations (ERM 2001) indicated that the site of the original Anna Bay Public School has local heritage significance as the site of the first public school established in Port Stephens (in 1879). Important elements of the site identified included two Hoop Pine trees (commemorative planting) and potential archaeological features.

View east to the to the former Anna Bay Public School site

Ground conditions. Former Anna Bay Public School site.

Figure 6-13 Images of the former Anna Bay Public School site

Potential impacts

A Historic Heritage Impact Assessment was undertaken in relation to the original Anna Bay Public School site by AHMS (Appendix F). The main findings of that assessment were as follows:

- It is unlikely that any potential historical archaeological deposits and objects to survive in the study area above or below ground due to extensive disturbance.
- As no objects or deposits are likely, it is highly unlikely that 'relics' as newly defined by the *Heritage Act 1977* are present at the site.
- Should any potential historical objects or deposits exist, they are most likely to be disturbed and fragmentary remains of the occupation of the area by the former school. Any potential historical archaeological resources are unlikely to have any (local or State) heritage significance and so would not be considered as 'relics' under the *Heritage Act 1977*.
- No further heritage assessment, permits, exceptions and/or exemptions are required under the Heritage Act 1977 prior to works proceeding.
- The Hoop Pines are likely to be of local heritage significance due to their age (Hoop Pine # 1) and their association with the location and commemoration of the former Anna Bay Public School (Hoop Pines # 1 and 2).

[3] Note that the Register of the National Estate was frozen on the 19 February 2007. The Register will continue as a statutory register until February 2012. From February 2012 all references to the Register will be removed from the EPBC Act. The RNE will be maintained after this time on a non-statutory basis as a publicly available archive.

A further assessment of the Hoop Pines by Stedinger Associates (Appendix G) found that while the trees had minor contributory significance due to association with the school site, both now represent a potential hazard due to structural defects and damage and should therefore be removed. In summing up the heritage impact, the report notes:

> *Removal of both Hoop Pines is considered to be an acceptable level of impact given their potential hazard to people and property, their lack of structural stability, reduced life expectancy, low local heritage significance, compromised aesthetic value and loss of associative integrity.*

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Unexpected impact on heritage values	• Should archaeological material be unexpectedly uncovered during construction, all works would cease within the vicinity of the material/find and environment staff from RMS Hunter Region would be contacted.	Works Supervisor	Construction
Impacts on trees with heritage significance	• Consideration would be given translocating two young Hoop Pines from their present location behind Hoop Pine No.1 to an appropriate site. Sites to be considered would include: - The east side of the Union Church at the site of the original 1879 Provincial School; or - Set back approximately 25 metres on the new southern road side marking the 1884 Public School.	RMS Project Manager	Detailed design

6.8 Noise and vibration

A construction and operational noise and vibration assessment was undertaken for the proposal by PAE Holmes (Appendix H). The following is a summary of the main findings of that report.

Existing environment

For the purposes of the assessment, the proposal extent was divided into four noise catchments areas (NCA) that capture various residential and other sensitive receivers (places of worship, active open space, passive open space) adjacent to the road. These are:

- Western extent of the project, to just east of Binder Road.
  - NCA A, on the northern side of the road.
  - NCA B, on the southern side of the road.
- Eastern extent of project, east of Binder Road.
  - NCA C, on the northern side of the road.
  - NCA D, on the southern side of the road.

Unattended noise monitoring was carried out at representative noise sensitive receivers between 29 November 2011 and 13 December 2011 to establish the prevailing background noise environment. The results are given in Table 6-6. Figure 6-14 and Figure 6-15 show the monitoring locations.

Table 6-6 Measured RBL noise levels

Receiver		RBL noise level	
	Standard hours	Evening (6:00pm – 10:00 pm)	Night (10:00 pm – 7:00 am)
BG1	50	40	33
BG2	50	42	34
BG3	49	43	35
BG4[#]	-	-	-

At Location BG4 the logging data was adversely affected by extraneous noise and is therefore not suitable to be used as part of this assessment and is not discussed further.

Figure 6-14 Monitoring locations (west)

Not to scale. North is top of image. Source: PAE Holmes.

Figure 6-15 Monitoring locations (west)

Not to scale. North is top of image. Source: PAE Holmes.

Noise and vibration criteria

Construction noise

Appropriate construction noise targets are given in the OEH *Interim Construction Noise Guideline* (DECCW 2009*)*.

In general these criteria provide that, for residential receivers, the construction noise should not exceed the background by more than 10 dBA during standard hours, and by more than 5 dBA out of hours (that is, for night-time works). Table 6-7 summarises the adopted noise management levels for the proposal.

Table 6-7 Project specific noise management levels (NML)

Receiver		Management level $L_{Aeq,\ 15\ min}$ (dBA)	
	Standard hours	Evening (6:00pm – 10:00 pm)	Night (10:00 pm – 7:00 am)
NCA A	59	48	40
NCA B	59	48	40
NCA C	60	45	38
NCA D[1]	60	45	38
Commercial	70	70	70

Note: 1. Background noise levels for NCA D are the same used for NCA C, as evening and night-time monitoring was adversely affected by extraneous noise at BG 4 in NCA D.

Construction vibration

The OEH publication *Assessing Vibration: a technical guideline* (DECC 2006) sets out human comfort criteria for continuous, impulsive and intermittent vibration. Table 6-8 provides limits for long-term (16 hours for daytime), continuous exposure to vibration sources.

Table 6-8 Peak Particle Velocity (PPV) values for continuous and impulsive vibration

Location	Assessment period (1)	Preferred values	Maximum values
Continuous vibration			
Critical areas (2)	Day or night	0.14	0.28
Residences	Day	0.28	0.56
	Night	0.20	0.40
Offices, schools, educational institutions and places of worship	Day or night	0.56	1.1
Workshops	Day or night	1.1	2.2
Impulsive vibration			
Critical areas (2)	Day or night	0.14	0.28
Residences	Day	8.6	17.0
	Night	2.8	5.6
Offices, schools, educational institutions and places of worship	Day or night	18.0	36.0
Workshops	Day or night	18.0	36.0

Notes: 1) Daytime is 7.00am to 10.00pm and night time is 10.00pm to 7.00am.

2) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas. Source BS 6472-1992.

Where vibration is intermittent, the dose values in Table 6-9 are applicable.

Table 6-9 Acceptable vibration dose values for intermittent vibration (m/s $^{1.75}$)

Location	Daytime(1)		Night time(2)	
	Preferred	Maximum	Preferred	Maximum
Critical areas (2)	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes:

1) Daytime is 7.00am to 10.00pm and night time is 10.00pm to 7.00am.

2) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas. Source BS 6472-1992.

In relation to potential building damage, *British Standard Part 2-1993 Evaluation and measurement for vibration in buildings Part 2* sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. For residential or light commercial buildings the following recommended limits are given:

- 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz
- 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above.

Operation

Relevant traffic noise criteria for the proposal have previously been determined by reference to the OEH document *Environmental Criteria for Road Traffic Noise* (ECRTN). In July 2011 that document was replaced with the NSW Road Noise Policy (RNP). The latter has been applied in this case.

In addition to new roads, the Road Noise Policy provides target noise levels for "redeveloped" roads of various types. "Redevelopments" are defined as works where it is proposed to increase traffic carrying capacity, change the traffic mix by increasing heavy vehicle usage, or change the road alignment.

The proposal has been assessed as 'redevelopment' of an existing road. RNP criteria for road redevelopments are presented in Table 6-10.

Table 6-10 NSW Road Noise Policy residential land use criteria

Road type	Type of project/land use	Assessment criteria - dBA
Freeway/arterial/sub-arterial roads	Existing residences affected by noise from redevelopment of existing freeway / arterial / subarterial roads.	Day (7 am to 10 pm) 60 dBA $L_{Aeq\ 15\ hour}$ (External) Night (10 pm to 7 am) 55 dBA $L_{Aeq\ 9\ hour}$ (External)

Relevant RNP criteria for other sensitive land uses are presented in Table 6-11.

