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The Northern Road Upgrade Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park

NSW Environmental Impact Statement /
Commonwealth Draft Environmental Impact Statement

Appendix M – Technical working paper: Aboriginal cultural heritage assessment report

June 2017

THE NORTHERN ROAD UPGRADE
BETWEEN MERSEY ROAD, BRINGELLY AND GLENMORE PARKWAY, GLENMORE PARK

Aboriginal Cultural Heritage Assessment Report

Prepared for Roads and Maritime Services

Penrith and Liverpool Local Government Areas

May 2017

Ref. 1454

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Document Summary

Project Name	The Northern Road Upgrade Between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park Aboriginal Cultural Heritage Assessment Report
Project Number	1454
Revision	0.10
Client Name	Roads and Maritime Services
Recipient	Dexter Isaaks, Roads and Maritime Project Development Officer Lidiya Hudson, Road and Maritime Project Development Manager
Issue Date	08 May 2017
Prepared by	Dr Matthew Kelleher; Mark Rawson; Ben Anderson
Approved by	Dr Matthew Kelleher; Alison Nightingale

Executive Summary

Roads and Maritime Services (Roads and Maritime) is seeking approval to upgrade 16 kilometres of The Northern Road between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park (the project). The proposed upgrade works will be undertaken in stages and are required to improve safety, increase road capacity and cater for expected future traffic growth.

Roads and Maritime engaged Kelleher Nightingale Consulting Pty Ltd (KNC) to prepare an Aboriginal Cultural Heritage Assessment Report (CHAR) for Aboriginal archaeological sites as part of the Environmental Impact Statement (EIS) for the project.

Aboriginal archaeological assessment of the project area found 28 Aboriginal archaeological sites within the project boundary. The sites comprised 23 artefact scatters and five isolated artefacts. The spatial extent of Aboriginal archaeology of the project area was topographically well defined and within scientifically well understood soil matrices, which enabled a clear establishment of the presence and significance of archaeological sites within the project boundaries.

Of the 28 Aboriginal archaeological sites affected, 12 sites would be totally impacted by the proposed works. Design refinement partially reduced the impact to the remaining 16 archaeological sites. All identified sites will at least be partially impacted by the project.

Archaeological and cultural significance of the identified Aboriginal sites is defined by the information exhibited by each site. The range of sites identifies an Aboriginal cultural highway where various activities took place in the past (similar to contemporary roadway and occupation). Aboriginal sites with greater levels of significance offer detailed information about the Aboriginal highway along the ridge and specific meeting spots (like the junction of Elizabeth Drive and The Northern Road). Survey and consultation with Aboriginal stakeholders identified 20 Aboriginal archaeological sites of at least moderate significance. The remaining archaeological sites contained disturbed or low value deposits.

Mitigative salvage excavation would be required for the 20 archaeological sites exhibiting moderate significance, while the remaining eight archaeological sites, exhibiting low levels of significance, require no mitigative action.

A management strategy (heritage management plan) is outlined in the CHAR to: facilitate the preconstruction mitigation plan, enable the transition to construction and then guide ongoing construction program. Aboriginal stakeholders have been consulted regarding the mitigation plan and ongoing heritage management plan to ensure upfront agreement regarding impacts to Aboriginal heritage and appropriate management of Aboriginal heritage.

This CHAR has been prepared in consultation with the registered Aboriginal stakeholders in compliance with the Secretary's Environmental Assessment Requirements (SEARs) for the project, guidelines for a draft public environment impact statement following referral under the *Environment Protection and Biodiversity Conservation Act 1999*, Office of Environment and Heritage requirements and guidelines and the Roads and Maritime *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI).

Project approval is being sought for the entirety of the lands subject to the proposed program of works and specifically for Aboriginal objects associated with sites:

