Appendix G Aboriginal heritage assessment

The Northern Road/ Bringelly Road Grade Separated Interchange

PACHCI Stage 2 Archaeological Survey Report

Report to GHD

November 2015

artefact

Artefact Heritage
ABN 73 144 973 526
Level 4, Building B
35 Saunders Street
Pyrmont NSW 2009
Australia

+61 2 9518 8411
office@artefact.net.au

EXECUTIVE SUMMARY

Roads and Maritime Services (Roads and Maritime) is proposing a new grade separated interchange at The Northern Road and Bringelly Road, Bringelly (referred to as 'the proposal' for the purposes of this report). The proposal is located within the Western Sydney Priority Growth Area (formerly known as the South West Growth Centre), about 45 km south-west of the Sydney central business district and 12 km west of Liverpool.

The proposal would tie into The Northern Road Upgrade Stage 2A (Peter Brock Drive to Belmore Road) to the south, The Northern Road Upgrade Stage 2C (Thames Road to Mersey Road) to the north, and the Bringelly Road Upgrade Stage 2 (King Street to The Northern Road) to the east.

Artefact Heritage has been engaged by GHD on behalf of Roads and Maritime to conduct an Aboriginal archaeological survey and assessment for the proposal in accordance with Stage 2 of the Roads and Maritime *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI). This heritage assessment forms part of the Review of Environmental Factors (REF) being prepared by GHD in accordance with the requirements of Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This report assesses and documents the potential Aboriginal heritage impacts of the proposal. The aim of this report is to identify whether any Aboriginal objects or areas of archaeological potential would be impacted by the proposal, whether an Aboriginal Heritage Impact Permit (AHIP) would be required from the Office of Environment and Heritage (OEH), and to recommend if any further assessment and/or management or mitigation measures are required.

Overview of findings

- Ten properties within the study area were not accessible at the time of survey and have not been assessed.
- Five registered AHIMS sites are located within the study area.
- AHIMS site BRP-S-07 (AHIMS site 45-5-3894) was assessed by KNC (2011: 44) as demonstrating low archaeological significance. This site would be impacted in its entirety.
- The site boundary of BRP-IF-16 #45-5-3886 was extended to incorporate TRNU14 (#45-5-4150) by KNC. This was assessed by KNC (2011: 44) as demonstrating moderate archaeological significance. This site would be partially impacted on.
- Site TNRU6 (AHIMS site 45-5-4142) was assessed as demonstrating moderate archaeological significance. The site would be partially impacted on.
- Site TNRU7 was assessed as having low archaeological significance and would not be impacted on.
- Two areas of PAD were identified within the study area. TNRB PAD01 and TNRB PAD02 have been assessed as demonstrating moderate archaeological potential and are likely to demonstrate moderate-low archaeological significance.
- AHIMS site BRP-S-07 is currently subject to AHIP C0000436. A condition of that AHIP is that community collection of artefacts occurs before the site is impacted.
- AHIMS site BRP-IF-16/TRNU14 is currently subject to AHIP C0000436. A condition of the AHIP is that salvage excavation of the site occurs before any impacts.

- AHIMS site TNRU6 is subject to an AHIP application for The Northern Road Stage 2. It is anticipated that a condition of that AHIP will be archaeological salvage excavation.
- The Northern Road Stage 2 Upgrade AHIP area includes portions of the proposal site boundary.

Recommendations

- Properties inaccessible at the time of survey should be investigated and incorporated into an addendum PACHCI Stage 2 report.
- Roads and Maritime confirm whether community collection of artefacts has occurred at BRP-S-07 as a condition of AHIP C0000436.
  - Where this has not occurred it will be necessary to conduct community collection of artefacts at BRP-S-07 as a condition of the existing AHIP where the site will be impacted by the proposal.
- Roads and Maritime confirm whether salvage excavation has occurred at BRP-IF-16/TNRU14 as a condition of AHIP C0000436.
  - Where salvage excavation has not occurred, it will be necessary to conduct salvage excavations as part of PACHCI Stage 4 as a condition of the existing AHIP where site BRP-IF-16/TNRU14 will be impacted by the proposal.
- Depending on the staging of The Northern Road upgrade works, Roads and Maritime may need to complete the current proposal under The Northern Roads Stage 2 AHIP in areas where they overlap.
- Prior to works commencing on the current project, Roads and Maritime will need to ensure that the conditions of The Northern Road Stage 2 AHIP have been met for site TNRU6.
- An AHIP will be required if the proposal is changed to include impacts to TNRU7.
- As Aboriginal sites would be impacted by the proposal, Stage 3 PACHCI would be implemented Stage 3 PACHCI tasks would include comprehensive Aboriginal consultation and preparation of a Cultural Heritage Assessment Report (CHAR).
- As newly identified PAD TNRB PAD01 and TNRB PAD02 may be impacted by the proposal, test excavations under the PACHCI Stage 3 and OEH Code of practice would be undertaken within the portions to be impacted. Test excavations would confirm the likely archaeological significance of TNRB PAD01 and PAD02.
- If Aboriginal objects are located at any stage outside areas where test excavations are being undertaken, or outside areas for which an AHIP is granted, work would stop immediately and the *Roads and Maritime Standard Management Procedure – Unexpected heritage items* (2015) would be followed. If human remains are located during any works associated with the project within the study area the *Roads and Maritime Standard Management Procedure – Unexpected heritage items* (2015) would be followed.
- If the project design is changed and areas not surveyed are to be impacted, or other Aboriginal sites not identified are to be impacted, further archaeological assessment would be required.

- No impacts to identified Aboriginal sites may occur without an AHIP. Impacts to PAD would be avoided prior to the test excavation program commencing. This recommendation applies to geotechnical testing.

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1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

Roads and Maritime Services (Roads and Maritime) is proposing a new grade separated interchange at The Northern Road and Bringelly Road, Bringelly (referred to as 'the proposal' for the purposes of this report). The proposal is located within the Western Sydney Priority Growth Area (formerly known as the South West Growth Centre), about 45 km south-west of the Sydney central business district and 12 km west of Liverpool (Figure 1).

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1.2 Study area and scope

The proposal site boundary supplied by GHD is shown in Figure 1. It is understood that the proposal site boundary represents the likely maximum extent of the road design and associated stockpile compound areas. For the purpose of this report, the proposal site boundary is referred to as the 'study area'.

This Aboriginal archaeological survey complies with Stage 2 of the Roads and Maritime PACHCI and the OEH *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (referred to in this document as 'the OEH Code of practice'). If Aboriginal sites or archaeological deposits were to be impacted by the proposal, Stage 3 PACHCI would be initiated by Roads and Maritime.

1.3 The Proposal

The grade separated interchange, which would involve The Northern Road passing under Bringelly Road, would be located about 300 m east of the existing intersection of The Northern Road, Bringelly Road and Greendale Road. The proposal also involves modifications to the existing intersection. The key features of the proposal are shown in Figure 1 and include:

- Widening and upgrading about 400 m of Bringelly Road, between Kelvin Park Drive and Greendale Road, to provide:

  - Two 3.5 m wide traffic lanes in each direction between Kelvin Park Drive and The Northern Road/Bringelly Road interchange, with wide central medians to allow for a future third traffic lane in each direction
  - Two 3.5 m wide traffic lanes in each direction on the western side of the interchange, transitioning to one lane in each direction to tie in to the existing intersection and Greendale Road
  - Two metre wide shoulders in each direction
- Constructing a new section of The Northern Road, to the east of the existing alignment, between about 200 m south of Robinson Road and the southern abutment of the bridge over Thompsons Creek. The new section, which would pass beneath Bringelly Road, would be about one kilometre long and about 50 m wide (including embankments), and would include:
  - Two 3.5 m wide traffic lanes in each direction
  - Four metre wide shoulders connecting to the on and off ramps of the interchange, allowing for the future provision of bus lanes
  - An underpass about 60 m long beneath the upgraded section of Bringelly Road
  - 2.5 m wide shoulders along The Northern Road under the interchange for a length of about one kilometre
  - A wide central median to allow construction of a future third traffic lane in each direction
- Providing a new signalised intersection on Bringelly Road over The Northern Road, with turning movements provided in all directions
- Providing dual right turn movements in all directions to and from The Northern Road and Bringelly Road, and dedicated left turn lanes in all directions
- Providing bus service facilities by:
  - Retaining the bus stops on the existing The Northern Road
  - Relocating bus stops on Bringelly Road to suit the interchange
  - Providing two new bus stops on The Northern Road northbound and southbound interchange on ramps
  - Providing a bus only lane for buses travelling north and south along The Northern Road at the traffic lights on Bringelly Road
- Providing three metre wide shared paths for pedestrians and cyclists
- Providing a new road connection between Robinson Road and The Northern Road via an extension of the realigned Belmore Road intersection, and building a cul-de-sac at the western end of Robinson Road
- Converting the existing section of The Northern Road (to the west of the new section) to a ‘no through road’, by providing cul-de-sacs at both the northern (at Thames Road) and southern ends (near Robinson Road).

It is anticipated that construction of the proposal would commence in late 2016 / early 2017 and would be open to traffic by the end of 2019.

1.4 Scope of this assessment

The purpose of this report is to document the results of the assessment of the potential Aboriginal heritage impacts of the operation and construction of the proposal. The report supports the REF for the proposal. The scope of assessment included:

- An overview of the Aboriginal history of the study area
- Identification of Aboriginal sites and areas of archaeological potential within the study area
- A site survey
- Assessment of the significance of identified Aboriginal sites
- Conclusions and recommendations including proposed mitigation strategies for the management of Aboriginal sites and areas of archaeological potential.

1.5 Report structure

- **Section 2 – Statutory requirements:** outlines relevant legislation for this assessment
- **Section 3 – Environmental context:** provides a succinct overview of the environmental context of the proposal site
- **Section 4 – Aboriginal historical and archaeological context:** Provides an overview of the Aboriginal history of the area and the results of previous archaeological investigations
- **Section 5 – Predictions:** provides a predictive model for the proposal site
- **Section 6 – Field methods:** methodology for the site inspection
- **Section 7 – Survey results:** describes the site survey conducted for this assessment
- **Section 8 – Desktop discussion of inaccessible properties:** provides a desktop assessment of those properties that were inaccessible for the current investigation
- **Section 9 – Analysis and discussion:** provides a discussion of the results of the site survey
- **Section 10 – Significance assessment:** provides an assessment of archaeological significance
- **Section 11 – Impact assessment:** assesses potential impacts to identified Aboriginal sites and areas of archaeological potential
- **Section 12 – Management and mitigation measures:** outlines relevant management and mitigation measures for the proposal
- **Section 13 - Test excavation methodology:** provides a methodology for test excavation of TNRB PAD01 and TNRB PAD02
- **Section 14 – Conclusions and recommendations**

1.6 Limitations and constraints

At the time of reporting ten properties within the study area were not accessible for inspection. Archaeological assessment of these properties would be undertaken once the access is available prior to works commencing on site. A discussion of the archaeological potential of each of those properties, and a map showing their location, is included in Section 8.

1.7 Report authorship and acknowledgements

This report was prepared by Claire Rayner, Archaeologist at Artefact Heritage, with contributions by Josh Symons, Senior Archaeologist. Dr Sandra Wallace, Principal Archaeologist at Artefact Heritage, provided review, management input and advice.

1.8 Aboriginal community involvement

Aboriginal consultation has been conducted in accordance with Stage 2 of the Roads and Maritime PACHCI. The study area falls within the boundaries of both Tharawal Local Aboriginal Land Council (TLALC) and Gandangara Local Aboriginal Land Council (GLALC). The Roads and Maritime Aboriginal cultural heritage advisor (ACHA) conducted the consultation with TLALC and GLALC. The consultation involved the participation of Aboriginal site officers from TLALC and GLALC during the survey. Abi Whillock (TLALC) and Brad Maybury (GLALC) were present for the first day of survey. The second and third day of survey was confined to the south of Bringelly Road within the TLALC boundaries. Abi Whillock was present for these survey days. When received, a copy of the TLALC and GLALC survey reports will be attached as an Appendix to this report. A draft version of this document was forwarded by Roads and Maritime to TLALC and GLALC for review and comment.

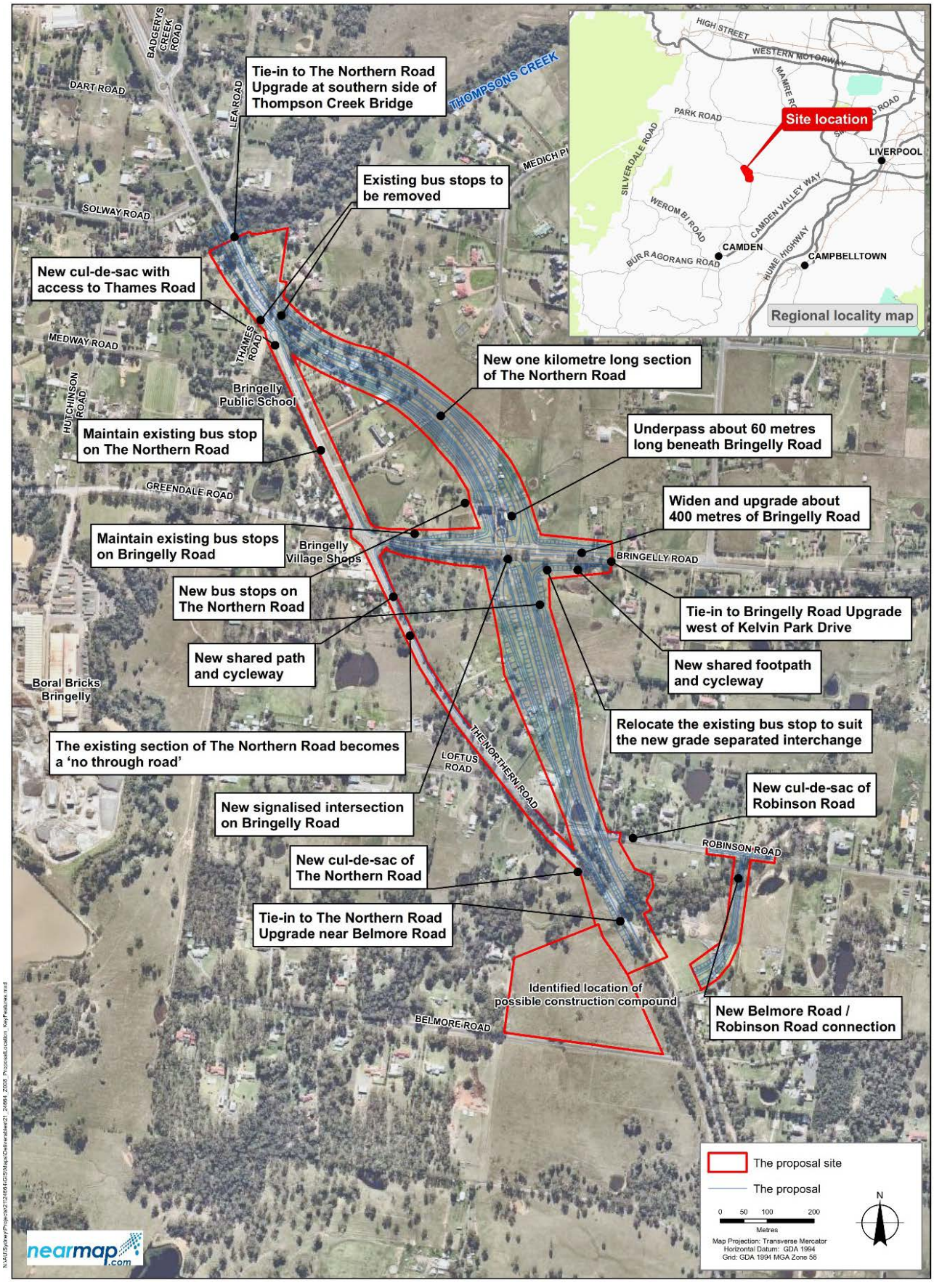

Figure 1: Key Features of the proposal and study area boundary (map provided by GHD)

2.0 STATUTORY REQUIREMENTS

2.1 National Parks and Wildlife Act (1974) (NPW Act)

The NPW Act, administered by the OEH provides statutory protection for all Aboriginal 'objects' (consisting of any material evidence of the Aboriginal occupation of NSW) under Section 90 of the Act, and for 'Aboriginal Places' (areas of cultural significance to the Aboriginal community) under Section 84.

The protection provided to Aboriginal objects applies irrespective of the level of their significance or issues of land tenure. However, areas are only gazetted as Aboriginal Places if the Minister is satisfied that sufficient evidence exists to demonstrate that the location was and/or is, of special significance to Aboriginal culture.

The NPW Act was amended in 2010 and as a result the legislative structure for seeking permission to impact on heritage items has changed. A Section 90 permit is now the only AHIP available and is granted by the OEH. Various factors are considered by OEH in the AHIP application process, such as site significance, Aboriginal consultation requirements, ESD principles, project justification and consideration of alternatives. The penalties and fines for damaging or defacing an Aboriginal object have also increased.

As part of the administration of Part 6 of the Act, OEH regulatory guidelines on Aboriginal consultation are in place, which are outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010). Guidelines are also in place for the processes of due diligence as outlined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (2010) in accordance with the 2010 amendment to the Act.

There are no gazetted Aboriginal Places within the proposal areas. All Aboriginal objects, whether recorded or not are protected under the Act.

2.2 Native Title Act (1994)

The NSW *Native Title Act 1994* was introduced to work in conjunction with the Commonwealth *Native Title Act 1993*. Native Title claims, registers and Indigenous Land Use Agreements are administered under the Act.

A search of the National Native Tribunal applications register was conducted on 20 May 2015. There are no Native Title claims registered within the study area.

2.3 Aboriginal heritage investigation guidelines

The current investigation adheres to Stage 2 of the Roads and Maritime PACHCI and the OEH Code of practice. Stage 2 of the PACHCI involve the identification of Aboriginal sites and areas of archaeological potential within a particular study area. The investigation involves an archaeological survey conducted with representatives of the local Aboriginal land council. Where it is identified in the PACHCI Stage 2 investigation that Aboriginal sites or areas of archaeological potential will be impacted, Roads and Maritime commences Stage 3 of the PACHCI. Stage 3 includes comprehensive Aboriginal stakeholder consultation, archaeological test excavation (where required), an Aboriginal Focus Group (AFG) meeting, and preparation of an Aboriginal Cultural Heritage Assessment Report (CHAR) to support an AHIP application or SSI approvals. Stage 4 of the PACHCI involves any mitigation measures required following approvals, such as archaeological salvage excavation or surface collection prior to impacts.

3.0 ENVIRONMENT CONTEXT

3.1 Geology

The study area is located within the Cumberland Plain, which is typified by an undulating landscape of rolling hills and prominent rises. The underlying geology of the study area consists of late Triassic period Bringelly shale deposits belonging to the Wianamatta Group (Clark and Jones 1991). These deposits consist predominantly of claystone and siltstone with thin laminate horizons. Areas of sandstone are minor and sporadic within the Bringelly formation. However, sandstone is prominent along north to south trending flat topped ridgelines from Minchinbury through Cecil Park to Leppington and from Orchard Hills through Luddenham and Bringelly to Cobbitty (Clark and Jones 1991).