Table 6-11 NSW Road Noise Criteria for other sensitive land uses

Use	Assessment criteria - dBA	Additional considerations
Places of worship	Day (7 am to 10 pm) 40 dBA $L_{Aeq\ 1\ hour}$ (Internal) Night (10 pm to 7 am) 40 dBA $L_{Aeq\ 1\ hour}$ (Internal)	The criteria are internal, i.e. the inside of a church. Areas outside the place of worship, such as a churchyard or cemetery, may also be a place of worship. Therefore, in determining appropriate criteria for such external areas, it should be established what in these areas may be affected by road traffic noise. For example, if there is a church car park between a church and

Use	Assessment criteria - dBA	Additional considerations
		the road, compliance with the internal criteria inside the church may be sufficient. If, however, there are areas between the church and the road where outdoor services may take place such as weddings and funerals, external criteria for these areas are appropriate. As issues such as speech intelligibility may be a consideration in these cases, the passive recreation criteria may be applied
Open space (active use)	Day (7 am to 10 pm) 60 dBA $L_{Aeq\ 15\ hour}$ (External) When in use	Active recreation is characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion. Passive recreation is characterised by contemplative activities that generate little noise and where benefits are comprised by external noise intrusion, e.g. playing chess, reading. In determining whether areas are used for active or passive, the type of activity that occurs in that area and its sensitivity to noise intrusion should be established. For areas where there may be a mix of passive and active recreation, e.g. school playgrounds, the more stringent criteria apply. Open space may also be used as a buffer zone for more sensitive land uses.
Open space (passive use)	Day (7 am to 10 pm) 55 dBA $L_{Aeq\ 1\ hour}$ (External) When in use	

Potential impacts

Construction noise

Predicted construction noise levels for the proposal at representative residential receivers are given in Table 6-12. Commercial receivers are addressed in Table 6-13.

Table 6-12 Predicted construction noise at representative locations

	Predicted noise levels, dBA							
Activity	NCA A	NCA B	NCA C	NCA D	Presbyt -erian Church	Baylife Church	Golf course	Ceme -tery
Noise Management Level, dBA – Day / Evening / Night	**59/48/40**	**59/48/40**	**60/45/38**	**60/45/38**	**45 (int)**	**45 (int)**	**65 (in use)**	**60 (in use)**
Clearing / grubbing	69-82	66-79	73-85	75-87	63-75	48-61	69-82	75-87
Demolition (w/o concrete saw)	69-74	66-71	73-78	75-80	63-68	48-53	69-74	75-80
Demolition (with	69-88	66-85	73-92	75-93	63-82	48-62	69-80	75-93

concrete saw)								
Earthworks / drainage	69-78	66-75	73-82	75-83	63-72	48-57	69-78	75-83
Concreting	69-76	66-73	73-79	75-81	63-69	48-55	69-76	75-81
Pavement	66-78	66-78	73-85	75-87	63-75	48-60	69-81	75-87

Table 6-13 Construction noise at commercial premises

Activity	Golf Course (Clubhouse) (NCA A)	Farm Shop (NCA B)	Garden Centre (NCA B)
Noise Management Level, dBA	**70**	**70**	**70**
Demolition (w/o concrete saw)	47-53	66-71	73-78
Demolition (with concrete saw)	47-61	66-85	73-92
Earthworks / drainage	47-56	66-75	73-82
Concreting	47-54	66-73	73-79
Pavement	47-59	66-78	73-85

A review of the predicted noise levels indicates that there will likely be exceedances of the construction noise management levels (including the highly noise affected criteria of 75dB(a)), at least during times when construction activities are closest to specific dwellings and when particularly noisy activities are carried out.

Construction vibration

The potential for construction vibration to exceed relevant criteria is higher where activities such as use of a vibratory roller are proposed.

Major sources of vibration associated with construction are typically related to use of vibratory rollers. Table 6-14 presents some typical vibration levels related to construction activities.

Table 6-14 Typical construction vibration levels

Equipment	Typical vibration level, mm/s
Vibratory roller	4.1 @ 10 metres
	2.6 @ 20 metres
	2.4 @ 30 metres
	2.2 @ 40 metres
	1.9 @ 50 metres

Table 6-15 presents typical safe working distances for various sources of vibration. Note that the vibration levels are indicative and will vary depending on specific plant and equipment used as well as geotechnical conditions on site.

Table 6-15 Construction vibration – safe working distances

Plant Item	Rating / Description	Safe Working Distance	
		Cosmetic Damage (BS7385)	Human Response (BS6472)
Vibratory Roller	<50kN (typically 1-2 t)	5 m	15 m to 20 m
	<100kN (typically 2-4t)	6 m	20 m
	<200kN (typically 4-6t)	12 m	40 m
	<300kN (typically 7-13t)	15 m	100 m
	<300kN (typically 13-18t)	20 m	100 m
	<300kN (>18t)	25 m	100 m
Small Hydraulic Hammer	(300 kg – 5-12t excavator)	2 m	7 m
Medium Hydraulic Hammer	(300 kg – 12-18t excavator)	7 m	23 m
Medium Hydraulic Hammer	(300 kg – 18-34t excavator)	22 m	73 m
Vibrator Pile Driver	Sheet piles	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	2 m (nominal)	N/A
Jackhammer	Hand held	1 m (nominal)	Avoid contact w/structure

Notes: From Transport Infrastructure Development Corporation Construction's Construction Noise Strategy (Rail Projects), November 2007. Vibration levels are indicative and will vary depending on specific type of plant and geotechnical conditions.

Table 6-14 and Table 6-15 indicate that the vibration criterion associated with building damage will likely be complied with, considering the typical distances that construction activity will be occurring to the nearest buildings. Compliance with the criterion indicates that there is a low risk of building damage from the proposal.

In relation to human comfort, the main activity with potential for affecting nearby residents is during use of vibratory rollers. Due to the proximity of the construction activities to the nearest residential buildings, some vibration from construction is likely to be perceptible at the closest residences. In particular, ground compaction with a vibratory roller may be perceptible at the closest residences and intensive use of vibratory rollers for long periods of time, at the one location, may result in annoyance. In such situations the criteria for human comfort within buildings can be complied with by limiting the duration of the vibration causing activity and/or the use of a lighter vibratory roller. The process is described in BS6472:1992 and the EPA's *Assessing Vibration: A Technical Guideline*.

Operational noise – Residential receivers

Road traffic volumes and mix are not expected to change as a result of the proposal. Accordingly, any increase or decrease in noise levels would be attributable to geometric changes (i.e. lanes moving further or closer to noise-sensitive receptors) and pavement changes, rather than changes in traffic volumes.

A review of the predicted traffic noise levels indicates that there will be a change in the number of properties that experience traffic noise levels in excess of the criteria. Table 6-16 presents a summary of expected exceedances at residential properties for build and no build options, both on opening and ten years after opening.

Table 6-16 Summary of exceedences

Option		2014				2024			
	NCA	A	B	C	D	A	B	C	D
No build	Within 2 dB of the criteria	2	1	5	2	2	2	5	2
	Greater than 2 dB above the criteria, but not acute	1	4	3	1	1	3	3	1
	Exceed the criteria by 5dB or more (acute)	1	2	11	6	1	3	11	6
	TOTAL	**4**	**7**	**19**	**9**	**4**	**8**	**19**	**9**
Build	Within 2 dB of the criteria	2	5	5	2	2	5	5	2
	Greater than 2 dB above the criteria, but not acute	0	2	5	1	0	2	6	1
	Exceed the criteria by 5dB or more (acute)	1	0	0	4	1	0	0	4
	TOTAL	**3**	**7**	**10**	**7**	**3**	**7**	**11**	**7**

A review of the predicted operational noise levels indicates that the redevelopment would result in a change in noise environment in all NCAs. The realignment, in addition to the change in pavement surface to dense grade asphalt is expected to reduce the overall number of receivers in excess of the RNP Leq criteria in all NCAs.