B 6	45-5-2636	Artefact	Moderate	Partial Impact
TNR AFT 06	45-5-4785	Artefact	Moderate	Total Impact
TNR AFT 07	45-5-4784	Artefact	Moderate	Total Impact
TNR AFT 08	45-5-4789	Artefact	Moderate	Partial Impact
TNR AFT 10	45-5-4781	Artefact	Low	Partial Impact
TNR AFT 11	45-5-4780	Artefact	Moderate	Partial Impact
TNR AFT 12	45-5-4778	Artefact	Moderate	Partial Impact
TNR AFT 13	45-5-4779	Artefact	Moderate	Partial Impact
TNR AFT 14	45-5-4786	Artefact	Moderate	Partial Impact
TNR AFT 16	45-5-4796	Artefact	Moderate	Total Impact
TNR AFT 17	45-5-4787	Artefact	Moderate	Total Impact
TNR AFT 19	45-5-4790	Artefact	Moderate	Total Impact
TNR AFT 20	45-5-4792	Artefact	Moderate	Partial Impact
TNR AFT 22	45-5-4793	Artefact	Moderate	Partial Impact
TNR AFT 23	45-5-4794	Artefact	Low	Total Impact
TNR AFT 24	45-5-4795	Artefact	Moderate	Partial Impact
TNR AFT 25	45-5-4791	Artefact	Low	Total Impact
TNR AFT 26	45-5-4798	Artefact	Moderate	Partial Impact
TNR AFT 27	45-5-4799	Artefact	Moderate	Partial Impact
TNR AFT 29	45-5-4801	Artefact	Moderate	Partial Impact

TNR AFT 30	45-5-4797	Artefact	Moderate	Partial Impact
TNR AFT 31	45-5-4802	Artefact	Moderate	Partial Impact
TNR AFT 33	tbc	Artefact	Moderate	Partial Impact
TNR IF 01	45-5-4805	Artefact	Low	Total Impact
TNR IF 02	45-5-4806	Artefact	Low	Total Impact
TNR IF 03	45-5-4807	Artefact	Low	Total Impact
TNR IF 04	45-5-4808	Artefact	Low	Total Impact
TNR IF 05	45-5-4809	Artefact	Low	Total Impact

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Roads and Maritime Services (Roads and Maritime) is seeking approval to upgrade about 16 kilometres of The Northern Road between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park (the project). The proposed upgrade works are required to improve safety, increase road capacity and cater for expected future traffic growth.

Kelleher Nightingale Consulting Pty Ltd (KNC) was engaged by Road and Maritime to prepare an Aboriginal Cultural Heritage Assessment Report (CHAR) for Aboriginal archaeological sites as part of the Environmental Impact Statement (EIS) for the project.

The CHAR has been prepared in accordance with the Secretary of NSW Department of Planning and Environment (the Secretary's Environmental Assessment requirements (SEARs)) issued on 28 July 2015 and amended SEARs issued 9 March 2016, guidelines for a public environment impact statement following referral under the Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act), the Office of Environment and Heritage (OEH) requirements and guidelines and the Roads and Maritime *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Roads and Maritime 2011).

1.1 Location and scope of activity

Roads and Maritime is seeking approval to upgrade 16 km of The Northern Road between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Parkway (the project). The location of the project is shown on Figure 1. The project comprises the following key features:

- A six-lane divided road between Mersey Road, Bringelly and Bradley Street, Glenmore Park (two general traffic lanes and a kerbside bus lane in each direction separated by a wide central median).
- The wide central median would allow for provision of an additional travel lane in each direction in the future, if required.
- An eight-lane divided road between Bradley Street to 100 m south of Glenmore Parkway (three general traffic lanes and a kerbside bus lane in each direction separated by a median).
- About eight kilometres of new road between Mersey Road and just south of the existing Elizabeth Drive, Luddenham, to realign the section of The Northern Road that currently bisects the planned western Sydney airport site and to bypass Luddenham.
- About eight kilometres of upgraded and widened road between the existing Elizabeth Drive and 100 m south of Glenmore Parkway.
- Closure of the existing The Northern Road through the Western Sydney Airport site.
- Tie-in works with the following projects:
  - The Northern Road Upgrade, Peter Brock Drive to Mersey Road (to the south)
  - The Northern Road Upgrade, Glenmore Parkway to Jamison Road (to the north)
- New intersections at:
  - A signalised intersection connecting the existing The Northern Road at the southern boundary of the Western Sydney Airport, incorporating a dedicated u-turn facility on the western side
  - Traffic light intersection for service vehicle access to the Western Sydney Airport, incorporating 160m of new road connection to planned airport boundary
  - Traffic light intersection connecting the new The Northern Road with the existing The Northern Road (west of the new alignment) south of Luddenham
  - An un-signalised (give way controlled) intersection connecting the new The Northern Road with the existing The Northern Road south of Luddenham (east of the new alignment, left in, left out only)
  - A four-way signalised intersection formed from a realigned Elizabeth Drive, the realigned The Northern Road and the existing The Northern Road, north of Luddenham
  - Traffic light intersection at Defence Establishment Orchard Hills entrance, incorporating a u-turn facility
- New traffic signals at four existing intersections:
  - Littlefields Road, Luddenham
  - Kings Hill Road, Mulgoa