3.2 Soils

The primary soil type across the study area is the Blacktown soil landscape. The Blacktown soil landscape is typified by shallow duplex soils over a clay base. The biomantle is underlain by heavily textured subsoil with a depth of generally less than a metre, and most commonly less than 30 cm. The archaeological implications of this soil landscape are that intact deposits are likely to occur in the A horizon, which is generally up to 30 cm depth, although stratigraphic potential would be limited.

3.3 Hydrology

The study area runs parallel to South Creek. Various tributaries of this watercourse traverse the study area. The northern end of the study area intersects with Thompsons Creek. The Nepean River runs 10 km to the west of the study area.

3.4 Natural resources

The study area would once have been covered by open Cumberland Plain Woodland, which is typical of the Wianamatta Group shale geology. Tree species would have included Forest Red Gum (*E. tereticornis*) and Grey Box (*E. moluccana*). Honey Myrtle (*Melaleuca decora)* and Prickly Leaf Paperbark (*Melaleuca nodosa*) would have been present on the floodplain at Bells Creek (Benson and Howell 1990).

Aboriginal people were highly mobile hunter-gatherers utilising different landform units and resource zones. Different resources may have been available seasonally, necessitating movement or trade (Attenbrow 2010: 78). Aboriginal people hunted kangaroo and wallaby and snared possums for food and skins. In marine or estuarine environments Aboriginal people caught fish and collected shellfish. There are many accounts by Europeans of Aboriginal people in canoes on rivers and the ocean, fishing and cooking the fish on small fires within the vessels (e.g. Collins 1798).

Plants were an important source of nutrition. Common edible species being *Macrozamia*, a cycad palm with poisonous seeds that were detoxified and ground into a paste and *Xanthorrhoea*, or grass tree. The grass tree nectar was a high-energy food, the resin a strong hafting glue, and the flower spikes used for spear barbs. From observations by early European colonists, only about twenty species of plant are identified as being used for food or manufacture by Aboriginal people of the Sydney region (Attenbrow 2010:41). It would be likely that this is only a fraction of what was actually used.

There are no known suitable stone sources for artefact manufacture within the study area (JMcDCHM 2007:17). Resources for tool manufacture would have been brought in from areas such as Mulgoa Creek, about 10 km north of the study area, or from the Plumpton Ridge and Marsden Park silcrete deposits 20 km north-east of the study area. Raw materials such as silcrete and tuff cobbles are also found in the Nepean River gravels and have been recorded at the confluence of South Creek and Badgerys Creek 10 km north-east of the study area. Quartz pebbles that occur naturally across some portions of the local area would also have been utilised for stone tool production.

3.5 Land use history

The study area has been heavily impacted by agricultural use and semi-rural development. Some areas have recently been developed as residential estates, or are in the process of such changes.

The Bringelly area was predominately part of a wider agricultural district until very recently and even now agricultural activities play a major role in the local area. During the 1840s, wheat cultivation was a major industry in the district and several flour mills were established to process this wheat (Atkinson 1988:31). However, in the early 1860s, an outbreak of rust destroyed the wheat industry and landholders diversified into other avenues of agricultural production (Atkinson 1988:95). These included sheep, cattle, dairying, crops such as oats, and fruit and vegetable cultivation. During the 1930s depression, many of the large properties in the area were subdivided and smaller farms for orchards or poultry became common (Willis n. d.).

Since the 1950s, the development of the region has been strongly affected by state government planning policies. The 1968 Sydney Region Outline Plan encouraged the growth of Bringelly (Willis n. d.) and from the 1970s, urbanisation in the area rapidly increased. The study area is currently within the South West Priority Growth Area.

4.0 ABORIGINAL HISTORICAL AND ARCHAEOLOGICAL CONTEXT

4.1 Aboriginal material culture

Aboriginal people have lived in the Sydney area for more than 20,000 years. The oldest securely dated site in the greater Sydney region is 17,800 years before present (yBP), recorded in a rock shelter at Shaw's Creek (Nanson et al 1987). Evidence of Aboriginal occupation has been found dated to 50-60,000 yBP at Lake Mungo in NSW, so it would be likely that Aboriginal people have lived in the Sydney region for even longer than indicated by the oldest recorded dates available at present. The archaeological material record provides evidence of this long occupation, but also provides evidence of a dynamic culture that has changed through time.

The existing archaeological record is limited to certain materials and objects that were able to withstand degradation and decay. As a result, the most common type of Aboriginal objects remaining in the archaeological record are stone artefacts. Archaeological analyses of these artefacts in their contexts have provided the basis for the interpretation of change in material culture over time. Technologies used for making tools changed, along with preference of raw material. Different types of tools appeared at certain times, for example ground stone hatchets are first observed in the archaeological record around 4,000 yBP in the Sydney region (Attenbrow 2010:102). It has been argued that these changes in material culture were an indication of changes in social organisation and behaviour.

The Eastern Regional Sequence was first developed by McCarthy in 1948 to explain the typological differences he was seeing in stone tool technology in different stratigraphic levels during excavations such as Lapstone Creek near the foot of the Blue Mountains (McCarthy 1948). The sequence had three phases that corresponded to different technologies and tool types (the Capertian, Bondaian and Eloueran). The categories have been refined through the interpretation of further excavation data and radiocarbon dates (Hiscock & Attenbrow 2005, JMcDCHM 2005). It is now thought that prior to 8,500 yBP tool technology remained fairly static with a preference for silicified tuff, quartz and some unheated silcrete. Bipolar flaking was rare with unifacial flaking predominant. No backed artefacts have been found of this antiquity. After 8,500 yBP silcrete was more dominant as a raw material, and bifacial flaking became the most common technique for tool manufacture. From about 4,000yBP to 1,000yBP backed artefacts appear more frequently. Tool manufacture techniques become more complex and bipolar flaking increases (JMcD CHM 2006). It has been argued that from 1,400 to 1,000 years before contact there is evidence of a decline in tool manufacture. This reduction may be the result of decreased tool making, an increase in the use of organic materials, changes in the way tools were made, or changes in what types of tools were preferred (Attenbrow 2010:102). The reduction in evidence coincides with the reduction in frequency of backed blades as a percentage of the assemblage.

After European colonisation Aboriginal people of the Sydney Basin often continued to manufacture tools, sometimes with new materials such as bottle glass or ceramics. There are a number of sites in Western Sydney where flaked glass has been recorded, for example at Prospect (Ngara Consulting 2003) and Oran Park (JMcD CHM 2007).

4.2 Aboriginal ethno-historic context

Aboriginal people traditionally lived in small family or clan groups that were associated with particular territories or places. The language group spoken in the Narellan/Bringelly area is thought to have been Dharawal (Tindale 1974). The Dhrawal language group is thought to have extended from the

Shoalhaven River, north to Botany Bay and then inland to Camden. Some sources also describe the Narellan area as being home to the Muringong people, speakers of the Darug language group (Mathews and Everitt 1900:265).

There is some evidence that Aboriginal people around Narellan spoke a distinctly separate language and their tribal area was known as Cubbitch-Barta after its white pipe clay (Russell 1914). Government records from the 1830s and 1840s identify an Aboriginal group known as the Cobbiti Barta as associated with the Camden area (JMcDCHM 2007:21).

Historical records show that Gandangara people visited the Narellan/Bringelly area. It is not known whether these visitations represented recent displacement patterns as a result of European colonisation or were part of a longer term interaction with the Dharawal (Karskens 2010:496).

Laila Haglund has suggested that at contact the area would have been near the border of the Dharawal, Darug and Gandangara territories and that the Narellan Valley may have been part of a 'travel corridor' facilitating movement between the northern Cumberland Plain and the Illawarra (JMcDCHM 2007:21 after Haglund 1989).

Historical observations suggest that Aboriginal people lived in the Narellan/Bringelly area in relatively large numbers. Lieutenant Dawes observed that a number of bark huts, about seventy in all, located close to the river between the farms of Mr Wentworth and Mr Campbell at Narellan (Barton 1996).

British colonisation had a profound and devastating effect on the Aboriginal population of the Sydney region, including Dharawal, Darug and Gandangara speakers. In the early days of the colony Aboriginal people were disenfranchised from their land as the British claimed areas for settlement and agriculture. The colonists, often at the expense of the local Aboriginal groups, also claimed resources such as pasture, timber, fishing grounds and water sources. Overall the devastation of the Aboriginal culture did not come about through war with the British, but instead through disease and forced removal from traditional lands. It is thought that during the 1789 smallpox epidemic over half of the Aboriginal people of the Sydney region died. The disease spread west to the Aboriginal groups of the Cumberland Plain and north to the Hawkesbury. It may have in fact spread much further afield, over the Blue Mountains (Butlin 1983). This loss of life meant that some of the Aboriginal groups who lived away from the coastal settlement of Sydney may have disappeared entirely before Europeans could observe them, or record their clan names (Karskens 2010:425).

The British initially thought that Aboriginal people did not live inland, but were confined to the coast taking advantage of the abundant marine resources available. The first major expeditions into the interior did not witness any Aboriginal people, but evidence of their existence was noted. In April 1788 Governor Philip led an expedition west to Prospect Hill. It was noted, '…that these parts are frequented by the natives was undeniably proved by the temporary huts which were seen in several places. Near one of these huts, the bones of kangaroo were found, and several trees were seen on fire' (Phillip 1789).

In 1789 Captain Watkin Tench led an expedition to the Nepean River. He noted that:

> *Traces of the natives appeared at every step, sometimes in their hunting huts which consist of nothing more than a large piece of bark bent in the middle and opened at both ends, exactly resembling two cards set up to form an acute angle; sometimes in marks on trees which they had climbed; or in squirrel-traps….We also met with two old damaged canoes hauled up on the beach. (Tench 1789)*

It wasn't until rural settlement began in the western Cumberland Plain, around 1791 that the colonists and Aboriginal peoples came face to face in that area. Relations quickly disintegrated, and tensions

over land and resources intensified. Governor King sanctioned the shooting of Aboriginal people in a General Order made in 1801 (Kohen 1986:24). A sustained drought during 1814 and 1815, and continued disenfranchisement led to tensions between farmers and Aboriginal people who remained to the south-west of Sydney. Aboriginal people were accused of stealing corn and potatoes and spearing cattle. A number of farmers were killed on their properties. In a dispatch Governor Macquarie wrote that 'The Native Blacks of this country…have lately broken out in open hostility against the British Settlers residing on the banks of the River Nepean near the Cow Pastures'. Aboriginal people were targeted and it was ordered that Aboriginal men be strung from trees when they were killed as an example (Turbet 2011:234). Intermittent killings on both sides continued for over 15 years, including the Appin massacre and attacks at South Creek in 1816 (Kohen 1986:23, Karskens 2010:225).

Although tensions existed between Aboriginal people and Europeans on the Cumberland Plain, a number of Aboriginal families continued to live semi-traditional lives in the area. The first parcels of land granted to an Aboriginal person were to the north of the study area between Richmond Road and Plumpton Ridge along Bells Creek. Governor Macquarie granted this land to Colebee and Nurragingy in 1819. Colebee did not stay long but Nurragingy lived on the land and it remained in the family until 1920 when it was resumed by the Aboriginal Protection Board (Kohen 1986:27).

The government policy of removal of Aboriginal children from their parents in order to assimilate them into white society began fairly early on in the colony's history, and was epitomised by the development of the Native Institution at Parramatta in 1814.

This facility was moved to the Black Town settlement in 1823, opposite Colebee and Nurragingy's land grant. It was closed in 1829 and the land was used for farming, but the site remains significant for its historical, archaeological and social values (GML 2007:36).

Into the nineteen and twentieth centuries descendants of Darug language speakers continued to live in western Sydney along with Aboriginal people from other areas of NSW.

4.3 Registered Aboriginal sites in the study area

An extensive search of the Aboriginal Heritage Information System (AHIMS) database was undertaken on the 26 June 2015 for sites registered within the following coordinates:

GDA 1994 MGA 56	289876 – 291603E 6240567 – 6243680N
Number of sites	23
AHIMS Search ID	179293

The distribution of registered sites is shown Table 1. There are 23 registered sites located within the search area. The frequency of site features are summarised in Table 1 below.

Table 1: Frequency of site types within the search area

Site Feature	Frequency	Percentage
Artefact	19	82%
Artefact Scatter	3	13%
Potential Archaeological Deposit	1	5%

Of the 23 previously recorded sites in the study area, artefacts are the predominant site feature (n= 22, 95%). Of these three are recorded as scatters (13%). There is one scarred tree recorded to the south of the study area.

The majority of sites are associated with The Northern Road and Bringelly Road. This is likely to reflect the focus of previous studies on road corridors and the exposures that often occur in these areas.

Of the sites identified by the AHIMS extensive search, there are three sites located within the study area (see Table 2). These sites were visited during the current survey and will be discussed further in Section 7.3.1.

Table 2: Registered sites located within the study area

AHIMS #	Name	Site Feature
45-5-3886	BRP-IF-16	Artefact
45-5-3894	BRP-S-07	Artefact
45-5-4150	TNRU14	Artefact
45-5-4142	TNRU6	Artefact Scatter
45-5-4143	TNRU7	Artefact Scatter

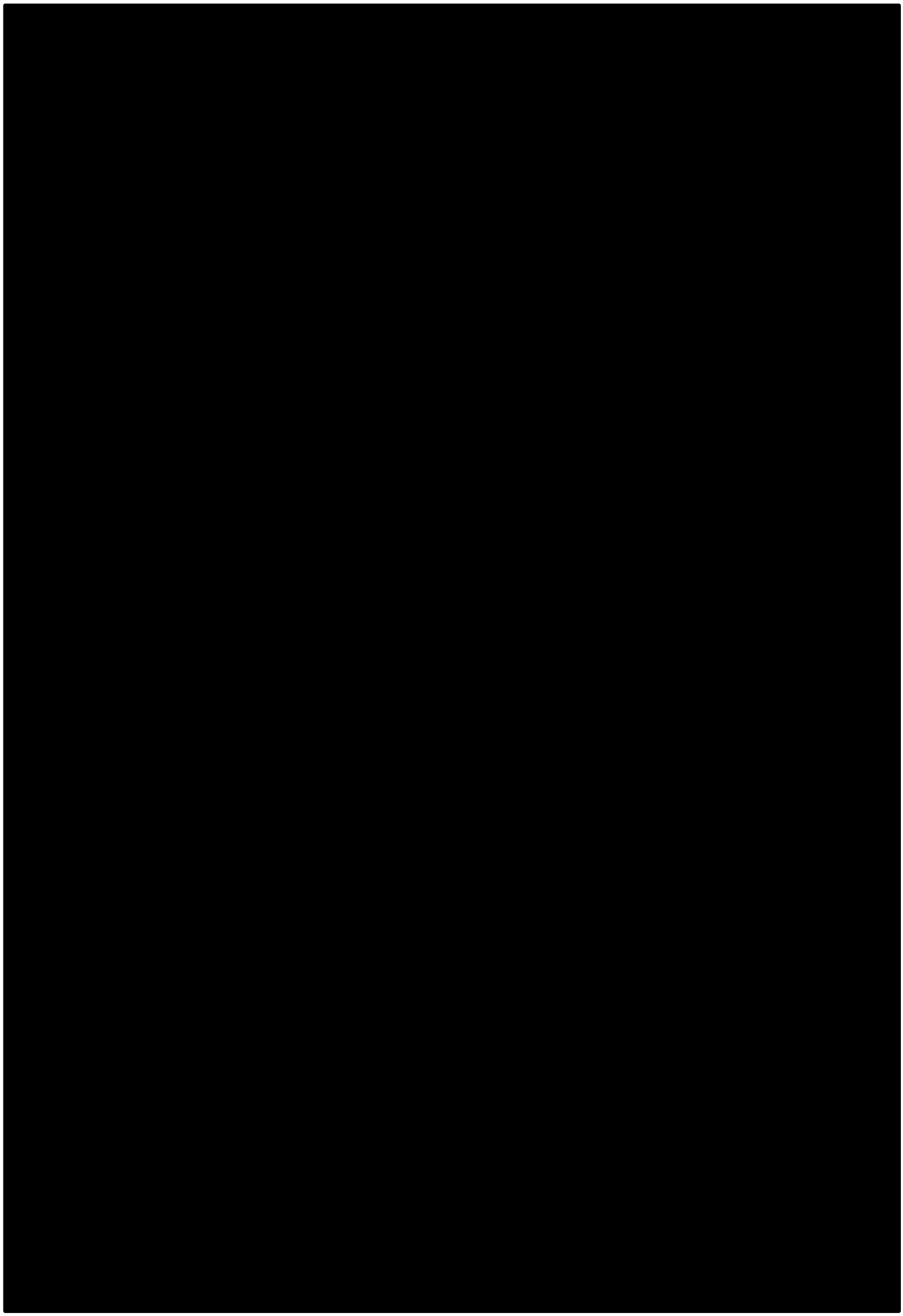

Figure 2: AHIMS extensive search results

4.4 Overview of previous archaeological investigations

There have been a number of major archaeological investigations that have included sections of the study area. These have generally been associated with large land releases and upgrades of The Northern Road and Bringelly Road. The following discussion takes into account the most recent and relevant studies and aims to provide contextual information for the current study. There has been a recent subsurface excavation program conducted along the Bringelly Road corridor for Roads and Maritime, with the results of that excavation upcoming.

Harrington Park and Mater Dei rezoning project (Australian Museum Business Services 2006)

The Harrington Park and Mater Dei study area extends along The Northern Road from Harrington Park (seven kilometres south of the current study area) to its intersection with Cobbitty Road.

The 2006 study of the Harrington Park and Mater Dei development areas followed on from a Phase 1 preliminary study which identified the need for further investigation (Central West Archaeological and Heritage Services 2004). The Phase 1 study identified 16 Aboriginal sites, including five possible scarred trees. The Phase 2 investigations identified a further 19 sites. A large portion of the study area was assessed as having a medium to high archaeological sensitivity with generally low disturbance levels. It was recommended that large sections of the precinct should be zoned for conservation with 60 per cent of the recorded sites within the conservation areas.

Archaeological investigation of the Oran Park precinct in the South West Priority Growth Area (Jo McDonald Cultural Heritage Management 2007).

The Oran Park precinct is located approximately six kilometres south of the study area. The survey undertaken by Jo McDonald Cultural Heritage Management (JMcD CHM) aimed to locate Aboriginal sites within the precinct and recommend appropriate conservation or mitigation measures. A total of 44 sites and four areas of archaeological potential were located during the survey with several sites having very high densities of artefacts. Site OPR-15 comprised of 193 recorded artefacts located on the banks of a minor tributary in the north-eastern section of the precinct.

The majority of the area along The Northern Road was assessed as having a low/moderate archaeological sensitivity with only 15 per cent of the total precinct assessed as having a high archaeological sensitivity.

The Northern Road upgrade preliminary Aboriginal archaeological assessment (Biosis 2008).

The Biosis study assessed the area of the proposed upgrade of The Northern Road from the Old Northern Road, Narellan to Bringelly/Greendale Road at Bringelly. The study involved a desktop assessment and a site survey. The field survey focused on creeks, drainage features and prominent rises, and any previously recorded sites within the corridor. Although the ground surface visibility throughout the study area was low, a total of eight Aboriginal sites and two areas of potential archaeological deposit were identified during the survey. Two of these sites were scarred trees, one was an artefact scatter and five were isolated finds.