The number of receivers classified as acute is expected to decrease as a result of the redevelopment across all NCAs. Ten years after opening, the decrease in the number of acute receivers is predicted to total 16 (three in NCA B, eleven in NCA C and two in NCA D). Upon opening, the decrease in the number of acute receivers is predicted to total 15 (two in NCA B, eleven in NCA C and two in NCA D).

The reduction of noise levels due to the implementation of the build option has reduced the number of acute receivers overall. This reduction has therefore increased the number of receivers who exceed the criteria by 2 dB but are not considered acute in accordance with

the RNP. The number of receivers that exceed the criteria by up to 2 dB are also expected to increase as a result of the redevelopment in NCAs B and C.

Overall the effect of the redevelopment is expected to decrease traffic noise levels in the project area. This is mainly due to the change of pavement surface from various grades of bitumen seal to dense grade asphalt.

Operational noise – Passive use open spaces

The cemetery located at 4142 Nelson Bay Road, Anna Bay Lawn Cemetery is classified as an open area of passive use under the RNP. Table 6-17 presents a summary of predicted noise levels.

Table 6-17 Predicted traffic noise levels - Open Areas Passive Use

Location	Criteria	No build 1 year of opening 2014	Build 1 year of opening 2014	No build 10 years of opening 2024	Build 10 years of opening 2024
Anna Bay Lawn Cemetery, 4124 Nelson Bay Road	55 $L_{Aeq, 15hr}$ (in use)	64-57 Day $L_{Aeq, 15hr}$	61-53 Day $L_{Aeq, 15hr}$	64-57 Day $L_{Aeq, 15hr}$	62-54 Day $L_{Aeq, 15hr}$

The predicted noise levels indicate that locations nearest the road will be in excess of the criteria for both build and no build options. Table 6-18 presents a range of noise levels to show that areas with a greater offset from the road are expected to comply with the criteria both on opening and ten years after opening for the build option. The build option is expected to decrease noise levels by up to 4 dB on opening and up to 3 dB ten years after opening. As there is a reduction in noise levels in combination with compliance being achieved in some parts of the cemetery, mitigation at this location is not considered reasonable.

Operational noise – Active use open spaces

The golf course located at 1 Cromarty Lane, Palms Public Golf Course, is classified as an open space with active use according to the RNP. The predicted road traffic noise levels and applicable criteria are summarised in Table 6-18.

Table 6-18 Predicted traffic noise levels - Open Area Active Use

Location	Criteria	No build 1 year of opening 2014	Build 1 year of opening 2014	No build 10 years of opening 2024	Build 10 years of opening 2024
Palms Public Golf Course	60 $L_{Aeq, 15hr}$ (in use)	61 Day $L_{Aeq, 15hr}$	62 Day $L_{Aeq, 15hr}$	61 Day $L_{Aeq, 15hr}$	62 Day $L_{Aeq, 15hr}$

The predicted noise levels indicate that road noise levels are expected to increase upon opening and ten years after opening by a marginal 1 dB. While the predicted noise level is in excess of the criteria, implementation of mitigation measures is not considered reasonable

given the expected marginal increase in noise levels as a result of the redevelopment. It should also be noted that the majority of the golf course is located with a greater offset from the road than the prediction location and therefore would experience road traffic noise levels lower than those predicted.

Operational noise – Places of worship

There are two churches located within the project area. A Presbyterian church located at 4187 Nelson Bay Road and Baylife church located at 4236 Nelson Bay Road. Table 6-19 presents a summary of predicted noise levels at the churches.

Table 6-19 Road traffic noise levels, Places of Worship

		Predicted noise levels, dBA $L_{Aeq, 1 hour}$							
		No build 1 year of opening 2014		Build 1 year of opening 2014		No Build 10 years of opening 2024		Build 10 years of opening 2024	
Activity	Criteria	Day	Night	Day	Night	Day	Night	Day	Night
Presbyterian Church	40 (internal) $L_{Aeq, 1 hr}$	58	55	50	47	58	55	50	47
Baylife Church		49	46	44	41	49	46	45	42

Note: Internal noise levels in the church are calculated using a noise reduction of 10 dB over outside levels.

The predicted traffic noise levels indicate that while the existing traffic noise is in excess of the criteria, with the implementation of the build option the noise levels are expected to decrease by 8 dB during the day and night at project opening at the Presbyterian church. Ten years after the project opens, with an increase in traffic numbers, the noise level is not expected to increase at this location.

Traffic noise levels experienced at Baylife church are also expected to change following the proposal. On opening, the build option is expected to decrease noise levels at the church by up to 5 dB during both the day and night. However, during the day noise levels are still expected to be up to 4 dB in excess of the criteria upon opening. Ten years after opening a marginal increase of 1 dB is expected for the build option as a result of the natural increase in traffic numbers. At this location, as a result of the proposal, the noise levels are predicted to decrease by up to 5 dB.

Maximum noise levels

The RMS Environmental Noise Management Manual suggests that the assessment of sleep disturbance should include an examination of “maximum noise events”. A “maximum noise event” is defined as any single event where the LAmax external noise level exceeds 65dBA and the LAmax noise level exceeds the LAeq,1 hour noise level by more than 15dBA.

The proposal is not expected to expose additional receivers to maximum noise level events.

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction noise and vibration	• A Construction Noise and Vibration Management Plan would be prepared for the proposal. The plan would be in accordance with the OEH *Interim Construction Noise Guideline* and would detail the specific measures to be implemented to reduce construction noise levels. The plan would cover aspects including site noise planning, scheduling of high noise activities, operator instruction, plant maintenance, plant noise audit and complaints management.	Contractor	Pre-construction
	• For works required outside standard hours, the procedure contained in the RMS *Environmental Noise Management Manual - Practice Note vii – Roadworks Outside Normal Working Hours* or similar process as outlined in the approved noise and vibration management plan would be followed.	Works Supervisor	Construction
	• Where reasonable and feasible, noisier activities would be carried out during the day (7.00am-6.00pm) or evening (6.00pm -10.00pm) periods to minimise noise impacts.	Works Supervisor	Construction
	• Potentially affected residents, property owners and/or administrators would be contacted prior to the commencement of works and would be informed of the proposed works, working hours, and the period of construction. Affected residents / properties would also be provided with a contact name and number should they wish to seek any advice.	Communications Representative	Pre-construction
	• The idling of machinery and equipment when not in use and for prolonged periods of time would be avoided where possible.	Works Supervisor	Construction
	• Construction timetabling, particularly for works outside standard hours, would aim to minimise noise impacts. Measures may include time and duration restrictions and respite periods.	Works Supervisor	Construction
	• Use of noisy plant simultaneously and/or close together, adjacent to sensitive receivers would be avoided where possible.	Works Supervisor	Construction
	• All machines would be in good working condition, with particular attention to exhaust silencers, engine covers and other noise reduction devices.	Works Supervisor	Construction
	• Vibration monitoring would be conducted in response to any vibration related complaints.	Works Supervisor / Project Manager	Construction

Impact	Environmental safeguards	Responsibility	Timing
Operational noise	• Consistent with RMS practice, reasonable and feasible mitigation treatments would be considered at all locations within the project catchment where noise levels are acute. They would also be considered where traffic noise levels increase by more than 2 dB and are in excess of the RNP criteria.	RMS Project Manager	Operation

6.9 Visual amenity

Ki Studio undertook a landscape character and visual impact assessment for the proposal (included at Appendix I). The following is a summary of the main findings of that assessment.

Assessment approach

The RTA requires that visual assessment be considered in accordance with the *RTA Guidelines for landscape character and visual impact assessment* (RTA 2009).