  - Chain-O-Ponds Road , Mulgoa
  - Bradley Street, Orchard Hills incorporating a u-turn facility
- Modified intersection arrangements at:
  - Dwyer Road (left in, left out only)
  - Existing Elizabeth Drive (left out only)
  - Gates Road (left in only)
  - Longview Road, Mulgoa (left in, left out only)
  - Grover Crescent south (left in only)
  - Grover Crescent north (left out only)
- Dedicated U-turn facilities at:
  - The existing The Northern Road at Luddenham, southwest of Elizabeth Drive
  - The existing Elizabeth Drive around 800m east of The Northern Road
  - Chain-O-Ponds Road
- Twin bridges over Adams Road, Luddenham
- Local road changes and upgrades, including:
  - Closure of Vicar Park Lane east of the realigned The Northern Road, Luddenham
  - Eaton Road – cul-de-sac west of the realigned The Northern Road, Luddenham
  - Eaton Road – cul-de-sac east of the realigned The Northern Road, Luddenham
  - Elizabeth Drive - cul-de-sac about 300 m east of The Northern Road with a connection to the realigned Elizabeth Drive, Luddenham
  - Extension of Littlefield Road east of The Northern Road, Mulgoa
  - New roundabout on the Littlefields Road extension, Mulgoa
  - A new service road connecting between the Littlefields Road roundabout and Gates Road, including an un-signalised intersection (give way controlled) at Gates Road, Luddenham
  - Extension of Vineyard Road, Mulgoa between Longview Road and Kings Hill Road
  - A new roundabout on the Vineyard Road extension at Kings Hill Road, Mulgoa
- A new shared-path on the western side of The Northern Road and pedestrian paths on the eastern side of The Northern Road, where required
- Drainage infrastructure upgrades
- Operational ancillary facilities including:
  - Heavy vehicle inspection bays for both northbound and southbound traffic, adjacent to Grover Crescent and Longview Road respectively
  - An incident response facility located on the southwestern corner of the proposed four-way signalised intersection at Elizabeth Drive, Luddenham
- New traffic management facilities including variable message signs (VMS)
- Roadside furniture and street lighting
- Utility services relocations
- Changes to property access along The Northern Road (generally left in, left out only)
- Establishment and use of temporary ancillary facilities and access tracks during construction
- Property adjustments as required
- Survey and clearance of undetonated explosive ordinance (UXO) within the Defence Establishment Orchard Hills as required.