Oran Park and Turner Road Precincts Aboriginal heritage investigation for proposed Infrastructure service routes and site options (Kelleher Nightingale Consulting KNC 2008).

This study involved the Aboriginal heritage assessment of proposed infrastructure service routes and sites under consideration for the early release areas of Oran Park and Turner Road Precincts. The survey of these routes located seven new Aboriginal sites, and five areas of potential archaeological deposit.

The assessment recommended that there were no constraints on development within the road corridor on either side of The Northern Road due to high levels of disturbance. It was recommended that a number of sites may be impacted by the proposed works outside the road corridor and within the Oran Park and Turner Road precincts. A Section 90 AHIP was recommended for these sites if they were to be impacted by the Oran Park and Turner Road proposal.

Archaeological excavations at the Oran Park and Turner Road precincts (AECOM 2009).

The archaeological test excavations at Oran Park involved a program of test pitting and open area excavations. Three hundred and forty test pits were excavated across a variety of landform units, with 160m^2 of open area excavated during salvage excavations. A total of 4780 artefacts were recovered from Phase 1 and Phase 2 excavations, with around three quarters of the artefacts made of silcrete. Approximately five per cent of the assemblage comprised of tools or cores including backed artefacts and scrapers.

The results of the excavations indicated a low density spread of archaeological material across the precinct which is argued to reflect a 'pre-contact landscape of extensive but low intensity Aboriginal activity with evidence of strategic defensive positioning of campsites within a cultural interaction zone between different language groups' (AECOM 2009:ES1).

Bringelly Road upgrade Camden Valley Way to The Northern Road Aboriginal cultural heritage assessment (Kelleher Nightingale Consulting KNC 2011).

The KNC study followed on from the Austral Archaeology preliminary investigation for the Bringelly Road upgrade route. There were 44 Aboriginal sites located along the Bringelly Road corridor during the KNC and Austral site surveys. The majority of artefacts recorded were made of silcrete, mudstone or tuff. Artefacts were predominantly flakes or flake fragments, with a smaller numbers of cores, flaked pieces and blades.

One of the sites recorded by KNC is located within the current study area. BRP-IF-16 (# 45-5-3886) is located within 993 Bringelly Road, 160 m east of the Bringelly Road and The Northern Road intersection. This site was assessed as containing moderate archaeological potential. The site was considered to represent the remnant portions of larger and more disturbed areas with a moderate potential for subsurface material. This site was recommended for salvage excavation if it was to be significantly impacted by the proposed works.

The Northern Road upgrade from The Old Northern Road, Narellan to Mersey Rd, Bringelly, Aboriginal Survey Report (Artefact Heritage 2012)

Artefact Heritage conducted an Aboriginal archaeological survey of The Northern Road between The Old Northern Road and Mersey Road. Portions of this study area intersect with the current study area. The assessment identified 23 Aboriginal sites within the study area, seven Aboriginal sites 20 m outside the study area and two new sites recorded more than 50 m outside the study area.

The majority of the sites identified were recorded as isolated finds or artefact scatters. There were two scarred trees recorded along The Northern Road corridor and one area of Potential Archaeological Deposit (PAD) was also recorded. Of the isolated finds recorded during the survey one of these, TNRU14 was recorded in association with BRP-IF-16 (# 45-5-3886) originally recorded by KNC in 2011. The assessment recommended salvage excavation for five sites recorded within the study area as moderately significant including BRP-IF-16.

5.0 PREDICTIONS

5.1 Previous predictive models for the area

The exact nature of Aboriginal land use patterns in the vicinity of the study area before colonisation is unknown. Assumptions about land use patterns are made on the basis of archaeological information gained from the local area, from observations made by the Europeans after settlement of the area, and from information known about available natural resources.

As Aboriginal people were mobile hunter-gatherers, it would be likely that they moved across the landscape between resources. It would also be likely that movement was related to socio/cultural factors such as gatherings and ceremonial obligations. Campsites would have provided temporary residences such as bark structures. It is difficult to ascertain whether a campsite existed at a given location, but correlations between stone artefact density and campsites are often assumed. While it would be likely that knapping would have occurred at a campsite, it would also be likely that knapping would have occurred during movement across the landscape, as tools were prepared or repaired during hunting and gathering activities.

Archaeological data gathered in the locality suggests that artefacts would be found across the landscape in low densities. Higher densities would be found in certain locations, often close to permanent water, or on ridgelines (JMcDCHM 2007, AECOM 2009).

5.2 Predictive model for the study area

Beth White and Jo McDonald have developed a model for site prediction on the Cumberland Plain in their discussion on the nature of Aboriginal site distribution as interpreted through lithic analysis of excavated sites in the Rouse Hill Development Area (RHDA) (White and McDonald 2010). This analysis brings together data from 631 dispersed 1m x 1m test squares from 19 sample areas, which yielded 4,429 stone artefacts in total. The findings of this study generally support earlier models that predicted correlations between proximity to permanent water sources and site location, but also highlighted the relationship between topographical unit and Aboriginal occupation.

The major findings of the study were that artefact densities were most likely to be greatest on terraces and lower slopes within 100m of water. The stream order model was used to differentiate between artefact densities associated with intermittent streams as opposed to permanent water. It was found that artefacts were most likely within 50-100m of higher (4th) order streams, within 50m of second order streams, and that artefact distribution around first order streams was not significantly affected by distance from the watercourse (White and McDonald 2010: 33). Overall landscapes associated with higher order streams (2nd order or greater) were found to have higher artefact densities, higher maximum densities, and more continuous distribution than lower order intermittent streams. The analysis also concluded that while there were statistically viable correlations that demonstrated a relationship between stream order, land form unit and artefact distribution across the RHDA, the entire area should be recognised as a cultural landscape with varied levels of artefact distribution (White and McDonald 2010: 37). This predictive model can be transferred to other areas of the Cumberland Plain, especially those on shale soil geology, as landscape, soils and artefacts patterning are similar throughout the region.

The results of excavations at the Oran Park precinct have been argued to suggest that correlations between stream confluence, or stream order, and artefact density do not hold for this area. Instead it was argued that ‘the evidence supports a more even spread of archaeological deposit comprising predominantly low density artefact distribution with occasional campsite concentrations in areas with

good outlook over the main valley up to locations anywhere to several hundred metres away from the watercourses' (AECOM 2009: 50).

The predictive model used in the current study comprises a series of statements about the nature and distribution of evidence of Aboriginal land use that is expected in the study area. These statements were based on the information gathered regarding:

- Landscape context and landform units
- Ethno-historical evidence of Aboriginal land use
- Distribution of natural resources
- Results of previous archaeological work in the vicinity of the study area
- Predictive modeling proposed in previous investigations.

Predictive statements were as follows:

- Stone artefacts/artefact scatters would be the most likely Aboriginal site type. Previous studies in the region, as discussed above, have found that stone artefacts are the most common site type
- Scarred trees are known to exist within the Camden region and where there is remnant old growth vegetation remaining there is a possibility of scarred trees being retained
- Artefact densities would be generally low. Previous studies in the region, and close to the study area such as AECOM 2009 have found that artefacts generally occur in a low density across the landscape with some isolated areas of higher density
- Silcrete, silicified tuff and quartz would be the dominant raw materials. Previous studies have indicated that these raw materials are most common on the Cumberland Plain, including the locality of the study area
- *In situ* artefacts would be located in areas of least ground disturbance
- Artefacts may be located on terraces and slopes within 100 m of water, or on areas with a good outlook over the main valley up to several hundred metres away from water, although it would be likely there would be a fairly even spread of archaeological material across the landscape. This prediction is based on the models developed by White and McDonald, and AECOM, as discussed above.

6.0 FIELD METHODS

6.1 Site definition

An Aboriginal site is generally defined as an Aboriginal object or place. An Aboriginal object is the material evidence of Aboriginal land use, such as stone tools, scarred trees or rock art. Some sites, or Aboriginal places can also be intangible and although they might not be visible, these places have cultural significance to Aboriginal people.

OEH guidelines state in regard to site definition that one or more of the following criteria must be used when recording material traces of Aboriginal land use:

- The spatial extent of the visible objects, or direct evidence of their location
- Obvious physical boundaries where present, e.g. mound site and middens (if visibility is good), a ceremonial ground
- Identification by the Aboriginal community on the basis of cultural information.

For the purposes of this study an Aboriginal site was defined by recording the spatial extent of visible traces or the direct evidence of their location.

6.2 Survey methodology and limitations

A survey of the study area was conducted over three days by Josh Symons (Artefact Heritage), Claire Rayner (Artefact Heritage), Abi Willock (TLALC) and Brad Maybury (GLALC) on 15 July, 24 July and 30 September 2015. Brad Maybury was present during the first day of survey only as the second and third days were limited to within the TLALC boundaries. The survey was undertaken in accordance with Stage 2 of the Roads and Maritime PACHCI and the OEH Code of practice.

The study area was divided into four survey units based on landform units. All survey units were covered on foot. Parts of the study area have been previously assessed and have existing AHIPs in place. These areas were visited during the current survey. Access to some of the properties was restricted at the time of survey. These properties have been excluded from the following survey area discussion.

All exposed areas within survey units were targeted for stone artefacts or other traces of Aboriginal occupation. Mature trees were inspected for evidence of cultural scarring or carving. Previously recorded sites within the study area were revisited. Dense grasses covered the majority of the study area making the relocation of sites difficult.

A handheld Global Positioning System (GPS) was used to track the path of the surveyor, relocate previously recorded sites and to record the geographical coordinates of features within the study area. Aerial photographs and topographic maps were carried by survey team members.

A photographic record was kept of all sections of the study area. Photographs were taken to represent the landform unit, vegetation communities, objects of interest and levels of disturbance. Scales were used for photographs where appropriate.

7.0 SURVEY RESULTS

7.1 Effective survey coverage

The survey covered all four survey units. Areas of high exposure were targeted. The coordinates of all previously recorded sites within the study area were visited. The area covered by the survey is illustrated in Figure 3. The effective survey coverage is summarised in Table 3 and the landform survey coverage is summarised in Table 4.

Table 3: Effective survey coverage

Survey Unit	Landform	Survey unit area (m^2)	Visibility (%)	Exposure (%)	Effective Survey Coverage (m^2)	Effective Coverage (%)
1	Flat	14,729	5%	10%	73.64	0.5
2	Slope	24,254	10%	10%	242.54	1
3	Crest	47,025	10%	10%	470.25	1
4	slope	41713	10%	10%	417.13	1

Table 4: Landform survey coverage

Landform	Landform area (m^2)	Area effectively surveyed (m^2)	% of landform surveyed	Number of sites
Flat	14,729	73.64	0.5	0
Slope	65,967	659.67	1	0
Crest	47,025	470.25	1	3

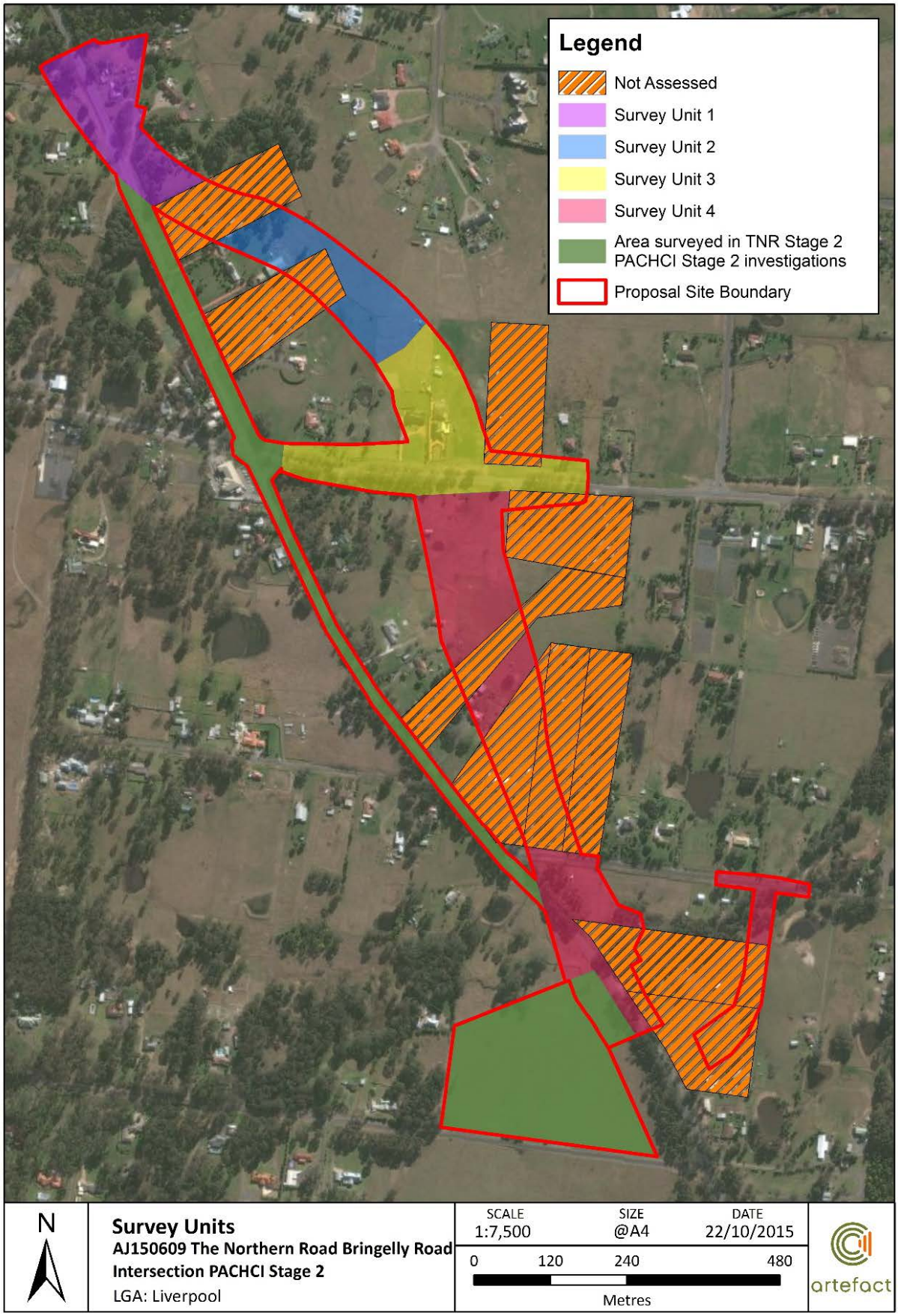

Figure 3: Survey units

7.2 Survey observations

7.2.1 Survey unit 1

Survey unit 1 extends south from the northernmost boundary of the study area to the southern boundary of 1250 The Northern Road. The survey unit is situated upon a flat landform adjacent to Thompsons Creek. The survey unit includes the following properties:

- 1262 The Northern Road
- 1254 The Northern Road
- 1250 The Northern Road.

Visibility within the survey unit was generally low, impeded by structures, sealed roads and driveways and vegetation. Exposures were inspected for Aboriginal objects and mature trees were inspected for evidence of scarring or carving. Disturbance was evident throughout the study area related to the construction of houses, gardens and The Northern Road. The area bordering Thompsons Creek was disturbed to a lesser extent. There were no Aboriginal sites or objects identified within survey unit 1.

Plate 1: Low visibility in survey unit 1 survey unit 1

Plate 2: low visibility due to dense grasses in

Plate 3: Area of exposure, survey unit 1

Plate 4: Mature trees, survey unit 1

Plate 5: artificial embankment, survey unit 1

7.2.2 Survey unit 2

Survey unit 2 is located on a slope landform, sloping north towards Thompsons Creek. This survey unit encompasses the following properties:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

This area consists of mainly cleared fields that are currently used for grazing animals (Plate 6). The area features dense grass cover impeding visibility. Areas of exposure were inspected for Aboriginal objects although none were identified. There were no mature trees located within the survey unit. Disturbance was evident within the survey unit in relation to the construction of houses, gardens, swimming pools and sheds (Plate 7).

Plate 6: Cleared fields, survey unit 2

construction of shed, survey unit 2

Plate 7: artificial embankment related to

7.2.3 Survey unit 3

Survey unit 3 is located on a crest landform. It includes the following properties:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

Visibility within the survey unit is generally impeded by dense grasses (Plate 8). Where exposures did occur these were inspected for Aboriginal objects. Levels of disturbance vary throughout the survey unit. The highest levels of disturbance are generally related to the construction of houses and Bringelly Road (Plate 9). Disturbance is generally found to be lower away from Bringelly Road towards the rear of the properties. Whilst clearance of vegetation has occurred in these areas the landform appears to be generally intact.

Three AHIMS sites (#45-5-3894, #45-5-4150 #45-5-3886) have previously been recorded within survey unit 3. The recorded coordinates of these sites were visited however the artefacts were not relocated. AHIMS site #45-5-3886 (BRP-IF-16, Plate 10) was originally assessed by KNC in 2011. Artefact Heritage later recorded AHIMS site #45-5-4150 (TRNU14) in association with BRP-IF-16. Both of these sites were recommended for salvage excavation as a condition of the Bringelly Road upgrade AHIP (C0000436). The area was assessed as demonstrating low levels of disturbance during the current survey.

TNRB PAD01 was identified towards the rear of 1232 Bringelly Road on a crest landform (Plate 11). This area demonstrates low levels of disturbance and is likely to contain intact archaeological material. A description of TNRB PAD01 is included in Section 7.3.2.

Plate 8: dense grasses in survey unit 3

Plate 9: ground disturbance caused by house construction, survey unit 3

Plate 10: AHIMS site #45-5-3886, survey unit 3

Plate 11: Area of potential archaeological deposit, survey unit 3

7.2.4 Survey unit 4

Survey unit 4 is located on a slope landform sloping south from Bringelly Road. This survey unit includes the following properties:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

This survey area is mainly comprised of cleared fields currently used for grazing (Plate 12). Visibility is generally low due to dense grasses, driveways, and buildings. Areas of exposure were inspected for Aboriginal objects, none were identified (Plate 13). An unnamed low order watercourse flows through the southern portion of the survey unit (Plate 14). Levels of disturbance vary throughout the study area. These are generally related to ground disturbance works involved in the construction of houses, gardens and dams (Plate 15).

TNRB PAD02 was recorded in the south eastern portion of the survey unit. This area encompasses a raised flat landform next to an incised creek line. The area appears to have only been used for grazing and it is likely that the area of potential may extend into the neighbouring property which was inaccessible at the time of survey. A description of TNRB PAD01 is included in Section 7.3.2.

Plate 12: cleared field, survey unit 4

Plate 13: area of exposure, survey unit 4

Plate 14: Low-lying rea adjacent to modified drainage line PAD next to an incised creek line (seen on left of image)

Plate 15: Newly recorded area of

7.3 Summary of results

The current survey identified two areas of archaeological potential – TNRB PAD01 and TNRB PAD02. Both PADs are located in areas that demonstrated low levels of surface disturbance and are located in landform contexts previously identified as demonstrating archaeological potential. The locations of previously recorded AHIMS sites in the study area were inspected. The artefacts associated with these sites were not relocated. The locations of the newly recorded and AHIMS sites are shown in Figure 8.