For both landscape character and visual impact, the guidelines establish an assessment process by reference to the sensitivity of the area and magnitude of the proposal in that area. Figure 6-16 illustrates this process.

Sensitivity	Magnitude: High	High to Moderate	Moderate	Moderate to Low	Low	Negligible
High	High impact	High	Moderate high	Moderate high	Moderate	Negligible
High to Moderate	High impact	Moderate high	Moderate high	Moderate	Moderate	Negligible
Moderate	Moderate High	Moderate high	Moderate	Moderate	Moderate low	Negligible
Moderate to Low	Moderate high	Moderate	Moderate	Moderate low	Moderate low	Negligible
Low	Moderate	Moderate	Moderate low	Moderate low	Low impact	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Figure 6-16 Landscape character and visual impact grading matrix

The visual magnitude of an activity is the expression of the visual interaction between it and the existing visual environment along the road corridor. It can also be expressed as a level of visual contrast between new work and the visual setting within which it is placed.

Visual sensitivity is a measure of how critically a change to the existing landscape would be viewed from various use areas. People using recreation areas, for example, would use the surrounding landscape as part of their leisure experience and will view changes to the landscape more critically than others.

Both the landscape character and visual impact of a proposal is determined by considering both the visual magnitude and the visual sensitivity as indicated in Figure 6-2. Various combinations of visual effect and visual sensitivity will produce high, moderate or low impact levels.

The assessment of landscape character and visual impact for the proposal is set out below.

Existing environment

From a road user perspective, the study area is part of a longer section of road characterised by the interspersed pattern of enclosing bushland and more open farmland.

Within the length of the upgrade itself, the route crosses through flatlands with minor undulations. The southern verge is predominantly flanked by dense bushland, whilst the northern verge has a more open character towards grazing lands and the flood plains of Tilligerry Creek.

The road corridor offers limited views to the landscape beyond. As a result, it is predominantly the immediate context along the road verges that define the landscape character for road users.

Landscape character

Based on a review of the site setting and topography, five landscape character zones were identified.

Zone 1 comprises an exposed rural residential setting and is characteristic of the areas further north with exposed modest single storey built form elements with varying set backs from the road. Some properties are of a commercial nature whilst most are residential.

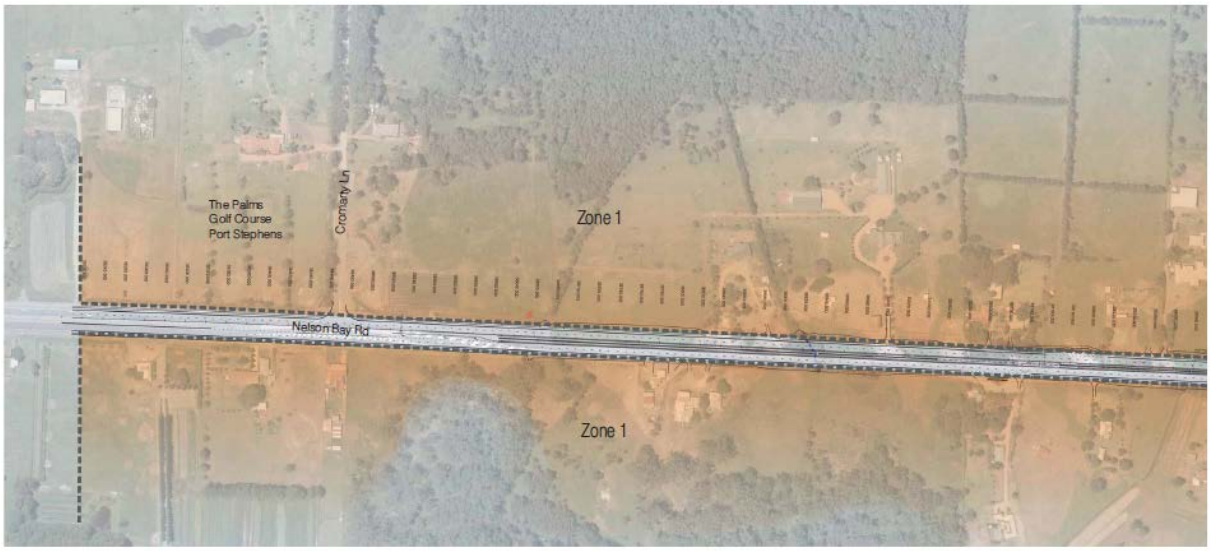
Bushland characterizes zone 2 which is dominated by areas of dense bushland at either end of the project with Banksias, Eucalypts and Kunzeas. In between, are areas of more open woodlands, slightly changing the character due to the visual permeability of the setting. However, for the purpose of this report we have combined these areas into a singular zone.

Zone 3 comprises of rural residences situated within a bushland setting. Partial visual screening from the road and a more intimate character define this zone. Tall trees are a dominant visual feature within a lush setting.

The visual character of Anna Bay Lawn Cemetery defines Zone 4. A rotunda in front of the grounds combined with mature trees within the road reserve strongly help to define the setting, whilst providing a visual and spatial buffer zone between the road and the cemetery grounds.

Zone 5 is located at the northern end of the project and is characterized by open pasture land with a scenic quality. It is in this area that it becomes apparent that the landform drops from the road towards a floodplain to the west, providing open views beyond and a stronger sense of the landscape setting.

The identified landscape character zones are identified in Figure 6-17.


The Palms
Golf Course
Port Stephens
Cromarty Ln
Zone 1
Nelson Bay Rd
Zone 1
Character Zones Map 1
0
100 m


Trotter Rd
Zone 1
Hellenvale Ln
Zone 1
Zone 2
Nelson Bay Rd
Zone 2
Zone 1
Zone 2
Zone 3
Character Zones Map 2
0
100 m


Fennighams Island Rd
Zone 1
Trotter Rd
Nelson Bay Rd
Zone 3
Zone 4
Zone 3
Zone 2
Character Zones Map 3
0
100 m

Figure 6-17 Landscape character zones

Impact on Zone 1

The rural residential character is primarily determined by the scarce built form density with generous setbacks which visually underpin the rural character of the area.

The sensitivity of the character zone was assessed as being medium, driven by its medium scenic value, while on the other hand being sensitive to changes in regards to setbacks and in some instances, land use.

The magnitude of impact of the proposal on this character zone was determined as moderate since the proposal minimised, where practical, impacts to setbacks of built form elements. Towards the western section of the proposal, setbacks would be impacted on private properties along the western verge which are generally more generous, limiting the overall effect of the new roadworks. Within the mid-section of the proposal, setbacks are generally not impacted, whilst towards the eastern end some properties would be affected, and in some areas, as setbacks would be increased, the rural character of the landscape would be predominantly retained.

Impact on Zone 2

The bushland setting within Zone 2 is considered to have a moderate sensitivity due to the fact that it has a medium-high visual absorption capacity. Infringing into the bushland would not dramatically change its character due to the extensive vegetation towards the east.

The magnitude of impact on the landscape character of this zone was found to be moderate-low, largely due to the effect of the proposal on the setting.

Impact on Zone 3

Zone 3 comprises of four distinct areas along the eastern verge of the proposal. Land uses tend to be of a residential nature within a bushland setting with generous vegetated buffer zones. Although, built form elements are visually less exposed, also in this case setbacks are a critical element in defining the landscape character.

The sensitivity within this character zone was assessed as moderate-high due to its limited absorption capacity and land use nature. The loss of any buffer vegetation, combined with a reduction in setbacks, would have a dramatic impact to the setting.

The greatest impact is likely to occur within the other areas of Zone 3, where some residential buildings would be more exposed to the proposal. In some cases, the loss of screening vegetation would have a significant impact on the character of the setting. Hence, the magnitude is assessed as moderate-high.

The resulting landscape character impact on this zone is hence considered moderate-high.

Impacts on Zone 4

This zone comprises the Anna Bay Lawn Cemetery grounds and is a visually important element along the journey. In front of the cemetery, a generous vegetated buffer zone with stands of mature trees contributes to defining the setting and visually enhances the entry into the grounds.

High sensitivity has been determined for this zone based on the low absorption capacity and visual sensitivity.

The magnitude of impact by the proposal is considered moderate as part of the vegetated curtilage between road corridor and cemetery would be lost.

Taking into consideration that the retention of trees is maximised as much as practical through the introduction of wire-rope barriers, the landscape character impact has been determined as moderate to high.

Impacts on Zone 5

The open character and vistas towards the Tilligerry Creek Floodplain provide a glimpse towards the greater landscape along the journey.

This zone's sensitivity is considered moderate to high due to the scenic quality it offers. The magnitude of impact of the proposal on this character zone was assessed as moderate since the fundamental character of the landscape would not be changed by the proposal. However, the road's proposed realignment would infringe into the floodplain in key areas where an existing drainage line occurs. This would require the removal of an existing stand of trees that visually contributes to the scenic quality of the setting.

In addition, the proposed straightened alignment of the road superimposed on the landscape, formalises the road formation within such rural setting. Hence, a moderate to high landscape character impact has been determined as a result of the proposal.

Visual impact

In order to assess the visual impact representative viewpoints of the various conditions along the road corridor were selected for more detailed consideration. Refer Figure 6-18. Table 6-20 presents the analysis of the 12 selected viewpoints.

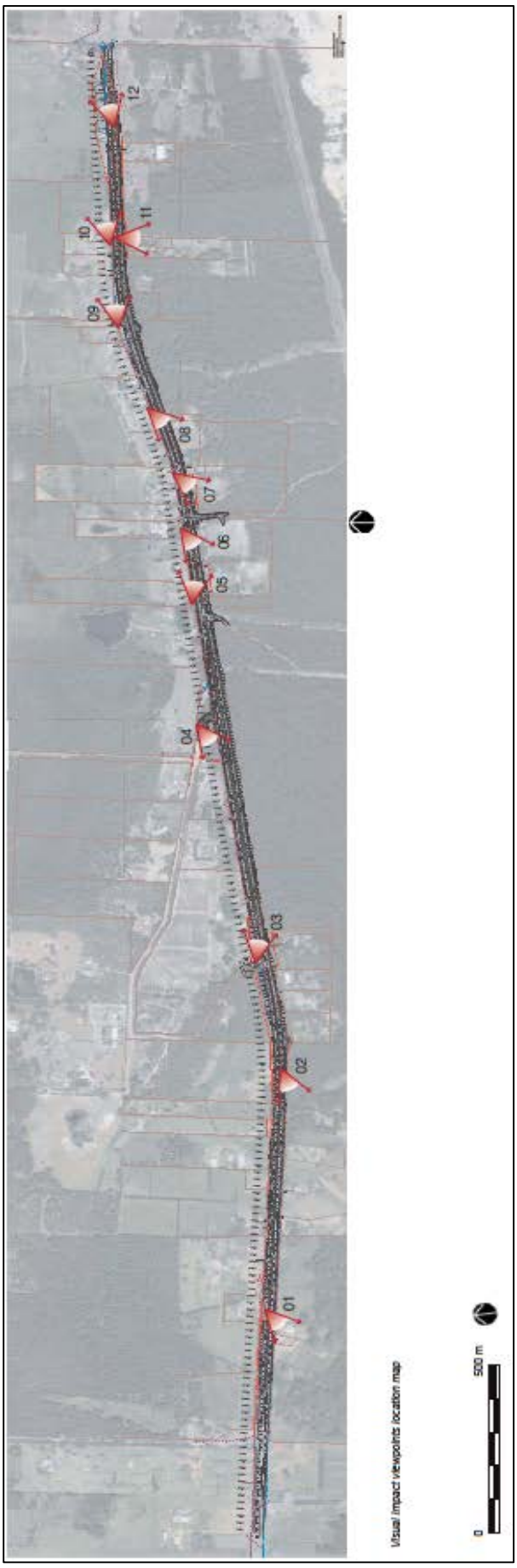


Figure 6-18 Viewpoints

Table 6-20 Visual impact grades

View No.	Impact	Comment
1	Moderate	The main impact at this location is a change in the streetscape character diminishing the rural character of the area.
2	Moderate	For properties beyond (to the north), the magnitude of impact is considered moderate to low, resulting in a moderate to high impact. Some vegetation buffers would remain to the properties beyond.
3	Moderate	The setting of the winery would not dramatically change, however the wider road corridor would diminish the presence of the bushland setting that visually reinforces the natural setting.
4	Road Moderate Residence Moderate-High	The relocation of the intersection would partially reinforce the bushland setting to the road user of Trotter Road with a positive effect.
5	Negligible	The self-enclosed character and orientation of the residence provides minimal interface with the streetscape. The loss of vegetation along the southern verge is considered to have minimal, or no impact from within the residence grounds
6	Moderate-High	The parkland setting in front of the cemetery compliments the locality and provides a scenic character as backdrop. The retention of tree at this locality is critical.
7	Moderate	The apparent commercial nature of the property limits its sensitivity. As this is the only locality where the continuous vegetated/bushland verge is visually interrupted, it detracts from the overall journey experience.
8	High	The existing trees along the southern verge visually defi ne the road's edge, enhance legibility and form part of the character of the locality. The removal of these trees would expose the private properties beyond which have limited vegetation, thereby creating a much more open streetscape character.
9	Moderate-High	The medium - high impact is predominantly due to the strong visual exposure from a slightly elevated position. The increased buffer zone provides the opportunity to enhance the setting and mark the church locality through landscape strategies.
10	Moderate-High	The existing planting provides some screening to the private residence. The biggest impact is the relocation of the southern verge bushland type

View No.	Impact	Comment
		setting, combined with the proximity of the residence to the proposal.
11	High	The change in visual character combined with the high sensitivity of this property inevitably result in a high impact. This is one of the few most impacted properties along the proposal.
12	Moderate-High	The proposal imposes itself onto the setting at this location. Responding to the natural features of the setting would provide a better integration of the proposal.

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Visual and character impacts	• The recommendations outlined in chapter 6 of the Landscape Character and Visual Impact Assessment (refer Appendix I) would be considered in the development of the detailed design and landscape plan for the proposal.	RMS Project Manager	Detailed design Construction
	• Areas disturbed as a result of construction would be restored to original condition.	Works Supervisor	Construction
	• A landscape plan would be prepared for the proposal consistent with the RMS Landscape Guideline.	RMS Project Manager	Construction

6.10 Socio-economic considerations

A proportion of businesses in the locality would rely on the passing trade of residents and tourists travelling between Nelson Bay and Newcastle. The proposal, following the existing alignment of Nelson Bay Road, would allow these businesses to continue to capitalise on the location and high exposure to residential and tourism traffic.

Some businesses and residents may be affected by restricted access to and from the opposite carriageway, traffic safety would be improved through the use of u-turn bays, turning lanes and upgraded intersections.

Potentially adverse social impacts of the proposal also include property acquisition. Acquisition is being undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* and the RMS Land Acquisition Policy.

During construction, there is potential for traffic disruptions on Nelson Bay Road. This disruption may affect local residents in addition to the inconvenience and delays to road users. It may also affect any local buses using the route.

Construction noise impacts are considered manageable through the implementation of appropriate management measures and through communication with affected people.

Operational traffic noise levels are expected to decrease due to the change of pavement surface.

Positive socio-economic impacts for residents along the proposed upgrade and the broader community include improved road user safety.