Visibility was generally nil across the study area and limited to exposures associated with dam walls, driveways and along road easements. Access to several properties was restricted at the time of survey, therefore these properties were not assessed. Surface disturbance varied throughout the study area and was generally higher in association with the construction of houses, dams, sheds, gardens and Bringelly Road and The Northern Road.

7.3.1 Previously recorded sites

Three registered AHIMS sites are located within the study area. The results of the current inspection of these sites is detailed below.

AHIMS Sites 45-5-3886 BRP-IF-16 and 45-5-4150 TNRU14

Site BRP-IF-16 was originally recorded by KNC in 2010. It was then revisited by Artefact Heritage in 2012 and additional artefacts were recorded as site TNRU14.

Site BRP-IF-16 consists of an isolated silcrete artefact located along a property access track at [redacted] within the study area. The artefact is located approximately 10 m south of Bringelly Road in an exposed area less than one metre squared. The site landform consists of a relatively intact north-facing upper slope of a low hill top. This area encompasses the crest of the low hill-top and the north and west running slopes from the hill-top (Figure 4). The site exhibits archaeological potential related to its landscape position, association with known archaeological sites and access to a range of resources (KNC 2010).

Site TNRU14 is located on an exposure within a BMX track 10 m from the Bringelly Road corridor and 40 m to the east of the site BRP-IF-16. The extended site area is within an east-west running ridgeline on a low hilltop. The site consists of a single red silcrete flake. This site was considered to be associated with site BRP-IF-16 at the time of recording.

The artefacts at site BRP-IF-16/TRNU14 were not relocated during the current survey. However, the landform was found to be in a relatively intact condition with very little evidence of subsurface disturbance (Plate 17).

Plate 16: BRP-IF-16, one metre scale

Plate 17: intact landform, BRP-IF-16

Plate 18: TRNU14, one metre scale

Plate 19: low level of disturbance, TRNU14

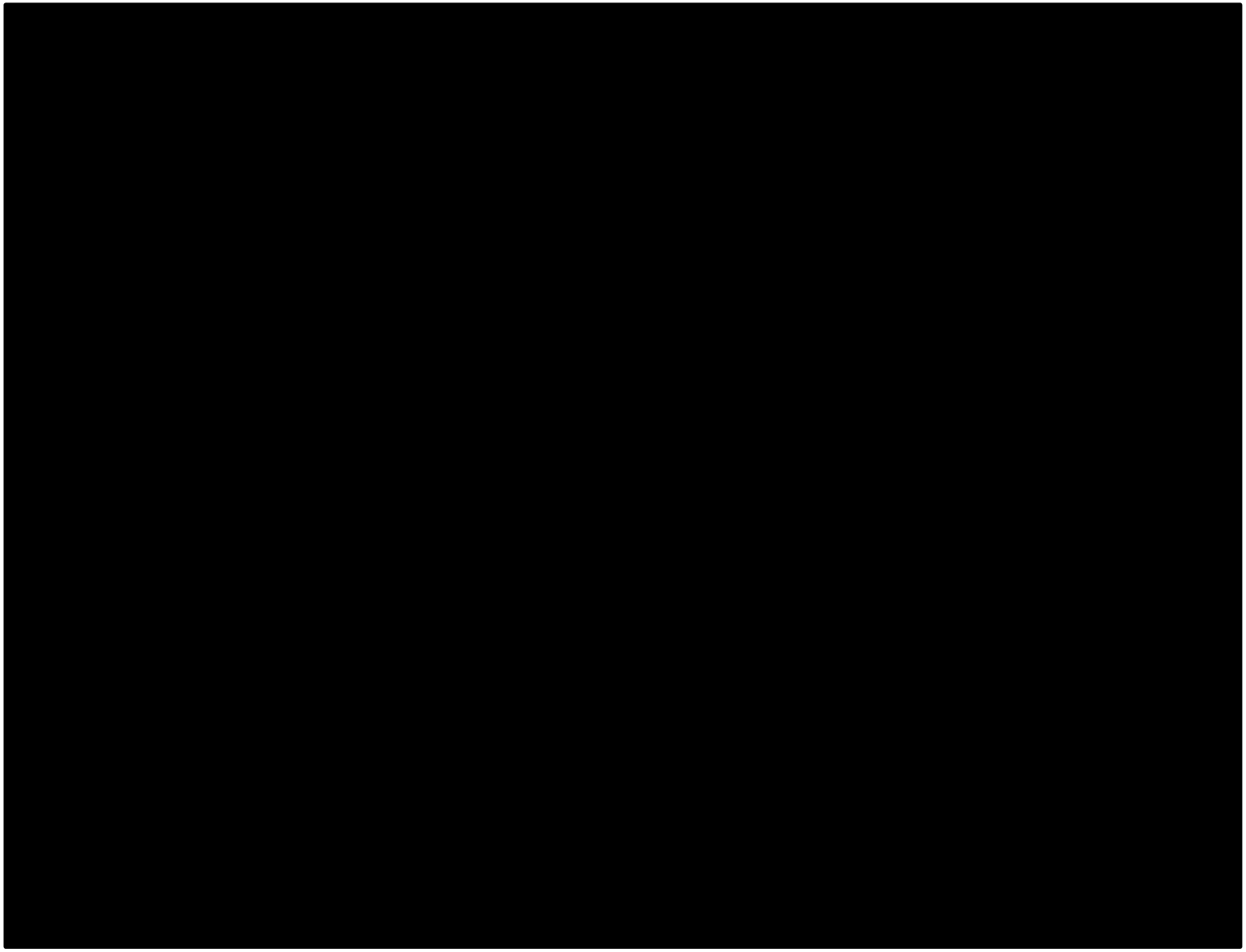

Figure 4: BRP-IF-16 with TNRU14 and extended site boundary

AHIMS Site 45-5-3894 BRP-S-07

Site BRP-S-07 was originally recorded by KNC in 2010 as one chert and one silcrete artefact located at the front of property [redacted]. The site is located on the northern side of Bringelly Road in a small area of exposure, about 15 m long by 15 m wide along a vehicle access track. The landform associated with the site is the upper slope of a gentle north-east running spur. The area is highly modified and disturbed with a road cutting across the surface of the slope. Road base gravels are evident in areas of exposure and the ground surface has been modified.

The artefacts were not relocated during the current survey. There has been a large amount of grass overgrowth resulting in much lower visibility than during the original survey.

Plate 20: location of BRP-S-07

AHIMS Site 45-5-4142 TNRU6

Site TNRU6 was not revisited during the current investigation.

Site TNRU6 was originally recorded by Artefact Heritage in 2011 during the first PACHCI Stage 2 investigation for The Northern Road Stage 2 upgrade (see Figure 5). The site was recorded as comprising two stone artefacts identified within a 15 metre x 15 metre exposure upon a lower hillslope landform. The lower hillslope landform rises gently upwards towards the south-west. The area is relatively undisturbed and has probably been cleared and used for grazing in the past. The site will be subject to archaeological salvage excavation as a condition of an AHIP for The Northern Road Stage 2.

The lower hillslope landform extends across to the eastern side of The Northern Road and also includes sites AHIMS #45-5-4143 (TNRU7), and #45-5-45-5-4144 (TNRU 8). It is likely that these sites, along with AHIMS #45-5-4142 (TNRU6), would have once formed a large site complex which has since been highly disturbed on the eastern side of the road.

AHIMS Site 45-5-4143 TNRU7

Site TNRU7 was not revisited during the current investigation as it is located in a property that was not accessible for the survey team.

Site TNRU7 was originally recorded by Artefact Heritage in 2011 during the first PACHCI Stage 2 investigation for The Northern Road Stage 2 upgrade (see Figure 5). The site consists of seven artefacts scattered across an area of 100 m x 20 m within the front paddock of a small property lot at 1375 The Northern Road, Bringelly. The site is within the study area. A small tributary of Lowes Creek runs 20 m to the north of the property with a gentle slope upwards towards the south.

The site area has recently been graded with topsoil pushed across to form an earthen bank along The Northern Road. The removal of topsoil has exposed subsoil along with artefacts that would have been buried within it. Although this area contained a relatively high number of artefacts the archaeological potential has been compromised by the disturbance of the topsoil.

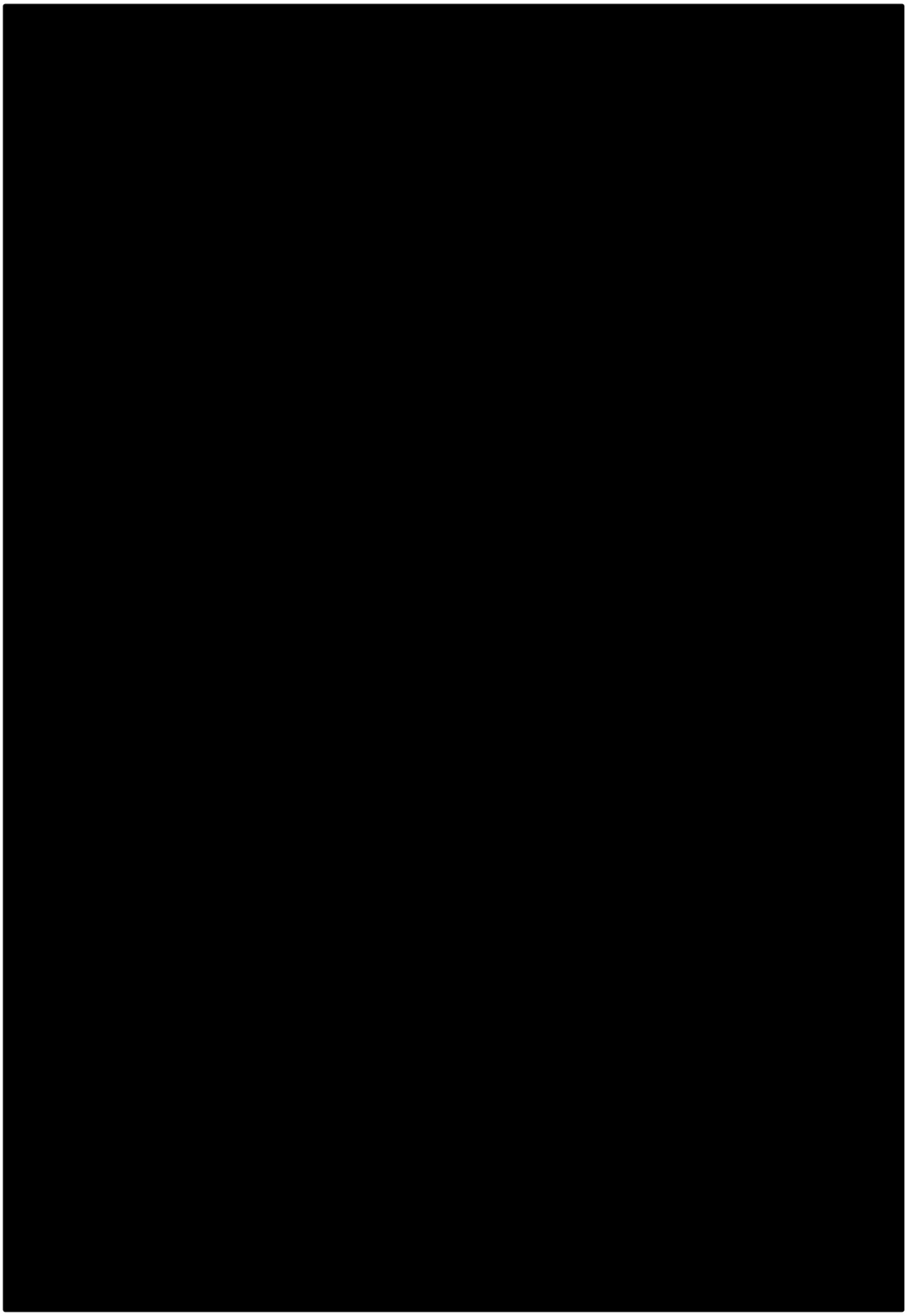

Figure 5: Location of TNRU6 and TNRU7

7.3.2 Newly recorded Potential Archaeological Deposit (PAD)

Two new PADs was identified during the current survey. The areas of potential is summarised below.

TNRB PAD01

TNRB PAD01 is located on a crest landform overlooking a drainage line within the property at [redacted] (Figure 6). The area of potential was identified behind the house and gardens within a cleared field that demonstrates much lower levels of disturbance than the rest of the property. Artefacts have been found in areas of exposure along Bringelly Road to the south and south-east of the PAD indicating the potential for this area to contain intact archaeological deposits and Aboriginal objects.

Plate 21: TNRB PAD01 looking west from PAD towards drainage line

Plate 22: TNRB PAD01, one metre scale

TNRB PAD02

TNRB PAD02 is located on a raised flat landform next to an incised creek line within the property at 30 Robinson Road (Figure 7). The landform appears to be relatively intact with no evidence of ploughing or furrowing. This field observation was also supported by analysis of aerial photography from 1947 until the present. Disturbance appears to be limited to the initial vegetation clearance. A mature gum tree is located within the vicinity of the area of potential. An artefact has been recorded on the wall of the dam in the neighbouring property to the east of the PAD and an artefact scatter has been recorded to the south west of the PAD. This indicates the potential for the area to contain intact archaeological deposits and Aboriginal objects. Note that the western, southern and eastern margins of the PAD are contained to the investigated area. It is likely that PAD02 would extend into neighbouring properties.

Plate 23: View north across TNRB PAD02, note mature gum seen on the left of the image

Plate 24: View east across TNRB PAD02 towards dam in neighbouring property where #45-5-4148