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Construction related disruption	• Affected people would be notified of all aspects of the proposal prior to commencement of construction. This would include notification of time and duration of the proposal provision of a contact name and number.	Communications Representative	Pre - Construction
	• Potentially affected residents and businesses would be notified of the progress of the works and advised in advance (e.g. by letterbox drop, meetings with community groups, etc) of any anticipated changes in noise emissions prior to critical stages of the works, and to explain complaint procedures and response mechanisms.	Communications Representative	Construction
	• Complaints would be recorded and addressed.	Communications Representative	Construction
Removal / relocation of roadside tribute	• Roadside tributes are to be managed in accordance with the RMS Roadside Tributes Policy.	RMS Project Manager	Pre-Construction

6.11 Waste minimisation and management

Potential Impacts

The proposal is not expected to generate large quantities of waste materials. There following waste streams have been identified.

- Excavated material.
- Asphalt from existing pavement.
- Concrete washout.
- Cleared turf/grasses/vegetation.
- General garbage and refuse.
- Potential asbestos or asbestos containing materials (refer section 6.1).

Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Waste generation	• The resource management hierarchy detailed by the *Waste Avoidance Resource Recovery Act 2001* would be adopted, namely avoid unnecessary consumption; resource recovery; disposal as a last resort.	Works Supervisor	Construction
	• All waste would be treated in accordance with the RMS *Waste Minimisation and Management Guidelines* (RTA 1998).	Works Supervisor	Construction
	• Any excavated material would be disposed of at a licensed landfill facility in accordance with its waste classification.	Works Supervisor	Construction
	• All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.	Works Supervisor	Construction

6.12 Demand on resources

Resources used in the construction of roads and associated works include construction materials such as fill material, base and sub-base gravels, pavement, fuels and oils, sand, cement, steel and the like. Power and water is also required.

Demand associated with the proposal would be moderate. Overall supply constraints are not expected, although localised shortages are possible due to other major infrastructure projects occurring in the region (e.g. Hunter Expressway).

6.13 Operational hazards and risks

Operational hazards and risks can be associated with the operation of the proposal itself or with its proximity to adjacent land uses (including hazardous facilities).

The proposal would improve traffic safety thorough the provision of a divided carriageway road.

No operational hazards or risks associated with the operation of the proposal, or with adjacent land uses, were identified.

6.14 Cumulative environmental effects

Cumulative effects may result from various types of interaction, including:

- Type 1 – Different impacts upon the same receiver – impacts that may arise as the result of an accumulation of impacts of a different nature at the same location. For example, the combined effect of construction noise and visual impacts may give rise to an overall significant impact on business viability, whereas individually these impacts may not be as significant.

- Type 2 – Similar impacts at different locations – impacts that may arise as a result of the accumulation of impacts of the same type, and from the same project, at a number of different locations. For example, a small number of truck movements to different sites may collectively give rise to an overall significant impact.
- Type 3 – Combination of interactions between projects – impacts that may arise as a result of the combination of similar impacts from multiple projects. For example, the construction related impacts of the project may be magnified by their association with construction activity from other major construction projects nearby.

Type 1 cumulative impacts have been considered as part of the individual discipline assessments provided at sections 6.1 to 6.13. Type 2 impacts are not relevant to the proposal.

Major Type 3 cumulative impacts are not anticipated because the impacts associated with the proposal would not affect, or have minimal effect on elements of the environment most susceptible to the accumulation of impacts. In particular, it is noted that impacts on threatened species and ecological communities, Aboriginal heritage and non-Aboriginal heritage are either not expected or have been assessed as minor. Potential impacts on water quality have been identified as manageable.

Note that cumulative impacts in relation to Aboriginal heritage have been considered in section 6.6. In relation to biodiversity, they have been considered in section 6.5.

7
Environmental management

7.1 Environmental management plans

The measures described in Section 7.2 would be incorporated into the Contractor's Environmental Management Plan (CEMP).

The CEMP would be developed consistent with the specifications set out in the applicable RMS QA Specifications including G36 Environmental Protection (Management System) and RMS QA Specification G38 – Soil and Water Management (Soil and Water Management Plan). Hunter Region environment staff would review the CEMP prior to the commencement of any site works.

7.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. All safeguards described in this REF would be incorporated into the contractor's environmental management plan (CEMP). Measures from section 6 as well as additional general measures are presented in Table 7-1 below.

Table 7-1 Proposed safeguards and mitigation measures

No.	Impact	Environmental safeguards	Responsibility	Timing
1.	General	• All safeguard measures and commitments from the REF, and any additional mitigation measures required to meet appropriate environmental legislation are to be incorporated within the following: – Contract specifications – Contractor's Environmental Management Plan (CEMP)	RMS Project Manager	Pre-construction
2.	General	• Any proposal to substantially modify the design of the proposal, works and boundaries applicable to the project as described in the REF would require additional environmental impact assessment.	RMS Project Manager	Pre-construction
3.	General	• Any works resulting from this approval and as covered by the REF may be subject to an environmental audit(s) and/or inspection(s) at any time during their duration.	RMS Environment Staff	Construction
4.	General	• The RMS Project Manager is to notify a Regional Environmental Officer, at least 5 days prior to work commencing.	RMS Project Manager	Pre-construction
5.	General	• Environmental awareness training is to be provided, by the contractor, to all field personnel and subcontractor/s. This training should highlight the location and protection responsibilities in relation to heritage items.	Works Supervisor	Pre-construction and construction