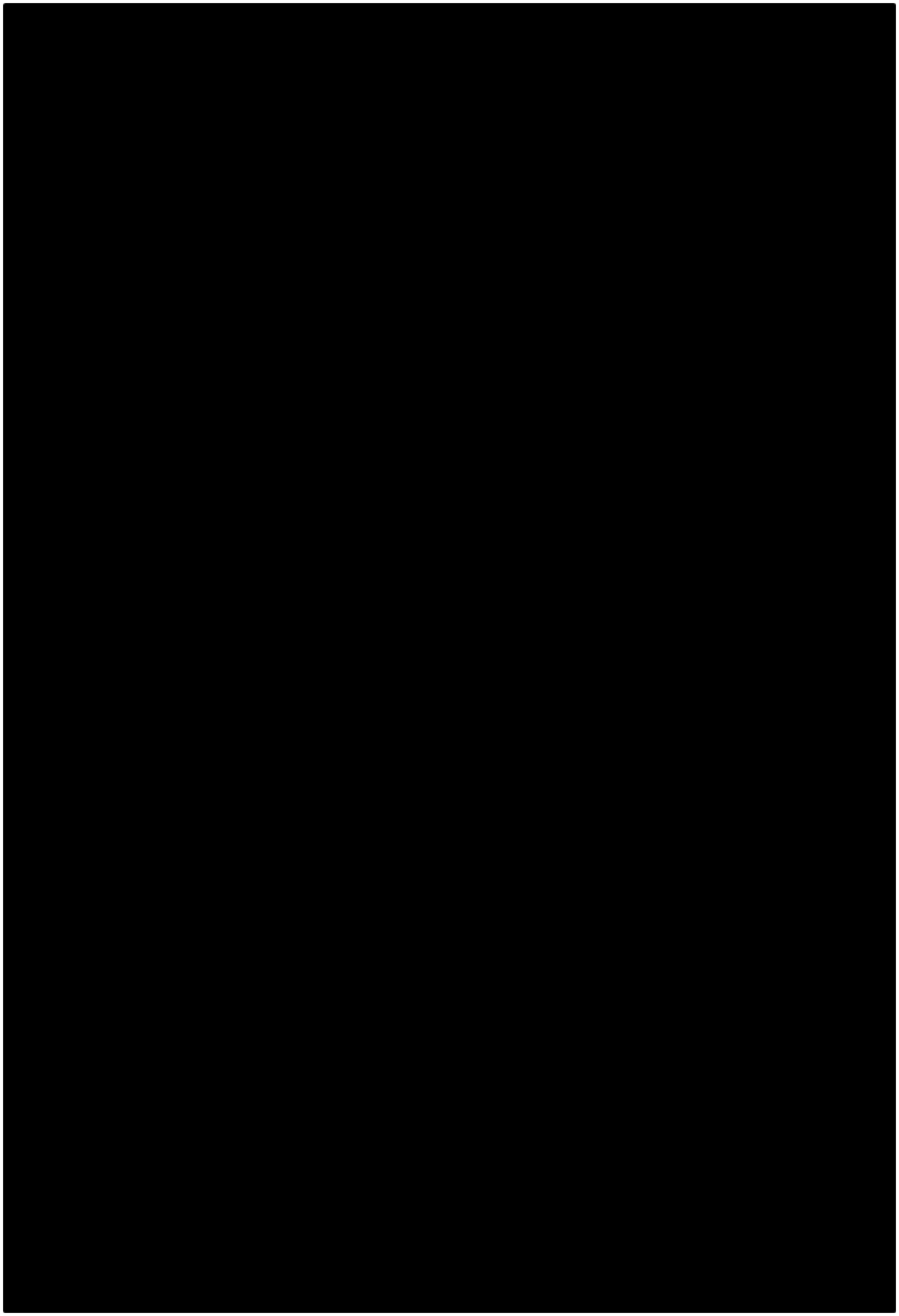

Figure 6: TNRB PAD01

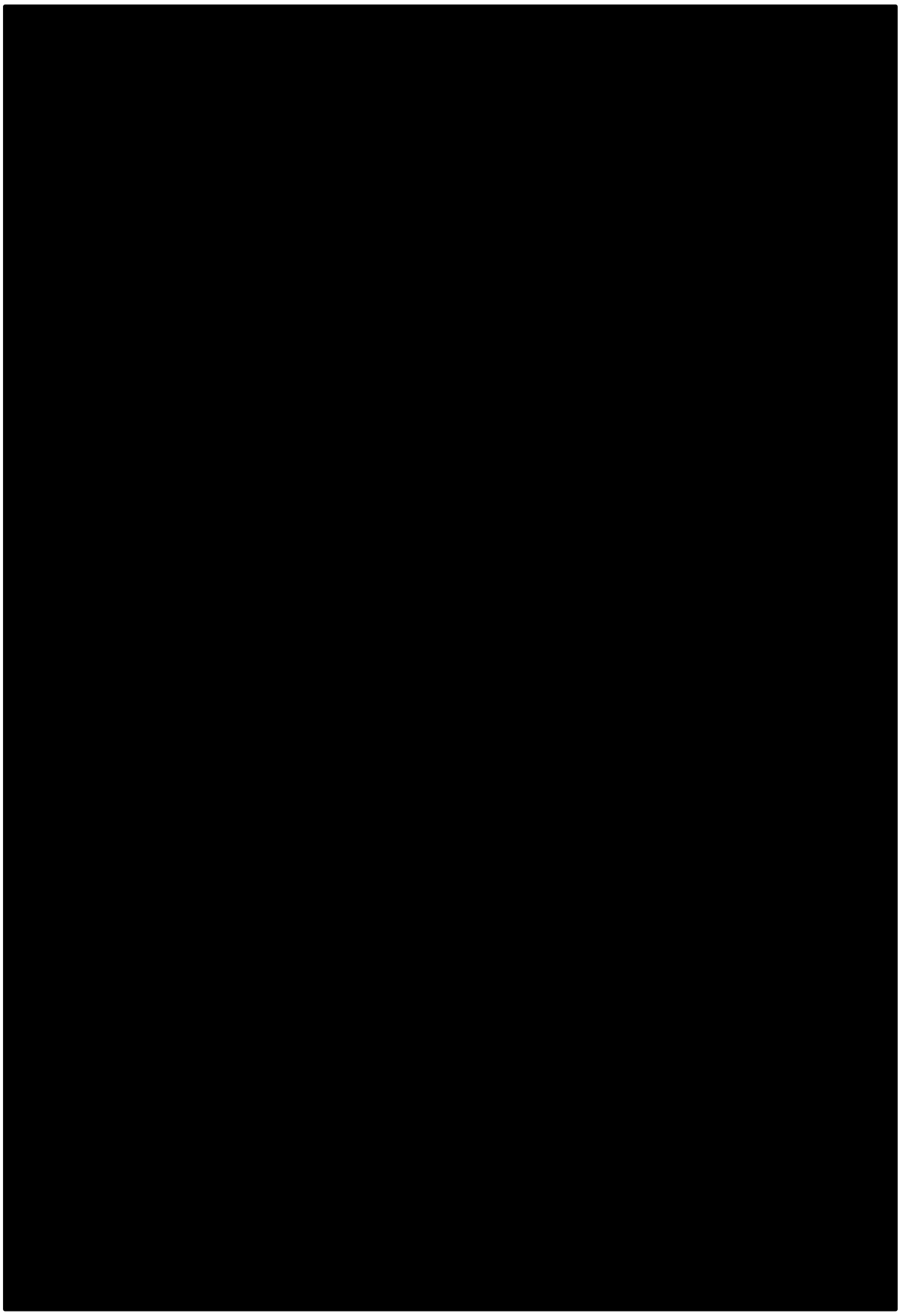

Figure 7: TNRB PAD02

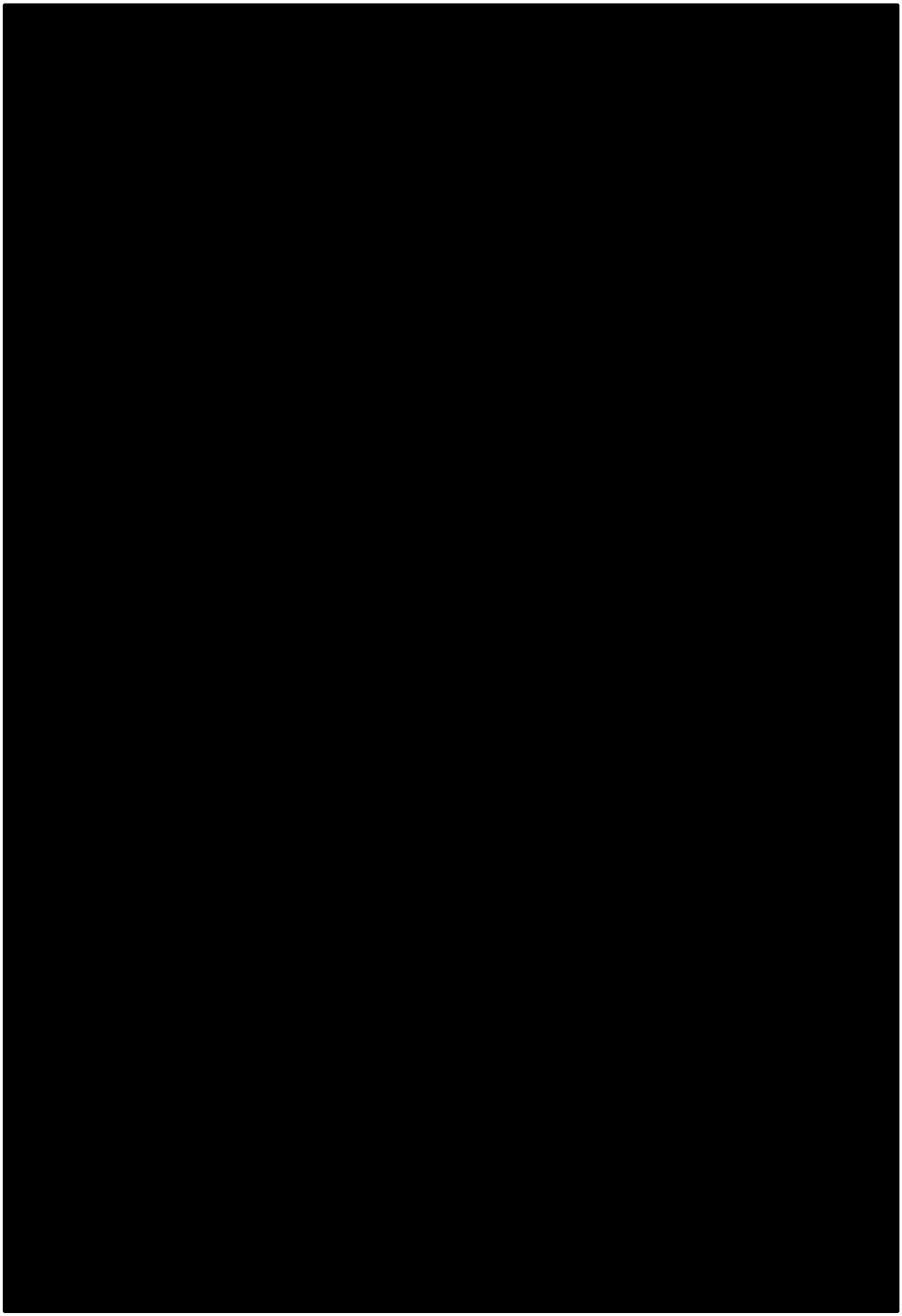

Figure 8: Survey results

8.0 DESKTOP DISCUSSION OF INACCESSIBLE PROPERTIES

A total of ten properties were not accessible for this version of the PACHCI Stage 2 report. Those properties are shown in Figure 9. This section provides a desktop assessment of the likely archaeological potential of those properties based on the observations and findings throughout the remainder of the study area.

Properties A and B Lot 4 and 6 DP712840

Survey of adjacent properties did not identify any Aboriginal objects or areas of archaeological potential. Aerial imagery and adjacent survey observations indicate a large number of regrowth Eucalypts with occasional old growth examples within Property A. The proposal portion of Property B is largely cleared of vegetation.

Based on the findings of adjacent properties, a summary of the archaeological potential of Properties A and B is as follows:

- It is likely that no areas of archaeological potential would be identified within Properties A and B
- Due to the possible presence of old growth Eucalypts, survey would be required to determine if any scarred trees are located in Property A
- Although no surface artefacts were identified in adjacent properties, isolated occurrences of artefacts on the ground surface may be identified in areas of surface exposure.

8.2 Property C ([redacted])

Property C is located approximately 100 metres east of TNRB PAD01 and adjacent to AHIMS site 45-5-3894. The landform associated with Property C generally consists of the eastern slopes of the crest at TRNB PAD01. The majority of the portion of Property C within the proposal site boundary that was not accessed for the current investigation was included in the Bringelly Road PACHCI Stages 2 and 3 investigations. That area is now within the area covered by AHIP C0000436. Only a small portion of Property C that has not been surveyed is within the proposal site boundary, and the results of both the Bringelly Road investigation and neighbouring properties for the current investigation indicate that archaeological potential is likely to be low in that area.

8.3 Property D ([redacted])

Property D is located on the southern side of Bringelly Road. The property is adjacent to Property C and AHIMS site 45-5-3894. The majority of the portion of Property D within the proposal site boundary that was not accessed for the current investigation was included in the Bringelly Road PACHCI Stages 2 and 3 investigations. That area is now within the area covered by AHIP C0000436. Only a small portion of Property D that has not been surveyed is within the proposal site boundary, and the results of both the Bringelly Road investigation and neighbouring properties for the current investigation indicate that archaeological potential is likely to be low in that area.

8.4 Property E ([redacted])

Property E fronts The Northern Road and extends northeast to the southern boundary of Property D. he portion of Property E within the proposal site boundary consists of slope landforms and a narrow

crest landform. The crest landform is associated with a saddle between higher ground to the northwest and southeast. The portion of Property E within the proposal site boundary is relatively narrow and largely cleared of vegetation.

Based on the findings of adjacent properties, a summary of the archaeological potential of Property E is as follows:

- It is likely that no areas of archaeological potential would be identified within Property E.
- Although no surface artefacts were identified in adjacent properties, isolated occurrences of artefacts on the ground surface may be identified in areas of surface exposure.

8.5 Properties F, G and H ([redacted])

Properties F, G and H front The Northern Road (Property F) and Robinson Road (Properties G and H). The portion of the proposal site boundary within each properties largely consists of slope and crest landform contexts. Each property has largely been cleared of vegetation, with some regrowth and the potential for isolated old growth trees. No areas of archaeological potential have been identified in neighbouring properties.

Based on the findings of adjacent properties, a summary of the archaeological potential of Properties F, G and H is as follows:

- It is likely that no areas of archaeological potential would be identified within Properties F, G and H
- Due to the possible presence of isolated old growth Eucalypts, survey would be required to determine if any scarred trees are located in Properties F, G and H
- Although no surface artefacts were identified in adjacent properties, isolated occurrences of artefacts on the ground surface may be identified in areas of surface exposure.

8.6 Properties I and J

Properties I and J front The Northern Road. The northern portion of Property I contains a portion of unnamed watercourse associated with TNRB PAD02 to the north. The area around the watercourse contains a large amount of vegetation, and may possibly contain old growth trees. One area of archaeological potential, TNRB PAD02, has been identified adjacent to Property I.

Property J has largely been cleared of vegetation. One Aboriginal site, TNRU 7, is located within Property I. As discussed in Section 7.3.1, the original site recording notes that the area has been comprehensively disturbed by land-use activities. The surface disturbance was assessed as likely to have compromised any research potential for that area. Although there may be no further research potential in Property I, the presence of site TNRU7 indicates the possibility that further surface artefacts may be identified across the property.

Based on the findings of adjacent properties, a summary of the archaeological potential of Properties I and J is as follows:

- It is likely that the area of archaeological potential associated with TNRB PAD02 extends south into Property I

- Due to the possible presence of isolated old growth Eucalypts, survey would be required to determine if any scarred trees are located Property I
- Although the research potential of Property J appears to have been compromised by surface disturbance, it is likely that further occurrences of surface artefacts may be identified across the property.

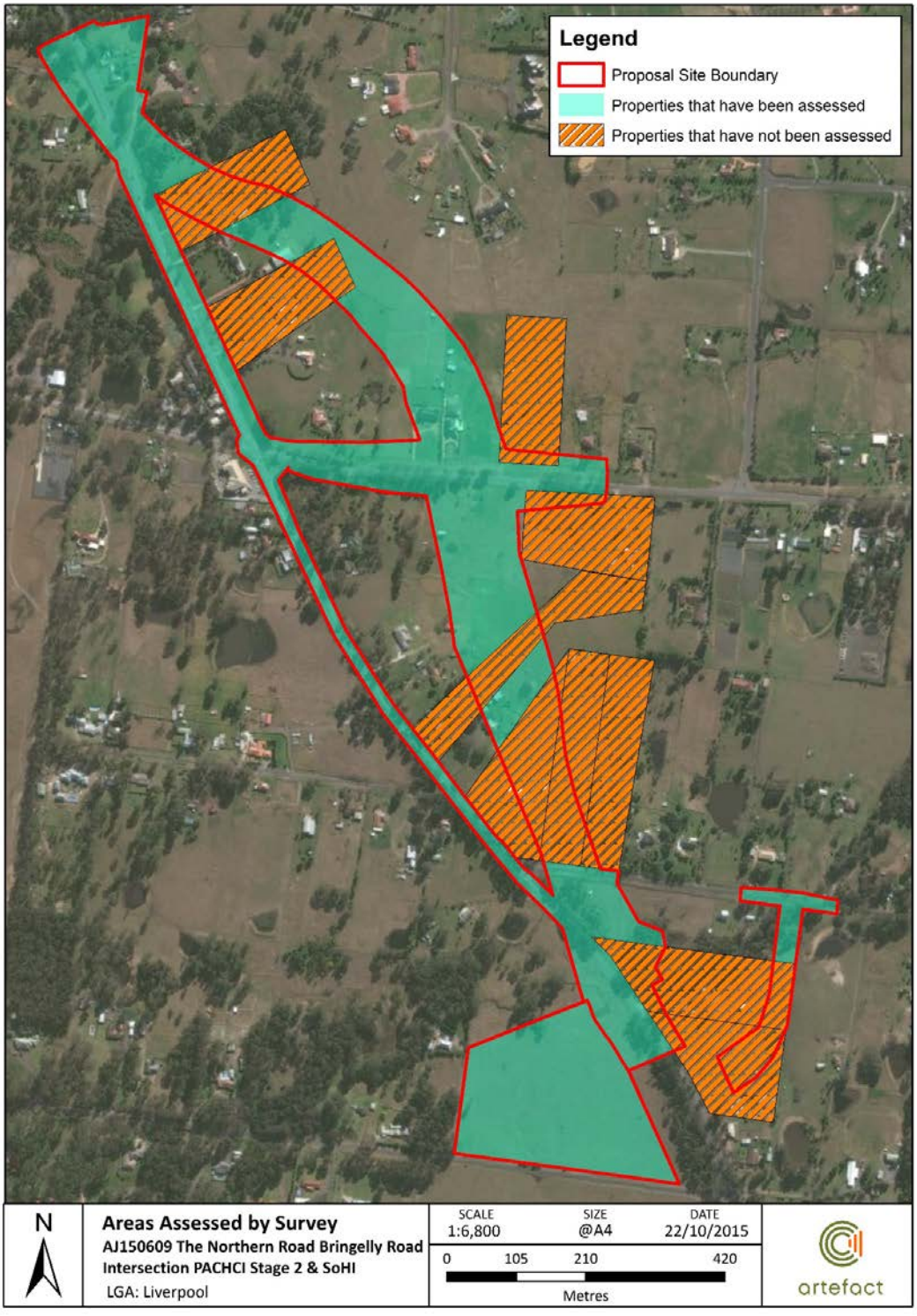

Figure 9: Location of properties not accessed for this investigation

9.0 ANALYSIS AND DISCUSSION

9.1 Disturbance levels

Disturbance has occurred throughout the study area to varying degrees. Areas within The Northern Road and Bringelly Road easements were generally heavily disturbed by the construction and maintenance of the roadways. Areas in which residential and agricultural structures and associated infrastructure have been constructed demonstrate high levels of disturbance.

Areas which have not been impacted significantly since initial land clearing demonstrate high levels of intactness and were generally in good condition. These areas include the central portion of the study area to the north and south of Bringelly Road (excluding the road corridor).

Analysis of aerial photographs from 1947 and 1955 indicate that the subdivision of the majority of the study area occurred after 1955 (Figure 10 and Figure 11). From these images it can be seen that a number of the original drainage lines have since been dammed.

Figure 10: 1947 aerial with study area shown in red

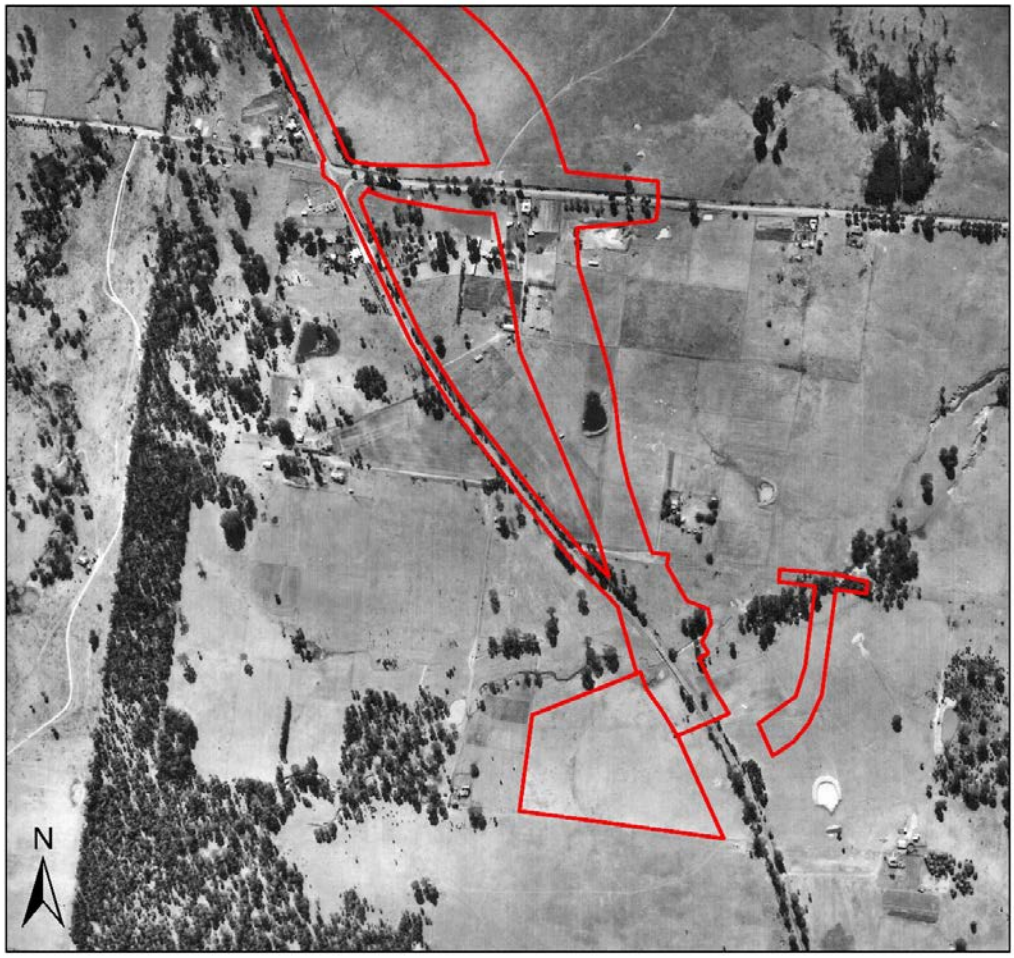

Figure 11: 1955 aerial with study area shown in red

9.2 Analysis of archaeological potential

Archaeological potential is closely related to the levels of ground disturbance in the area. Other factors are also taken into account when assessing archaeological potential, such as whether artefacts were located on the surface, and whether the area is within a sensitive land form unit according to the predictive statements for the area.

Disturbance within the study area was generally limited to areas within the road corridors and where residential and agricultural structures and related infrastructure have been constructed. The central portion of the study area north of Bringelly Road has been disturbed less when compared with the study area south of Bringelly Road.

The predictive model identifies areas of potential based on the landform unit and distance from water. Terraces and slopes within 100 m of water are considered to have a high potential to contain intact deposits and Aboriginal objects. Areas with a good outlook over a valley several hundred metres from water are considered to have moderate potential to contain intact archaeological deposits and Aboriginal objects.

By examining aerial photographs of the area from 1947 to 2015 it is possible to discern that there has been little ground disturbances around the areas of PAD identified in this study. Site BRP-IF-16 and TNRB PAD01 are located within crest landforms overlooking drainage lines. TNRB PAD02 is located on a raised flat landform next to an incised creekline. These PADs would have been close to natural resources and are therefore considered to demonstrate archaeological potential according to the current predictive model.

10.0 SIGNIFICANCE ASSESSMENT

10.1 Assessment criteria

Archaeological significance refers to the archaeological or scientific importance of a landscape, site or area. This is characterised using archaeological criteria such as archaeological research potential, representativeness and rarity of the archaeological resource and potential for educational values. These are outlined below:

- Research potential: does the evidence suggest any potential to contribute to an understanding of the area and/or region and/or state's natural and cultural history?
- Representativeness: how much variability (outside and/or inside the subject area) exists, what is already conserved, how much connectivity is there?
- Rarity: is the subject area important in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practised? Is it in danger of being lost or of exceptional interest?
- Education potential: does the subject area contain teaching sites or sites that might have teaching potential?

Cultural values and significance would be discussed by the Aboriginal groups during ongoing Aboriginal consultation for the project and would be detailed in the Cultural Heritage Assessment Report during Stage 3 of the Roads and Maritime PACHCI.

10.2 Archaeological significance assessment

The archaeological potential of each recorded Aboriginal site and the study area as a whole is closely related to significance values. Areas of archaeological potential have research potential and the potential for Aboriginal objects that are representative of Cumberland Plain archaeology.

Areas of low archaeological potential have limited research potential and rarity values, and are likely to be in disturbed contexts not representative of intact areas on the Cumberland Plain. Also, these areas are not associated with sensitive landforms and are therefore less likely to contain cultural material.

All recorded Aboriginal sites and areas of archaeological potential within the study area have education potential. The distribution and nature of Aboriginal sites and associated heritage values provide important educational values for Aboriginal land-use on the Cumberland Plain.

A summary of the archaeological significance of identified Aboriginal sites and areas of archaeological potential within the study area is outlined in Table 5 and discussed below.

Table 5: Summary of archaeological significance values

Site name	Research Potential	Scientific Value	Representative Value	Rarity Value	Overall archaeological Significance
BRP-IF-16 (#45-5-3886)/ TNRU14 (#45-5-4150)	Moderate	Moderate	Moderate	Low	Moderate
BRP-S-07 (#45-5-3894)	Low	Low	Low	Low	Low
TNRU6	Moderate	Moderate	Moderate	Low	Moderate
TNRU7	Low	Low	Low	Low	Low
TNRB PAD01	Moderate	Moderate	Moderate	Moderate – Low	Moderate – Low*
TNRB PAD02	Moderate	Moderate	Moderate	Moderate – Low	Moderate – Low*

* = likely significance (see text below)

Sites of low archaeological significance

AHIMS site #45-5-3894 and TNRU7 were assessed by KNC (2011: 44) and Artefact Heritage (2012) respectively as demonstrating low archaeological significance based on the disturbed context, low archaeological potential, and relative frequency of the site type in the local area.

Sites of moderate archaeological significance

Sites 45-5-3886/ 45-5-4150 and TNRU 6 were assessed by KNC (2011: 44) and Artefact Heritage (2012) respectively as demonstrating moderate archaeological significance based on the moderate potential for subsurface potential, the generally undisturbed nature of the site, and the ability of the site to add to the corpus of archaeological knowledge for the area. The high frequency of surface artefact site types in the area is indicated in the assessment of low rarity values.

Likely significance of TNRB PAD01 and PAD02

Although it is likely that intact Aboriginal archaeological deposits would be located during testing of TNRB PAD01 and TNRB PAD02, it is likely that these deposits would be similar to other Aboriginal sites recorded in the locality and have a moderate or low archaeological significance. No artefact sites of high archaeological significance were located during investigations for The Northern Road upgrade (Narellan to Bringelly) or the Bringelly Road upgrade (Camden Valley Way to The Northern Rd). TNRB PAD01 is within a similar crest landform to other previously identified sites such as BRP-IF-16 (#45-5-3886) which has been assessed as having moderate archaeological significance. TNRB PAD2 is within a similar landform (raised terrace next to a waterway) to identified sites such as TNRU 6 and TNRU 7 which have been assessed as having a moderate and low archaeological significance respectively.

It is therefore unlikely that TNRB PAD01 and TNRB PAD02 would be found to have high archaeological significance. It is therefore likely that impacts to TNRB PAD01 and TNRB PAD02 could be effectively mitigated through retrieval of information by archaeological excavation.

10.3 Cultural significance

The Aboriginal cultural heritage values associated with the study area will be discussed by Aboriginal stakeholders in their written responses to this report. It is anticipated that written comments will be incorporated into this document when received.

11.0 IMPACT ASSESSMENT

The proposal involves constructing a grade separated interchange about 300 m east of the existing intersection of The Northern Road, Bringelly Road and Greendale Road. The key features of the proposal are shown in Figure 1 and include:

- Widening and upgrading about 400 m of Bringelly Road, between Kelvin Park Drive and Greendale Road, to provide:
  - Two traffic lanes in each direction between Kelvin Park Drive and The Northern Road/Bringelly Road interchange, with wide central medians to allow for a future third traffic lane in each direction
  - Two traffic lanes in each direction on the western side of the interchange, transitioning to one lane in each direction to tie in to Greendale Road
- Constructing a new section of The Northern Road between Robinson Road and Thompsons Creek, to the east of the existing alignment. The new section would be about one kilometre long and about 50 m wide (including embankments), and would include:
  - Two 3.5 m wide traffic lanes in each direction
  - Four metre wide shoulders connecting to the on and off ramps of the interchange, allowing for the future provision of a bus lane
  - An underpass about 60 m long beneath the upgraded section of Bringelly Road
  - 2.5 m wide shoulders along The Northern Road under the interchange for a length of about one kilometre
  - A wide central median to allow construction of a future third traffic lane in each direction
- Providing a new signalised intersection on Bringelly Road over The Northern Road, with turning movements provided in all directions
- Providing dual right turn movements in all directions to and from The Northern Road and Bringelly Road, and dedicated left turn lanes in all directions
- Providing bus service facilities by:
  - Retaining the existing bus stops on the existing alignment of The Northern Road
  - Relocating existing bus stops on Bringelly Road to suit the interchange
  - Providing two new bus stops on The Northern Road northbound and southbound interchange on ramps
  - Providing a bus only lane for buses travelling north and south along The Northern Road at the signalised intersection on Bringelly Road
- Providing three metre wide shared paths for pedestrians and cyclists
- Providing a new connection between Robinson Road and The Northern Road via an extension to the realigned Belmore Road intersection
- Converting the existing section of The Northern Road to a ‘no through road’, providing a cul-de-sac at the southern end near Robinson Road, and a cul-de-sac at Thames Road at the northern end.

On the basis of the 50 per cent concept design all of the AHIMS sites with the exception of TNRU7 and identified PADs within the study area will be impacted to varying degrees. The type, degree and consequence of harm is summarised in Table 6.

The wider site boundaries of sites BRP-IF-16 (#45-5-3886), TNRU14 (#45-5-4150) and TNRU6 (#45-5-4142) extend beyond the 50 per cent concept design footprint and therefore will only be partially impacted by the proposal. The recorded coordinates of BRP-IF-16 (#45-5-3886) and TNRU14 (#45-5-4150) will be directly impacted by the proposal. Sites BRP-S-07 (#45-5-3894), TNRB PAD01 and TNRB PAD02 will be totally impacted by the proposal resulting in a complete loss of value.

Site TNRU7 (#45-5-4143) is located within the proposal site boundary, but is not shown as being impacted by the 50% design. On this basis, although TNRU7 is located within the proposal site boundary, it is assumed that there will be no impact to the site.

Table 6: Summary of impacts

Site	Type of harm	Degree of harm	Consequence of harm
BRP-IF-16 (#45-5-3886)/ TNRU14 (#45-5-4150)	Direct	Partial	Partial loss of value
BRP-S-07 (#45-5-3894)	Direct	Total	Total loss of value
TNRU6 (#45-5-4142)	Direct	Partial	Partial loss of value
TNRU7 (#45-5-4143)	None	None	No loss of value
TNRB PAD01	Direct	Total	Total loss of value
TNRB PAD02	Direct	Total	Total loss of value