No.	Impact	Environmental safeguards	Responsibility	Timing
6.	Erosion and sedimentation	• A Soil and Water Management Plan (SWMP) would be developed for the works. It would be prepared in accordance with RTA specification *G38 Soil and Water Management (Soil and Water Management Plan)* and would be consistent with the *Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines* (the Blue Book) (Landcom 2004): Requirements would include: - The prompt completion of works relating to drainage and sediment control to minimise exposure time of disturbed area. - Provision of bunding or similar measures to prevent pavement runoff from entering drainage related excavation. - The provision of sediment and filter traps, in advance of and in conjunction with earthworks operations, to prevent contaminated run-off leaving the site. - The adoption of a dewatering procedure that is consistent with the RMS *Construction Dewatering Guidelines*.	Works Supervisor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
7.		• The SWMP would identify areas for stockpiling of material or transportation offsite, storage of plant and equipment and compound areas. It would be forwarded to a Regional Environmental Officer for review at least 10 working days prior to the commencement of works.	Contractor	Pre-construction
8.		• An Acid Sulfate Soils Management Plan would be prepared for the proposal. The Plan would outline the appropriate trenching, stockpiling and removal methods for soil so to minimise the risk of PASS to the surrounding environment The management plan would be prepared in accordance with the Acid Sulfate Soil Management Advisory Committee's Acid Sulfate Soil Planning Guidelines (Stone & Hopkins 1998) and the RTA publication *Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze* (RTA, 2005).	Contractor	Pre-construction
9.	Erosion and sedimentation	• Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.	Works Supervisor	Construction
10.	Erosion and sedimentation	• Erosion and sediment control measures are not to be removed until the works are complete or areas are stabilised.	Works Supervisor	Construction
11.	Erosion and sedimentation	• Disturbed areas would be progressively stabilised and rehabilitated during the works.	Works Supervisor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
12.	Contaminated material	• Asbestos waste would be managed in accordance with Work Health and Safety Regulation 2011, the document *Working with asbestos* (Workcover 2008) and the *Code of Practice for the Safe Removal of Asbestos*, 2nd Edition (NOHSC 2005).	Works Supervisor	Construction
13.	Contaminated material	• The relocation of utility poles would be managed consistent with the document *Protocols for recycling redundant utility poles and bridge timbers in New South Wales* (OEH 2011).	Works Supervisor	Construction
14.	Water pollution	• Water quality control measures would be used to prevent any materials (eg. concrete, grout, sediment etc) entering drain inlets or waterways.	Works Supervisor	Construction
15.	Spills	• All fuels, chemicals and liquids would be stored in an impervious bunded area a minimum of 50 metres away from: - Rivers, creeks or any areas of concentrated water flow. - Flooded or poorly drained areas. - Slopes above 10 per cent.	Works Supervisor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
16.	Spills	• Refuelling of plant and equipment outside the site compound would be avoided wherever practicable. Where this is not practicable, refuelling of plant and equipment would occur on relatively level ground at least 50 metres from waterways, drainage lines and sensitive areas, with spill containment measures in place.	Works Supervisor	Construction
17.	Spills	• Vehicles and plant would be properly maintained and regularly inspected for fluid leaks.	Works Supervisor	Construction
18.	Spills	• An emergency spill kit would be kept on site at all times. All staff would be made aware of the location of the spill kit and trained in its use. If a spill occurs, the RMS *Environmental Incident Classification and Management Procedure* is to be followed and the RMS Contract Manager notified immediately.	Works Supervisor	Construction
19.	Emissions from equipment	• Construction equipment would be properly maintained to ensure exhaust emissions are minimised.	Works Supervisor	Construction
20.	Dust	• Measures (including watering or covering exposed areas) would be used to minimise or prevent air pollution and dust.	Works Supervisor	Construction
21.	Dust	• Works would not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely.	Works Supervisor	Construction
22.	Dust	• Measures (including watering or covering exposed areas) would be used to minimise or prevent air	Works Supervisor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		pollution and dust.		
23.	Dust	• Vehicles transporting waste or other materials that may produce odours or dust would be covered during transportation.	Works Supervisor	Construction
24.	Dust	• Any soil or mud deposited on public roads by construction activities and vehicle movements would be removed at the end of each day and disposed of appropriately.	Works Supervisor	Construction
25.	Other emissions	• Vegetation or other materials would not be burnt on site.	Works Supervisor	Construction
26.	Greenhouse gas emissions	• Vehicles and construction equipment would be properly maintained so as to achieve optimum fuel efficiency.	Works Supervisor	Construction
27.	Greenhouse gas emissions	• Plant and equipment would be switched off when not in use.	Works Supervisor	Construction
28.	Removal and disturbance of native vegetation and associated habitat.	• The extent of clearing would be minimised. It would be shown on drawings kept on site and would be communicated to personnel during inductions.	Works Supervisor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
29.	Removal and disturbance of native vegetation and associated habitat.	• Exclusion zones that identify the limits of clearing and environmentally sensitive areas would be established prior to the commencement of construction and would be in accordance with the RMS *Biodiversity Guidelines*.	Works Supervisor	Construction
30.	Removal and disturbance of native vegetation and associated habitat.	• Any dead wood to be removed as part of the proposal should be retained and placed elsewhere in those portions of the site that are to be retained.	Works Supervisor	Construction
31.	Removal and disturbance of native vegetation and associated habitat.	• Where possible, hollows from those trees to be removed would be cut from the tree and placed in adjacent woodland areas where they can serve as habitat. A nest box strategy would also be investigated as part of the biodiversity offset strategy.	Works Supervisor / RMS Project Manager	Construction
32.	Impacts on Koala	• Should Port Stephens Council observe an increase in Koala mortality within the project area or revise and upgrade the status of the area from 'potential problem areas' to 'conflict areas' or 'black spots', RMS would implement the actions put forward in Chapter 8 of the Comprehensive Koala Plan of Management.	RMS Project Manager	Construction Operation

No.	Impact	Environmental safeguards	Responsibility	Timing
33.	Injury to wildlife	• A qualified ecologist is to undertake a preclearing survey of trees and any underscrub. Any wildlife found must be relocated to a predetermined safe location.	Works Supervisor	Construction
34.	Injury to wildlife	• Clearing must follow staged habitat removal process as outlined in RMS *Biodiversity Guidelines*.	Works Supervisor	Construction
35.	Threatened species impacts	• A biodiversity offset strategy would be prepared by a suitably qualified an experienced ecologist and would be reviewed by the RMS Biodiversity Specialist and the RMS regional environmental officer. The strategy would be in accordance with the RMS *Guidelines for biodiversity offsets* (RMS 2011).	RMS Project Manager	Pre-operation
36.	Weed proliferation	• Any noxious weeds would be managed in accordance with the RMS *Biodiversity Guidelines* and in consultation with Port Stephens Council.	Works Supervisor	Construction
37.	Impacts on Aboriginal cultural heritage	• Investigation / salvage of NBR3/ PAD1 (associated with NBR 3/2) will continue in accordance with relevant Aboriginal Heritage Impact Permits.	RMS Project Manager	Pre-Construction
38.	Impacts on Aboriginal cultural heritage	• An Aboriginal Heritage Impact Permit would be sought for remaining sites and the project as a whole, in consultation with registered Aboriginal stakeholders.	RMS Project Manager	Pre-Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
39.	Impacts on Aboriginal cultural heritage	• A cultural heritage awareness program would be developed in consultation with registered Aboriginal stakeholders and would be included as part of the site induction.	Contractor	Pre-Construction
40.	Disturbance of Aboriginal objects	• All personnel working on site would receive training in their responsibilities under the *National Parks and Wildlife Act, 1974*.	Works Supervisor	Construction
41.	Disturbance of Aboriginal objects	• Should Aboriginal heritage items outside the scope of applicable Aboriginal Heritage Impacts Permits be uncovered during works, all works in the vicinity of the find would cease and the RMS Aboriginal Cultural and Heritage Advisor and Regional Environmental Officer Hunter Region would be contacted. Works would not re-commence until appropriate clearance has been received. The steps outlined in the Roads and Maritime Services Unexpected Archaeological Finds Procedure would be followed.	Works Supervisor	Construction
42.	Unexpected impact on heritage values	• Should archaeological material be unexpectedly uncovered during construction, all works would cease within the vicinity of the material/find and environment staff from RMS Hunter Region would be contacted.	Works Supervisor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
43.	Impacts on trees with heritage significance	• Consideration would be given translocating two young Hoop Pines from their present location behind Hoop Pine No.1 to an appropriate site. Sites to be considered would include: - The east side of the Union Church at the site of the original 1879 Provincial School; or - Set back approximately 25 metres on the new southern road side marking the 1884 Public School.	RMS Project Manager	Detailed Design
44.	Construction noise	• A Construction Noise and Vibration Management Plan would be prepared for the proposal. The plan would be in accordance with the OEH *Interim Construction Noise Guideline* and would detail the specific measures to be implemented to reduce construction noise levels. The plan would cover aspects including site noise planning, scheduling of high noise activities, operator instruction, plant maintenance, plant noise audit and complaints management	Contractor	Pre-Construction
45.	Construction noise	• For works required outside standard hours, the procedure contained in the RTA's *Environmental Noise Management Manual - Practice Note vii – Roadworks Outside Normal Working Hours* would be followed.	Works Supervisor	Construction
46.	Construction noise	• Where reasonable and feasible, noisier activities would be carried out during the day (7.00am-6.00pm) or evening (6.00pm -10.00pm) periods to minimise noise impacts.	Works Supervisor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
47.	Construction noise	• Potentially affected residents, property owners and/or administrators would be contacted prior to the commencement of works and would be informed of the proposed works, working hours, and the period of construction. Affected residents / properties would also be provided with a contact name and number should they wish to seek any advice.	Communications representative	Pre-construction
48.	Construction noise	• Construction timetabling, particularly for works outside standard hours, would aim to minimise noise impacts. Measures may include time and duration restrictions and respite periods.	Works Supervisor	Construction
49.	Construction noise	• The idling of machinery and equipment when not in use and for prolonged periods of time would be prohibited.	Works Supervisor	Construction
50.	Construction noise	• Use of noisy plant simultaneously and/or close together, adjacent to sensitive receivers would be avoided where possible.	Works Supervisor	Construction
51.	Construction noise	• All machines would be in good working condition, with particular attention to exhaust silencers, engine covers and other noise reduction devices.	Works Supervisor	Construction
52.	Construction vibration	• Vibration monitoring would be conducted in response to any vibration related complaints.	Works Supervisor / Project Manager	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
53.	Operational noise	• Consistent with RMS practice, reasonable and feasible mitigation treatments would be considered at all locations within the project catchment where noise levels are acute. They would also be considered where traffic noise levels increase by more than 2 dB and are in excess of the RNP criteria.	RMS Project Manager	Operation
54.	Visual and character impacts	• The recommendations outlined in chapter 6 of the Landscape Character and Visual Impact Assessment (refer Appendix I) would be considered in the development of the detailed design and landscape plan for the proposal.	RMS Project Manager	Detailed Design Construction
55.	Visual and character impacts	• Areas disturbed as a result of signage installation would be restored to original condition.	Works Supervisor	Construction
56.	Visual and character impacts	• A landscape plan would be prepared for the proposal consistent with the RMS Landscape Guideline.	RMS Project Manager	Construction
57.	Construction related disruption	• Affected people would be notified of all aspects of the proposal prior to commencement of construction. This would include notification of time and duration of the proposal provision of a contact name and number.	Communications Representative	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
58.	Construction related disruption	• Potentially affected residents and businesses would be notified of the progress of the works and advised in advance (e.g. by letterbox drop, meetings with community groups, etc) of any anticipated changes in noise emissions prior to critical stages of the works, and to explain complaint procedures and response mechanisms.	Communications Representative	Construction
59.	Construction related disruption	• Complaints would be recorded and addressed.	Communications Representative	Construction
60.	Removal / relocation of roadside tribute	• Roadside tributes are to be managed in accordance with the RMS Roadside Tributes Policy.	RMS Project Manager	Pre-construction
61.	Waste generation	• The resource management hierarchy detailed by the *Waste Avoidance Resource Recovery Act 2001* would be adopted, namely avoid unnecessary consumption; resource recovery; disposal as a last resort.	Works Supervisor	Construction
62.	Waste generation	• All waste would be treated in accordance with the RMS *Waste Minimisation and Management Guidelines* (RTA 1998).	Works Supervisor	Construction
63.	Waste generation	• Any excavated material would be disposed of at a licensed landfill facility in accordance with its waste classification.	Works Supervisor	Construction
64.	Waste generation	• All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.	Works Supervisor	Construction