Figure 12: Proposed impacts to BRP-IF-16 and TRNU14

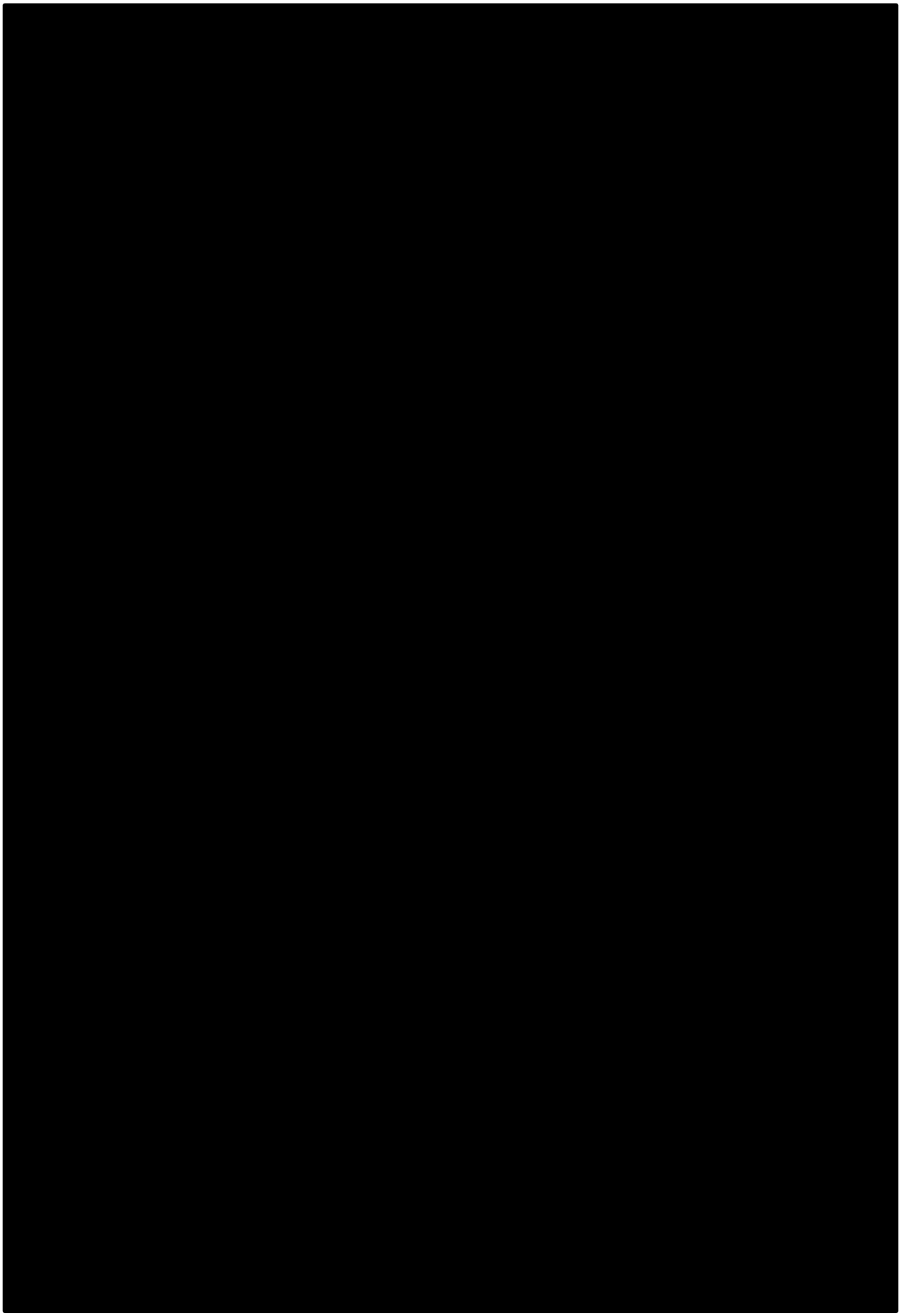

Figure 13: Proposed impacts to TRNU6 and TRNU7

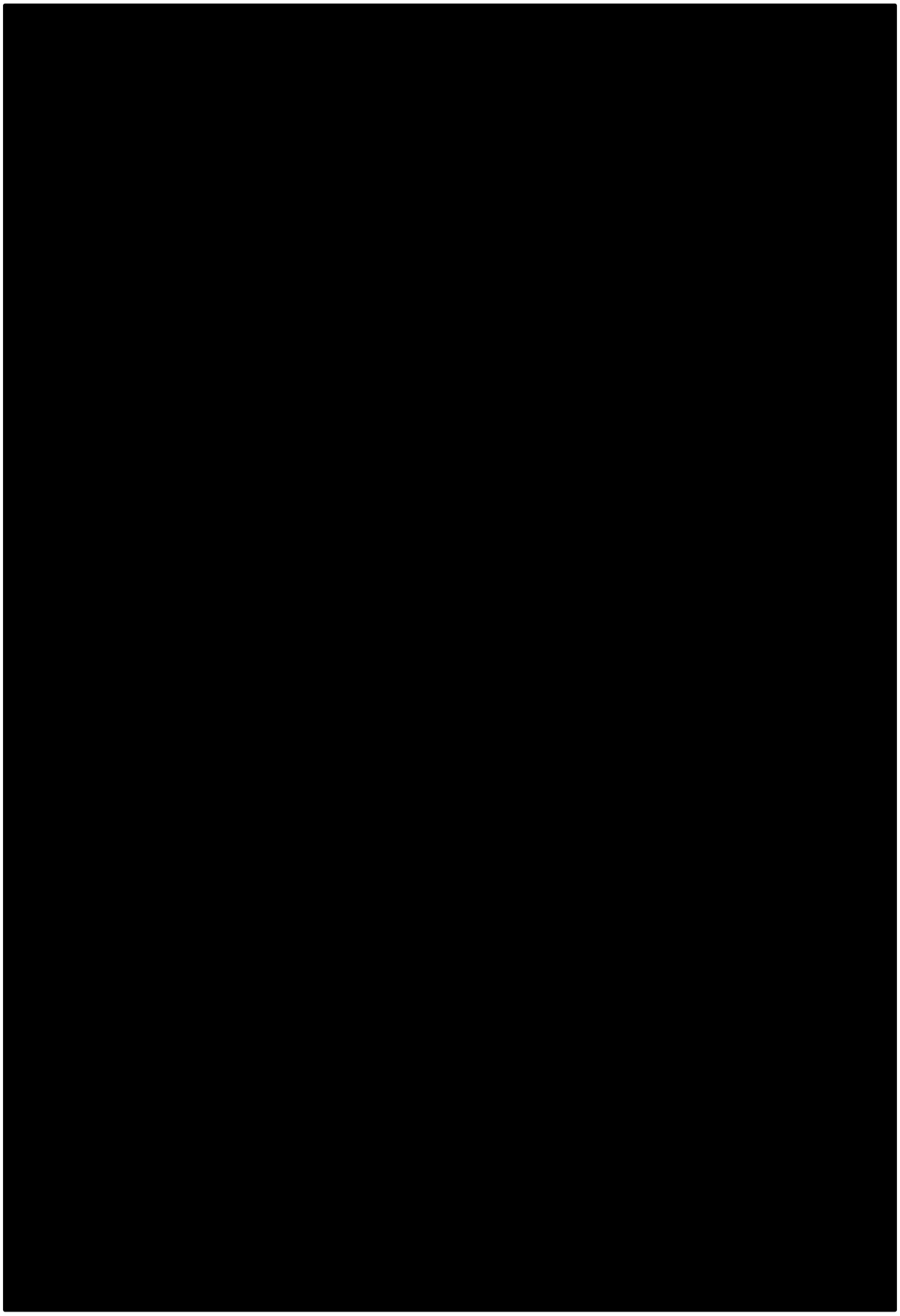

Figure 14: Proposed impacts to BRP-S-07

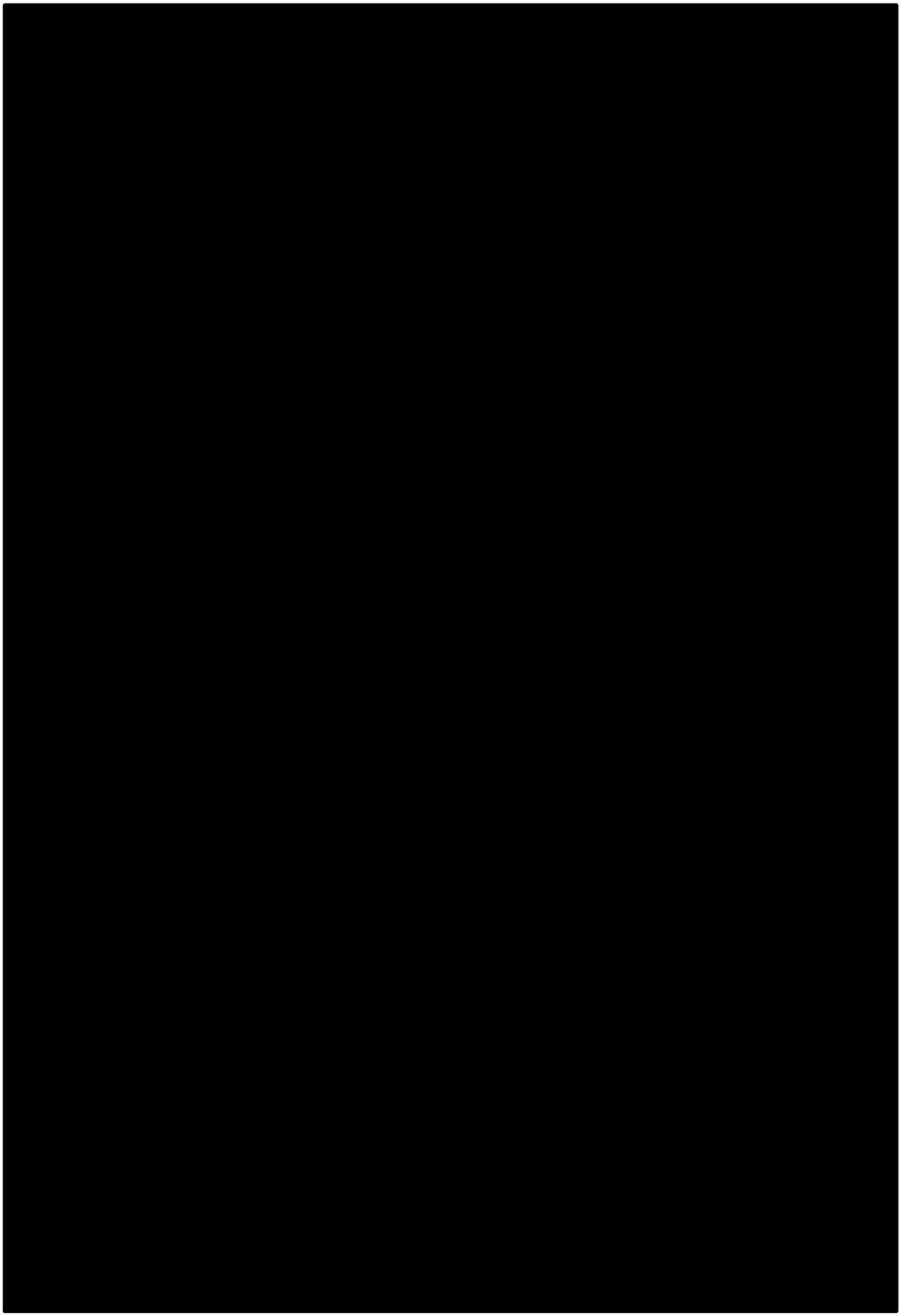

Figure 15: Proposed impacts to TNRB PAD01

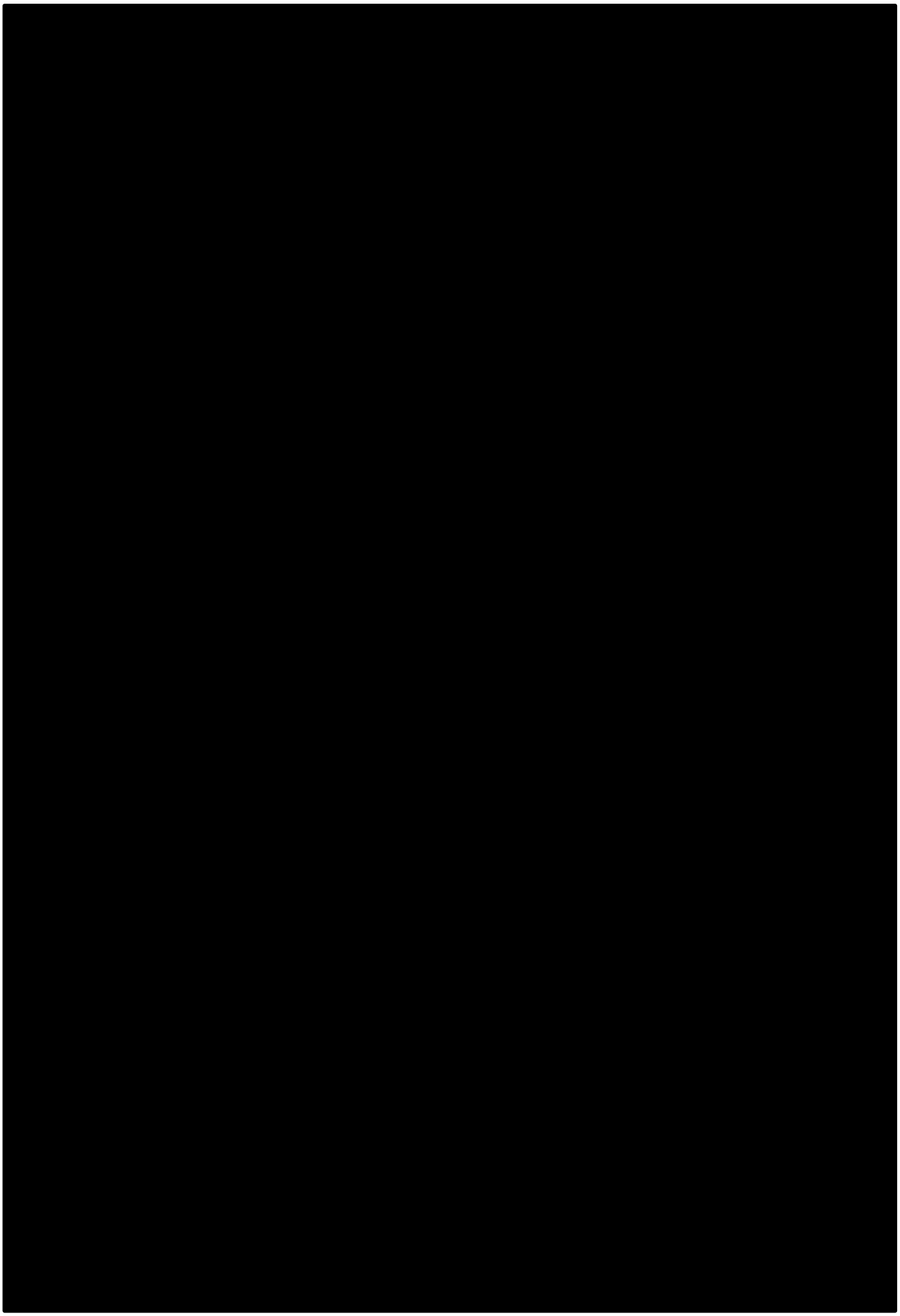

Figure 16: Proposed impacts to TNRB PAD02

12.0 MANAGEMENT AND MITIGATION MEASURES

12.1 Guiding principles

The overall guiding principle for cultural heritage management is that where possible Aboriginal sites should be conserved. If conservation is not practicable, measures should be taken to mitigate against impacts to Aboriginal sites.

The nature of the mitigation measures recommended is based on the assessed significance of the site or sites. The final recommendations in the second REF in mid-September would also be informed by cultural significance, which will be discussed by the Aboriginal community in their responses to the current investigation.

12.2 Mitigation and management measures

The mitigation measures recommended vary depending on the assessment of archaeological significance of the Aboriginal site which is based on its research potential, rarity, representativeness and educational value. In general the significance of a site would involve the following mitigation measures:

- Low archaeological significance – Conservation where possible. An AHIP would be required to impact the site before works can commence.
- Moderate archaeological significance – Conservation where possible. If conservation was not practicable further archaeological investigation would be required such as salvage excavations or surface collection under an AHIP.
- High archaeological significance – Conservation as a priority. An AHIP would be required only if other practical alternatives have been discounted. Conditions of this AHIP would depend on the nature of the site, but may include removal and preservation of scarred trees, or comprehensive salvage excavations.
- Unknown archaeological significance – Conservation where possible. Further investigation under the OEH Code of practice (2010) will be required to assess the extent and significance of the PAD. Test excavation is not a mitigation measure.

Table 7 provides a summary of the consequence of impacts and indicative management and mitigation measures. This information would be updated once the progressed concept design has been integrated into this report and the impact assessment revised.

Table 7: Summary of impacts and mitigation/management measures

Site ID	Site names	Site type	Significance	Consequence of Impact	Mitigation/management measures
#45-5-3886/ 45-5-4150	BRP-IF-16/ TNRU14	Artefact sites	Moderate	Partial loss of value	Salvage as a condition of AHIP C0000436
#45-5-3894	BRP-S-07	Artefact Scatter	Low	Total loss of value	Surface collection as a condition of AHIP C0000436

Site ID	Site names	Site type	Significance	Consequence of Impact	Mitigation/management measures
45-5-4142	TNRU6	Artefact Scatter	Moderate	Partial loss of value	Salvage as a condition of The Northern Road Stage 2 AHIP application currently being processed by OEH
45-5-4143	TNRU7	Artefact Scatter	Low	No loss of value	AHIP required if proposal changes and site is impacted.
N/A	TNRB PAD01	PAD	Likely: moderate - low	Total loss of value	Further investigation under the OEH Code of practice (2010) required
N/A	TNRB PAD02	PAD	Likely: moderate - low	Total loss of vale	Further investigation under the OEH Code of practice (2010) required

12.2.1 AHIMS sites BRP-IF-16 (#45-5-3886)/ TNRU14 (#45-5-4150) and BRP-S-07 (#45-5-3894)

The proposal will impact registered AHIMS sites #45-5-3886/#45-5-4150 and #45-5-3894.

These sites are currently subject to AHIP C0000436 which applies to the Bringelly Road upgrade held by Roads and Maritime. The conditions of the AHIP require salvage excavation of BRP-IF-16/TNRU14 and surface collection at BRP-S-07 prior to impacts at these sites.

Information on what mitigation measures have been conducted subject to AHIP C0000436 at AHIMS sites 45-5-3886, 45-5-4150 and 45-5-3894 was not available when this report was prepared. Roads and Maritime will need to confirm whether mitigation measures specified in AHIP C0000436 have been carried out and may need to seek a variation to AHIP C0000436 where there is an increase in impact to AHIMS sites 45-5-3886, 45-5-4150 and 45-5-3894 from the Bringelly Road proposal.

12.2.2 TNRB PAD01 and TNRB PAD02

PAD TNRB PAD01 and TNRB PAD02 will be impacted by the current proposal resulting in total loss of value.

The archaeological significance of the PADs is at present assessed as likely to be moderate - low. The PADs have been assessed as having moderate archaeological potential. If impacts to the PADs cannot be avoided by the proposal, test excavation under the PACHCI Stage 3 and OEH Code of practice would be undertaken in order to determine whether sub-surface intact archaeological deposits and Aboriginal objects are present in that area. The purpose of these excavations would be to assess the significance of each PAD and not to mitigate against impacts. A test excavation methodology is included in Section 12 of this document.

If both PAD areas are found to be of a low archaeological significance, there would be no Aboriginal heritage constraints on the proposed development in those areas. However, where Aboriginal objects are retrieved during test excavation an AHIP would be required prior to any works commencing. Where no Aboriginal objects are retrieved during test excavation, an AHIP will not be required prior to impacts in that area.

If the PAD areas are confirmed to have moderate archaeological significance it is likely that there would be no constraints on the proposed development in those areas, but that archaeological salvage excavations would be recommended to mitigate against any proposed impacts as a condition of an AHIP. An AHIP would be obtained from OEH prior to works commencing.

If the PAD areas are found to be of high archaeological significance, this would inform future design preparation during Stage 3 of the Roads and Maritime PACHCI regarding future management of the areas, such as conservation where possible. It is therefore important to understand the nature of the buried archaeological deposits within the PAD by archaeological test excavation before further recommendations are made.

12.2.3 TNRU6 (#45-5-4142)

Site TNRU6 (#45-5-4142) would be directly impacted by the proposed works. The impacts would result in partial loss of value for TRNU6. Salvage excavation has been recommended for TRNU6 as a condition of an AHIP currently being processed by OEH in regards to The Northern Road Stage 2 upgrade. Prior to commencement of works for the current proposal, Roads and Maritime will need to confirm that salvage excavation mitigation measures associated with The Northern Road Stage 2 AHIP have been completed.

12.2.4 TNRU7 (#45-5-4143)

Although site TRNU7 (#45-5-4143) is located within the proposal site boundary, the site would not be impacted by the road alignment as shown in the 50% design. Where the proposal changes or ancillary facilities are added that will impact TRNU7, an AHIP will be required prior to impacts taking place.

12.3 Management strategies

A comprehensive discussion of management strategies and processes would be prepared for the Stage 3 CHAR in consultation with Aboriginal stakeholder groups. This discussion would outline procedures for management of unexpected archaeological finds, including human remains, along with processes to manage changes in proposed impacts.

12.3.1 Existing AHIPS within the study area

Roads and Maritime currently hold AHIP C0000436 for the Bringelly Road upgrade. This AHIP carries conditions to be adhered to if sites BRP-IF-16/ TNRU14 (#45-5-3886/#45-5-4150) and BRP-S-07 (#45-5-3894) are to be impacted.

Roads and Maritime have also applied for an area based AHIP in relation to The Northern Road upgrade Stage 2. It is understood that an AHIP has been issued for The Northern Road Stage 2, the area for which is shown in Figure 18. Note that the Bringelly Road AHIP has not been mapped and is not shown in Figure 18.

OEH stipulates that AHIPs cannot overlap in areal extent. An area-based AHIP application for the current proposed works corridor, which would include impacts to AHIMS sites 45-5-3886/45-5-4150, 45-5-4142 and 45-5-3894 and TNRB PAD01 cannot include the area covered by AHIP C0000436 or the area covered by the AHIP for The Northern Road Stage 2 upgrade.

Depending on the timing of The Northern Road and Bringelly Road upgrade works in relation to the proposal, Roads and Maritime may choose:

- To operate works for the proposal under the existing AHIPs in those areas (subject to the conditions of the AHIPs) or
- To relinquish the pending The Northern Road Stage 2 AHIP and current Bringelly Road AHIP (C0000436) and apply for an area based AHIP for current proposal.

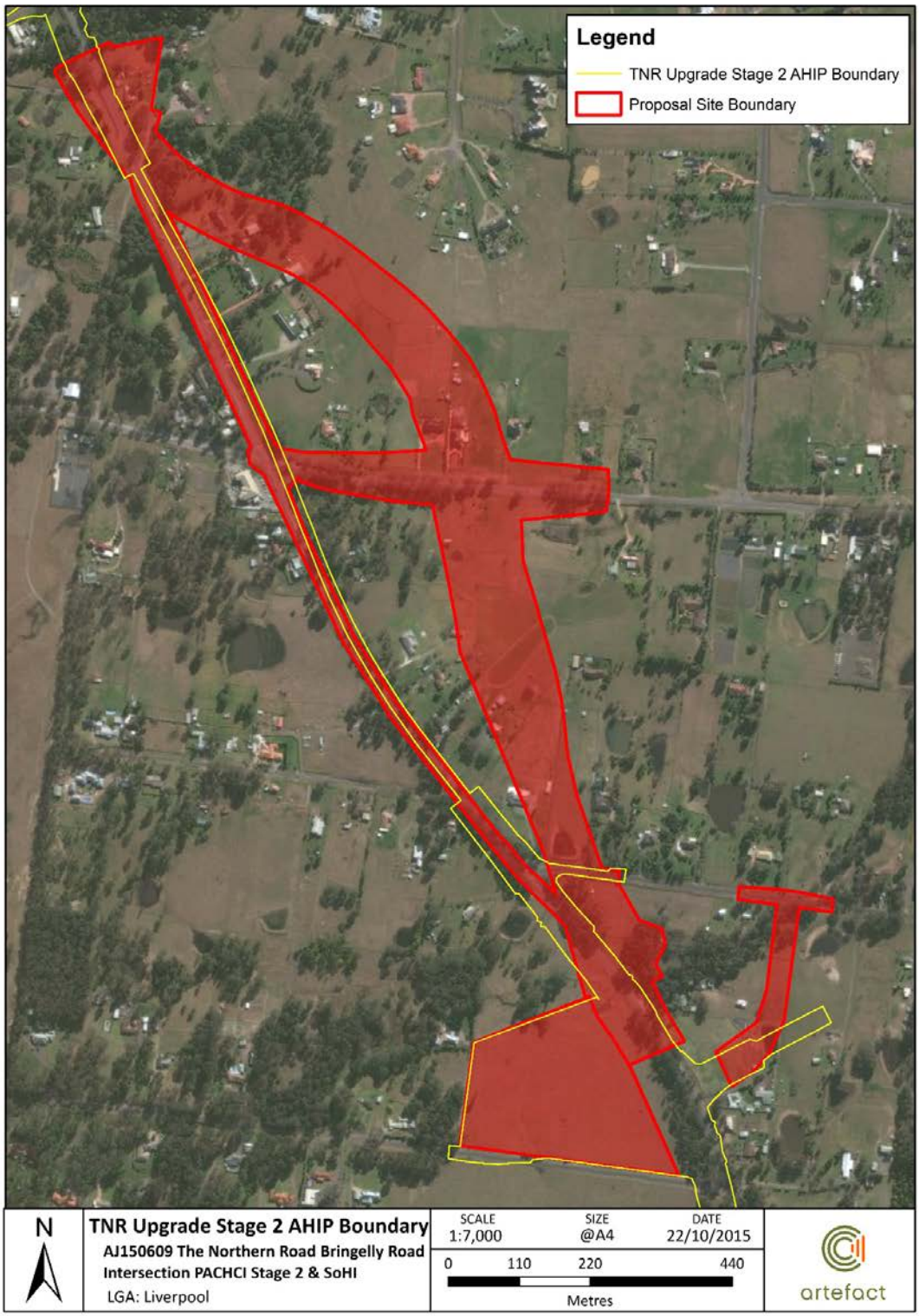

Figure 17: Location of The Northern Road Stage 2 AHIP area (yellow) overlaid with the proposal site boundary

13.0 TEST EXCAVATION METHODOLOGY

13.1 Test Excavation Scope

The scope of this archaeological test excavation methodology is TNRB PAD01 and TNRB PAD02. These areas of potential have been identified during the current PACHCI Stage 2 investigations. The PADs have been recommended for test excavation in accordance with the OEH code of practice.

The aim of this chapter is to outline the proposed methodology for archaeological test excavation of those areas during Stage 3 of the PACHCI.

13.2 Archaeological Test Excavation Guidelines

Archaeological test excavation will be conducted in accordance with the OEH code of practice. The OEH code of practice prescribes guidelines for archaeological test excavation, and outlines the amount of excavation allowed in a particular area, the size of the test pits, and the way in which they are excavated. The code of practice provides a standard methodology which can be used to effectively compare data sets from other sites in the locality and does not require an AHIP.

13.3 Aboriginal Stakeholder Consultation

Comprehensive Aboriginal stakeholder consultation in accordance with the Roads and Maritime PACHCI and the OEH 'Aboriginal cultural heritage consultation requirements for proponents' (2010) is being conducted by Roads and Maritime.

13.4 Areas for Archaeological Test Excavation

The current study has identified two areas of PAD that may be impacted by the proposal, TNRB PAD01 and TNRB PAD02 (see Figure 15 and Figure 16).

13.5 Aims of Test Excavation

The archaeological field survey conducted for the current study observed very low surface visibility across the proposal site. This was largely due to dense grass cover. Due to this low surface visibility in most areas, landform observations and information from previous archaeological investigations were used to inform the selection of areas of PAD.

TNRB PAD01 is located on a crest landform overlooking a drainage line leading down slope towards Thompsons Creek. TNRB PAD02 is located on a raised flat area next to an incised creek line. This PAD is located down slope to the south of TNRB PAD01. The location of these PADs within two contrasting landforms presents the opportunity to further investigate these landforms within the context of the southern Cumberland Plain.

In accordance with the OEH code of practice the aims of archaeological test excavation are:

- To adequately identify the extent of TNRB PAD01 and TNRB PAD02.
- To assess the scientific significance of TNRB PAD01 and TNRB PAD02 following an assessment of the test excavation results.
- To provide an opportunity for registered Aboriginal stakeholders to comment on the Aboriginal cultural heritage values of the site.

- To provide the proponent with recommendations on opportunities to avoid impact and future requirements for further archaeological investigation where required.

13.6 Excavation Methodology

Archaeological test excavation would be conducted at each location with the aim of testing the extent and nature of potential sub-surface Aboriginal objects.

The basis of the test excavation would be hand excavation 50 centimetre x 50 centimetre excavation units. These would be spaced out 15 metres apart on transects laid out generally on a north to south orientation across the PAD. The location of the test pits would be at the discretion of the site supervisor, and may exclude areas that are unsuitable for excavation at the time of testing. This would provide an adequate sample of the site and provide a clear indication to the extent and characteristics of sub-surface archaeological deposit.

The distribution and total number of test pits is a guide only (see Figure 19 and Figure 20) and may include a varying number of pits to that shown at the discretion of the supervising archaeologist in the field. Examples of circumstances that may alter the timing and total number of pits at each location include the depth of deposit, hardness of deposit, any encountered areas of contamination, and access issues.

The OEH code of practice outlines requirements for when enough information has been retrieved and test excavation must cease. Test excavation at each location must cease when (OEH 2010: 28):

- 'Suspected human remains are encountered'
- 'Enough information has been recovered to adequately characterise the objects present with regard to their nature and significance'

'Enough information' is defined by OEH (OEH 2010: 28) as: '…the sample of excavated material clearly and self-evidently demonstrates the deposit's nature and significance, and may include things like:

- Locally or regionally high object density.
- Presence of rare of representative objects.
- Presence of archaeological features or locally or regionally significant deposits, stratified or not.'