7.3 Licensing and approvals

An applicable road occupancy licence would be in place prior to the commencement of works.

Aboriginal test excavation and collection would continue to be in accordance with an appropriate Aboriginal Heritage Impact Permit under the NPW Act.

8
Justification and conclusion

8.1 Justification

Proposal is needed to improve road safety and efficiency for local road users and commuters, as well as to support the growing tourism industry on the Tomaree Peninsula. The proposal addresses this need by providing additional lanes and separated carriageways. It is consistent with other improvements on Nelson Bay Road.

The potential environmental impacts of the proposal have been identified as moderate and management measures and offsets have been proposed. On balance, the benefits derived from the proceeding with the proposal are considered to outweigh the potential impacts. It is therefore considered justified.

8.2 Objects of the EP&A Act

A consideration of the proposal in the context of the objects of the EP&A Act is presented in Table 8-1 below.

Table 8-1 Objects of the EP&A Act review

Object	Comment
5(a)(i) To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.	The proposal would improve the transport network and in doing so would deliver economic and social benefits. Some adverse impacts on amenity and the natural environment have been identified and mitigation measures have been proposed.
5(a)(ii) To encourage the promotion and co-ordination of the orderly economic use and development of land.	The proposal would improve road safety and accommodate growth. This has economic value.
5(a)(iii) To encourage the protection, provision and co-ordination of communication and utility services.	The proposal would have some effect on communication and utility services. Relocations would be undertaken in consultation with relevant providers.
5(a)(iv) To encourage the provision of land for public purposes.	The proposal represents the management of a public asset.
5(a)(v) To encourage the provision and co-	The proposal would improve an element

ordination of community services and facilities.	of the transport network on which the community relies.
5(a)(vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.	The proposal would have minimal impact on the natural environment.
5(a)(vii) To encourage ecologically sustainable development.	Ecologically sustainable development is considered in Section 8.3 below.
5(a)(viii) To encourage the provision and maintenance of affordable housing.	Not relevant to the proposal.
5(b) To promote the sharing of the responsibility for environmental planning between different levels of government in the State.	Not relevant to the proposal.
5(c) To provide increased opportunity for public involvement and participation in environmental planning and assessment.	The level of public involvement is commensurate with the nature and scale of the proposal. Refer section Chapter 5.

8.3 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been a consideration throughout the development of the Proposal. The EP&A Act recognises that ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are considered in the context of the proposal below.

Precautionary principle

The precautionary principle deals with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation. The threat of serious or irreversible environmental damage is one of the essential preconditions to the engagement of the precautionary principle. As no threat of serious or irreversible environmental damage has been identified the precautionary principle does not operate.

Inter-generational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The impacts of the proposal have been identified as short term and manageable. Benefits would be experienced over a longer period.

Conservation of biological diversity and ecological integrity

The twin principles of biodiversity conservation and ecological integrity have been a consideration during the course of the design and assessment process with a view to identifying, avoiding, minimising and mitigating impacts.

The proposal is not expected to have significant biodiversity impacts. Impacts would be minimised through the implementation of various measures and offsets would be provided as appropriate.

Improved valuation and pricing of environmental resources

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by a project, including air, water, land and living things. While it is often difficult to place a reliable monetary value on the residual, environmental and social effects of the project, the value placed on environmental resources within and around the corridor is evident in the extent of environmental investigations, planning and design of impact mitigation measures to prevent adverse environmental impacts.

8.4 Conclusion

The proposal is Stage 3, of the upgrade of Nelson Bay Road between Bobs Farm and Port Stephens Drive, Anna Bay. It involves duplication alongside the existing road to provide four lane divided carriageway.

The proposal is subject to assessment under Part 5 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

A number of potential environmental impacts from the proposal have been avoided or reduced during the community consultation and options assessment stages. The proposal as described in the REF best meets the project objectives but would still result in some impacts. Mitigation measures as detailed in this REF would ameliorate or minimise these expected impacts.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the EP&A Act. The proposal is unlikely to significantly affect threatened species, populations or ecological communities or their habitats and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance.

On balance, the benefits derived from the proceeding with the proposal are considered to outweigh the potential impacts. It is therefore considered justified.

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Certification

This Review of Environmental Factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Stuart Hill
Environmental Planner

I have examined this Review of Environmental Factors and the certification by Stuart Hill and accept the Review of Environmental Factors on behalf of RMS.

RMS representative (print name)_____

RMS Position _____

Signature _____

Date _____

Terms and acronyms used in this REF

Term	Meaning
AHIMS	Aboriginal Heritage Information Management System
ARI	Annual Recurrence Interval
CEMP	Contractor Environmental Management Plan
DECCW	NSW Department of Environment, Climate Change and Water
DPI	NSW Department of Primary Industries
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
ECRTN	Environmental criteria for road traffic noise
ENMM	RTA Environmental Noise Management Manual
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically sustainable development.
FM Act	*Fisheries Management Act 1994*
Infrastructure SEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local environmental plan
LGA	Local government area
NCA	Noise Catchment Area
NML	Noise Management Level
OEH	NSW Office of Environment and Heritage
PACHCI	RMS Procedure for Aboriginal Cultural Heritage Consultation and Investigation
PAD	Potential Archaeological Deposit
PO	Permissive Occupancy
POEO Act	*Protection of the Environment Operations Act 1997*
REF	Review of Environmental Factors
REP	Regional Environmental Plan
RMS	Roads and Maritime Services
RNP	NSW Road Noise Policy
RTA	Roads and Traffic Authority of NSW
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
TSC Act	*Threatened Species Conservation Act 1995*