The determination of whether there is enough information to stop excavation would be made in the field following discussions between the site supervisor and Aboriginal stakeholder representatives present in the field at that time.

13.6.1 Excavated Area

Under the OEH code of practice guidelines for test excavation, no more than 0.5% of each investigated location can be excavated without an AHIP. A summary of the areal total of each area and proposed total excavation area is outlined in Table 8 below.

Table 8: Proposed total excavated area at each PAD

PAD	Total square metres	Proposed excavation area (metres^2)	Proposed excavated percentage of total area
TNRB PAD01	1708	1.5	0.08
TNRB PAD02	2775	2.5	0.09

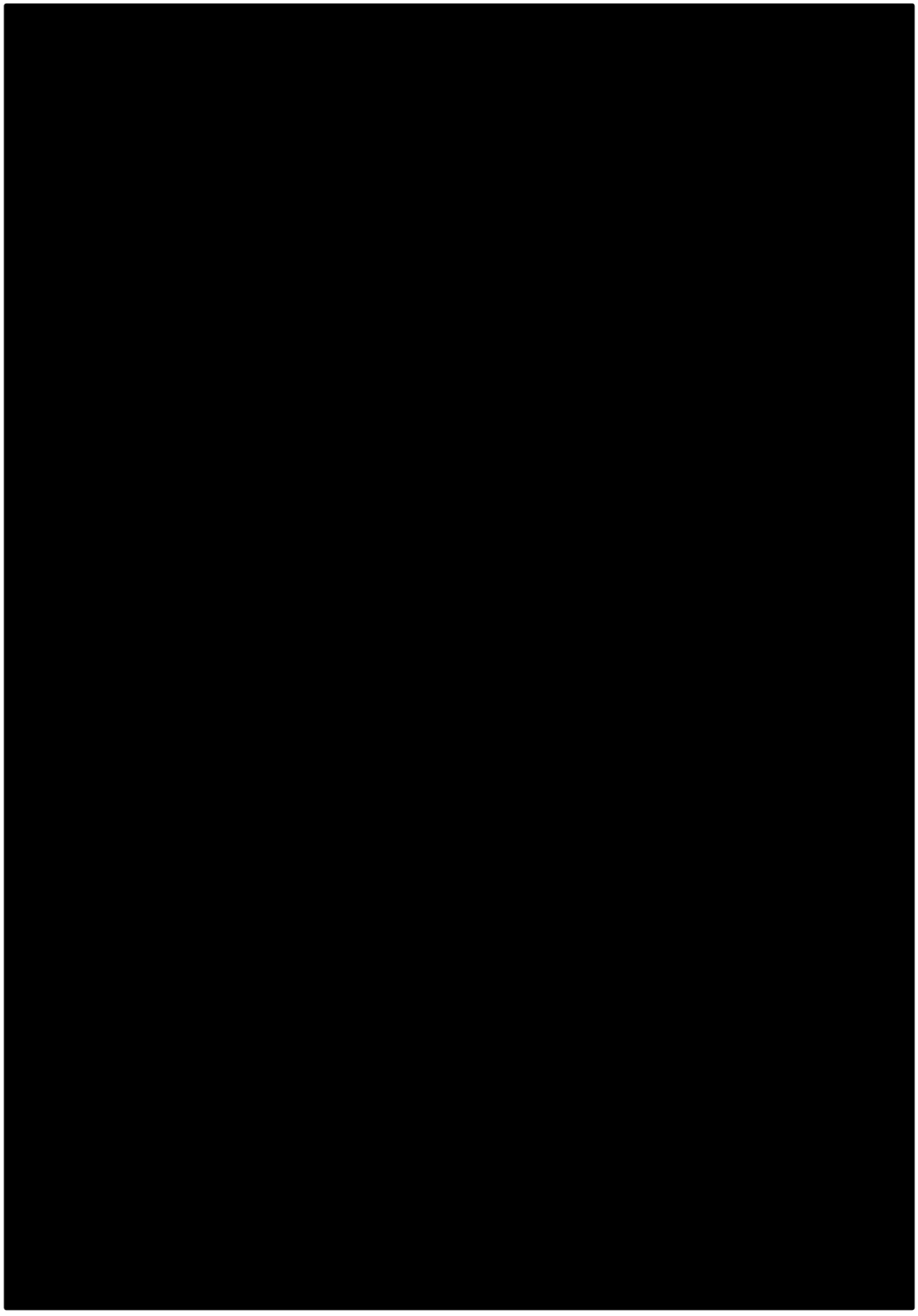

Figure 18: Indicative location and number of test pits at TNRB PAD01

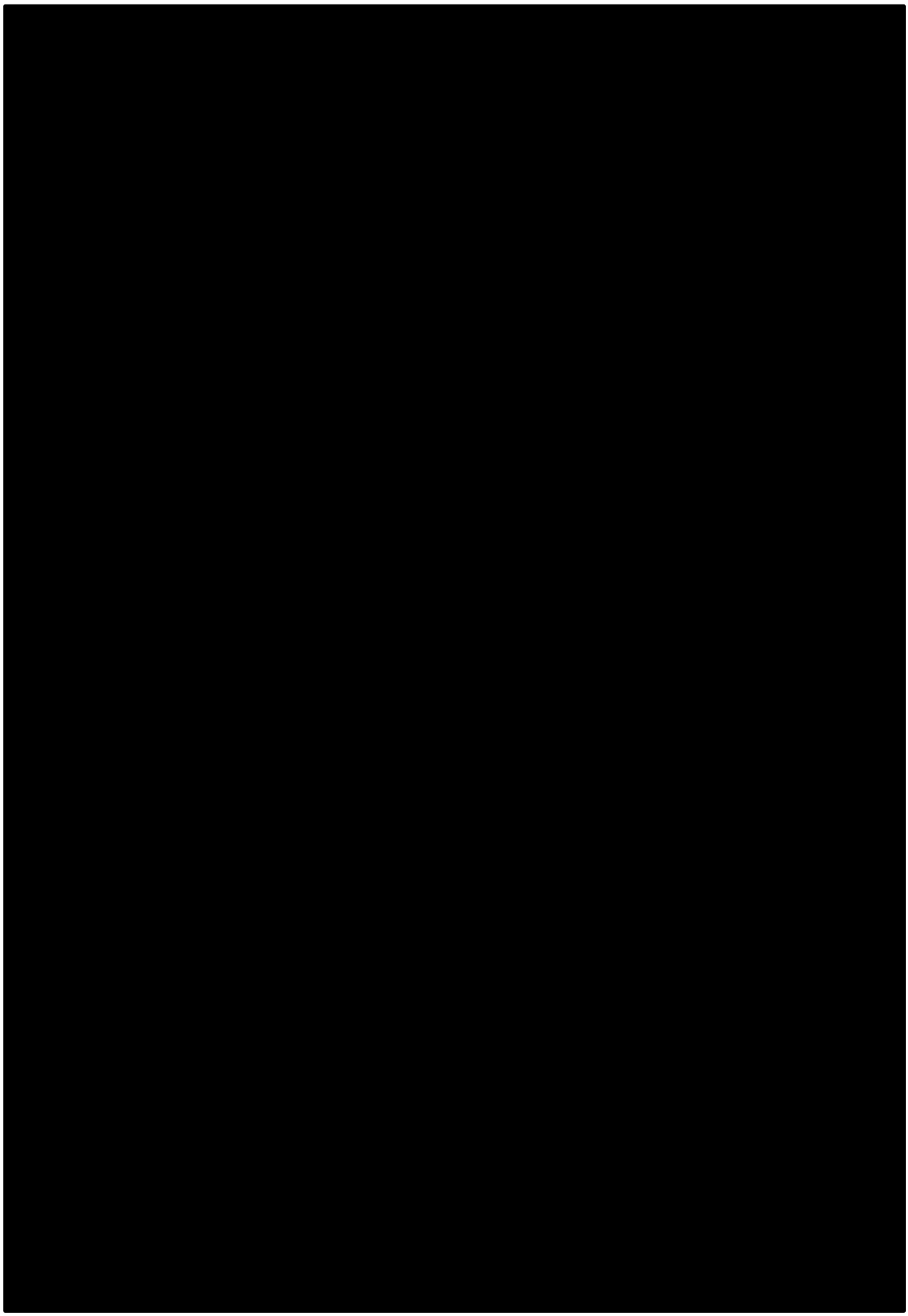

Figure 19: Indicative location and number of test pits at TNRB PAD02

13.6.2 TNRB PAD02 extent

At the time of this report the Stage 2 PACHCI investigations for the proposal have not been completed. The properties to the south of TNRB PAD02 have not been surveyed and it is likely that the PAD extends into these properties. Therefore the total area TNRB PAD02 in Table 8 and the mapped extent in Figure 19 are indicative only and may change following the completion of PACHCI Stage 2 investigations.

13.6.3 Excavation Procedure

Transects and excavation squares would be laid out using long hand-tapes, flags and pegs. An initial baseline would be laid out at each location, and trigonometry used to lay out parallel transects and offset excavation squares. A flag and peg would be placed at each point to be tested, and hand tapes and pegs used to lay out the remaining pegs at each corner of the excavation units. A datum would be established at the first excavation unit on the baseline. The location of each excavation unit would be recorded using a hand-held non-differential GPS, and the magnetic bearing of the first transect recorded using a compass. An arbitrary site grid would be established at the datum.

In accordance with the OEH code of practice, the initial excavation unit would be excavated in 5 centimetre spits. Subsequent excavation units will be excavated in 10 centimetre spits to the base of the artefact bearing deposit. Where time allows and further investigation is required for particular areas, the code of practice allows for excavation units to be combined to open an area no larger than three square metres. The location of small open area excavations at each location would be at the discretion of the supervising archaeologist in consultation with Aboriginal stakeholder representatives in the field.

A context sheet for each excavation unit would be completed in the field. Details recorded will include date of excavation, name of excavators, depth, number of buckets and soil description. Additionally, one representative section wall from each excavation unit will be scale drawn, and photographs will be recorded of each section wall and base.

All retrieved deposit from each excavation unit would be placed in buckets and transported to a sieve area using wheelbarrows. All retrieved deposit would be sieved using nested 5 mm and 3 mm sieves.

All excavation units would be back-filled with clean fill and sieve spoil following the completion of test excavation using a rubber tracked back-hoe or similar plant.

13.6.4 Wet sieving

It is anticipated that all of the excavated soils will be wet sieved as opposed to dry sieving. Wet sieving will involve establishing silt fencing where necessary to stop the flow of sediment loaded water into any neighbouring watercourse. Erection of silt fencing will involve the placement of wooden stakes in the ground at set intervals to support the silt fence.

Management of sieved spoil at each location will be arranged with GHD and Roads and Maritime, and may involve collection of some of that material and back-fill into the excavated pits using a rubber tracked back-hoe or similar plant.

13.6.5 Fencing off open excavation units

Arrangements for the necessity of fencing off open excavation units overnight will be discussed with GHD and Roads and Maritime for each location. Depending on the presence of livestock or public accessibility, marking out open excavation units may require high-visibility fencing around wooden

stakes or metal star pickets. Where there is no livestock or public access, a flag at one corner of the pit may suffice.

13.6.6 Procedure for the discovery of human remains

Under the OEH code of practice and *Roads and Maritime Standard Management Procedure – Unexpected heritage items* (2015) archaeological test excavation must cease when suspected human remains are encountered.

In the situation where human remains or suspected human remains are identified, all work will cease at that location and procedures enacted as outlined in Appendix E of the *Roads and Maritime Standard Management Procedure – Unexpected heritage items* (2015). This includes seeking specialist advice where clarification of the nature of skeletal remains is required, or contacting the NSW Police directly where it is immediately obvious that the remains are human. Where the skeletal material is more than 100 years old and are likely to be Aboriginal remains, OEH must be notified on the Environment Line (131 555) and no further works can proceed in that area until authorisation in writing is provided by OEH.

Hard copies of the *Roads and Maritime Standard Management Procedure – Unexpected heritage items* (2015) and the OEH code of practice will be available in the field throughout the test excavation program.

13.6.7 Aboriginal Objects

All Aboriginal objects retrieved during the course of test excavation would be washed and placed in re-sealable bags for further analysis and recording. Once test excavation has been completed, the artefact assemblage would be recorded and stored as stipulated in the OEH code of practice. This includes recording key attributes of material, artefact type, platform type, termination type and dimensions, as well as photographic and drawn records of representative artefacts. All recorded information would be entered into a Microsoft Excel spreadsheet with detail linked to the provenance of each artefact. Once entered into the Excel spreadsheet, the data can be readily supplied with the test excavation report to OEH and registered Aboriginal stakeholders in both electronic and hard-copy form. In accordance with the PACHCI, Roads and Maritime would provide the test excavation report to registered Aboriginal stakeholders.

All artefacts would be given a unique number and stored in double re-sealable snap lock bags. A permanent marker will be used to record the provenance and unique number of artefacts on the outside of the bag and on an archival grade tag such as Dupont ™ Tyvek ® paper.

All artefacts retrieved during the test excavation program must be reburied as soon as practicable in a manner prescribed by the OEH code of practice. The exact location of reburial would be decided following the completion of the test excavation report and assessment of site extent and scientific significance. The location of the reburied artefacts must be recorded with a hand-held GPS and the coordinates forwarded to OEH on an Aboriginal Heritage Information Management System (AHIMS) site recording form.

Options for long-term management of retrieved Aboriginal objects will be discussed with registered Aboriginal stakeholders during Stage 3 of the PACHCI.

13.7 Reporting on Aboriginal Objects

A report detailing the results of the archaeological test excavation program would be prepared once excavation and artefact recording activities are concluded. The excavation report would be completed to the requirements outlined in the OEH code of practice requirement 11 and Stage 3 of the PACHCI.

The excavation report would provide details on the established extent and scientific significance of each of the investigated PADs and would provide recommendations regarding the necessity of further archaeological investigations.

If an investigated location is assessed as demonstrating low archaeological significance, no further archaeological investigation would be required.

If an investigation location is assessed as demonstrating moderate-high archaeological significance, further archaeological work, such as salvage may be required following completion of PACHCI Stage 3 investigations.

13.7.1 Changes to proposed impacts

Where proposed impacts are revised to encompass other areas of high archaeological potential identified during PACHCI Stage 2 investigations, a separate test excavation methodology and timeframes for stakeholder review as specified in the OEH code of practice and Roads and Maritime PACHCI will be required.

13.7.2 Site recording form and site impact recording form

A site recording form will be submitted to the OEH AHIMS site register where Aboriginal objects are retrieved from any of the investigated PADs. It is not a requirement to submit a site impact recording form for any of the investigated PADs where no Aboriginal objects are retrieved.

14.0 RECOMMENDATIONS

The following recommendations were based on consideration of:

- Statutory requirements under the National Parks and Wildlife Act 1974 as amended.
- The results of the background research, site survey and assessment.
- The interests of the Aboriginal stakeholder groups.
- The likely impacts of the proposed development.

It was found that:

- Ten properties within the study area were not accessible at the time of survey and have not been assessed.
- Five registered AHIMS sites are located within the study area.
- AHIMS site BRP-S-07 (AHIMS site 45-5-3894) was assessed by KNC (2011: 44) as demonstrating low archaeological significance. This site would be impacted in its entirety.
- The site boundary of BRP-IF-16 #45-5-3886 was extended to incorporate TRNU14 (#45-5-4150) by KNC. This was assessed by KNC (2011: 44) as demonstrating moderate archaeological significance. This site would be partially impacted on.
- Site TNRU6 (AHIMS site 45-5-4142) was assessed as demonstrating moderate archaeological significance. The site would be partially impacted on.
- Site TNRU7 was assessed as having low archaeological significance and would not be impacted on.
- Two areas of PAD were identified within the study area. TNRB PAD01 and TNRB PAD02 have been assessed as demonstrating moderate archaeological potential and are likely to demonstrate moderate-low archaeological significance.
- AHIMS site BRP-S-07 is currently subject to AHIP C0000436. A condition of that AHIP is that community collection of artefacts occurs before the site is impacted.
- AHIMS site BRP-IF-16/TRNU14 is currently subject to AHIP C0000436. A condition of the AHIP is that salvage excavation of the site occurs before any impacts.
- AHIMS site TNRU6 is subject to an AHIP application for The Northern Road Stage 2. It is anticipated that a condition of that AHIP will be archaeological salvage excavation.
- The Northern Road Stage 2 Upgrade AHIP area includes portions of the proposal site boundary.

It is therefore recommended that:

- Properties inaccessible at the time of survey should be investigated and incorporated into an addendum PACHCI Stage 2 report.
- Roads and Maritime confirm whether community collection of artefacts has occurred at BRP-S-07 as a condition of AHIP C0000436.

  - Where this has not occurred it will be necessary to conduct community collection of artefacts at BRP-S-07 as a condition of the existing AHIP where the site will be impacted by the proposal.
- Roads and Maritime confirm whether salvage excavation has occurred at BRP-IF-16/TNRU14 as a condition of AHIP C0000436.
  - Where salvage excavation has not occurred, it will be necessary to conduct salvage excavations as part of PACHCI Stage 4 as a condition of the existing AHIP where site BRP-IF-16/TNRU14 will be impacted by the proposal.
- Depending on the staging of The Northern Road upgrade works, Roads and Maritime may need to complete the current proposal under The Northern Roads Stage 2 AHIP in areas where they overlap.
- Prior to works commencing on the current project, Roads and Maritime will need to ensure that the conditions of The Northern Road Stage 2 AHIP have been met for site TNRU6.
- An AHIP will be required if the proposal is changed to include impacts to TNRU7.
- As Aboriginal sites would be impacted by the proposal, Stage 3 PACHCI would be implemented Stage 3 PACHCI tasks would include comprehensive Aboriginal consultation and preparation of a Cultural Heritage Assessment Report (CHAR).
- As newly identified PAD TNRB PAD01 and TNRB PAD02 may be impacted by the proposal, test excavations under the PACHCI Stage 3 and OEH Code of practice would be undertaken within the portions to be impacted. Test excavations would confirm the likely archaeological significance of TNRB PAD01 and PAD02.
- If Aboriginal objects are located at any stage outside areas where test excavations are being undertaken, or outside areas for which an AHIP is granted, work would stop immediately and the *Roads and Maritime Standard Management Procedure – Unexpected heritage items* (2015) would be followed. If human remains are located during any works associated with the project within the study area the *Roads and Maritime Standard Management Procedure – Unexpected heritage items* (2015) would be followed.
- If the project design is changed and areas not surveyed are to be impacted, or other Aboriginal sites not identified are to be impacted, further archaeological assessment would be required.
- No impacts to identified Aboriginal sites may occur without an AHIP. Impacts to PAD would be avoided prior to the test excavation program commencing. This recommendation applies to geotechnical testing.

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artefact

Artefact Heritage

ABN 73 144 973 526
Level 4, Building B
35 Saunders Street
Pyrmont NSW 2009
Australia

+61 2 9518 8411
office@artefact.net.au
www.artefact.net.au