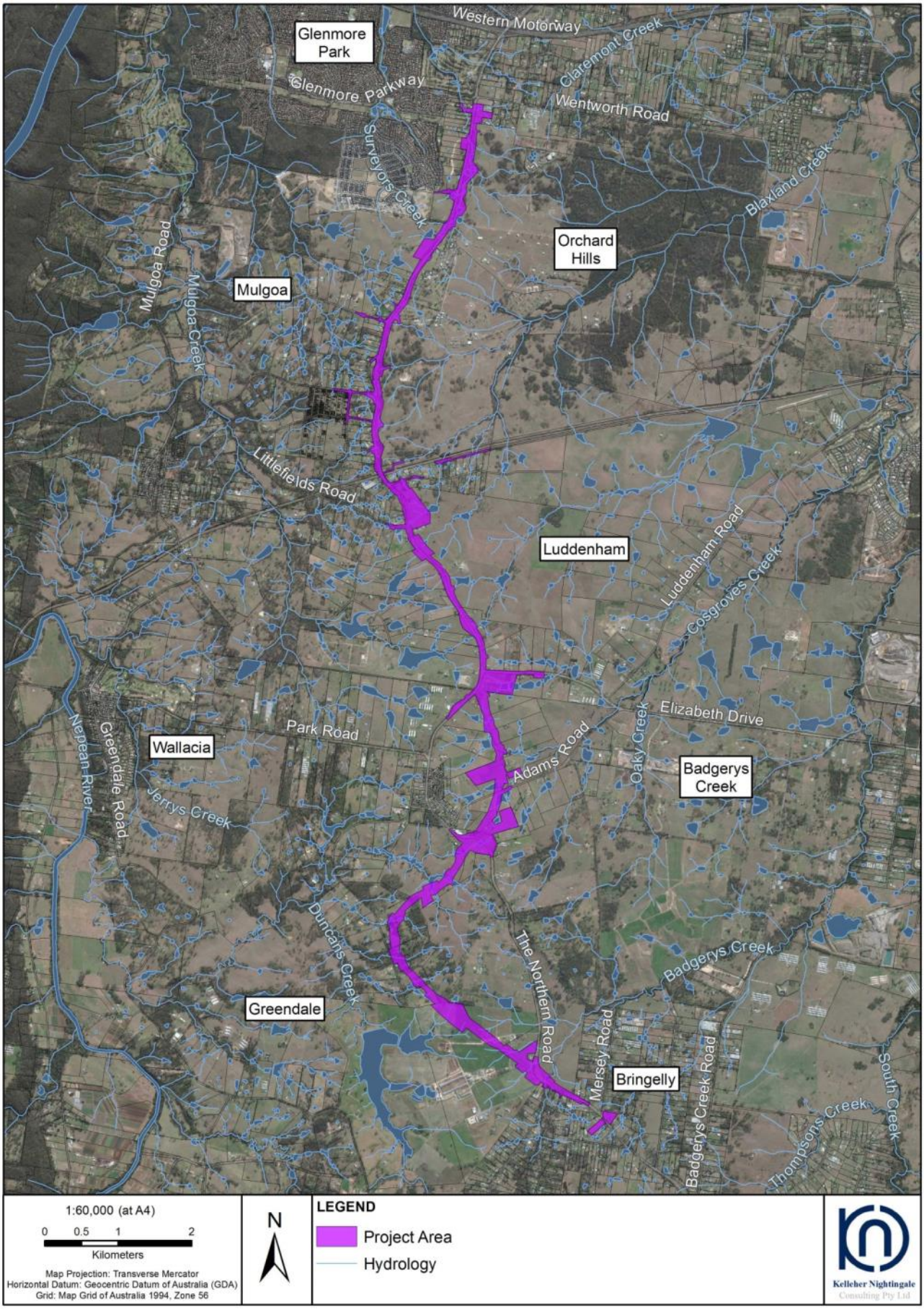

Figure 1. Project area

- Local road changes and upgrades at:
  - New roundabout on Littlefields Road extension
  - Extension of Littlefields Road to Gates Road
  - Extension of Vineyard Road, Orchard Hills between Kings Hill Road and Longview Road
- A new shared-path on the western side of The Northern Road and a pedestrian foot path on the eastern side of The Northern Road
- Upgraded drainage infrastructure
- Operational ancillary facilities including
  - Heavy vehicle inspection bays for both northbound and southbound traffic. The northbound site would be adjacent to Grover Crescent, while the southbound site would be south of Longview Road
  - An incident response facility would be located at the southbound heavy vehicle inspection bay
- New traffic control facilities including variable message signs (VMS)
- Roadside furniture and street lighting
- Utility services relocations
- Changes to property access along The Northern Road (generally left in, left out only)
- Establishment of temporary site compounds during construction.

Approval for the project is being sought under Part 5.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). Accordingly, the project is subject to assessment under Part 5.1 of the EP&A Act and requires the approval of the Minister for Planning. In addition, the proposal was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Minister for the Environment and Heritage. It was determined that an Environmental Impact Statement (EIS) was required. For the purpose of this planning application for the project, Roads and Maritime Services is the proponent.

The project is part of the Western Sydney Infrastructure Plan (WSIP). WSIP involves major road and transport linkages that will capitalise on the economic gains from developing the western Sydney airport site at Badgerys Creek whilst boosting the local economy and liveability of Western Sydney. Additionally, the project would provide better connections for the South West Priority Land Release Area and Western Sydney Priority Growth Area by enhancing the transport corridor through completing the upgrade of The Northern Road.

1.2 Project requirements

This CHAR assessment addresses the Aboriginal heritage requirements identified in the project SEARs. The objectives of the CHAR combine Aboriginal community consultation with an archaeological investigation in accordance with:

- Secretary's requirements;
- EPBC Act assessment requirements;
- RMS PACHCI (RMS 2011);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010);
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011); and
- *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

Aboriginal cultural heritage assessment for the project was designed to meet the SEARs and the EPBC Act. This included:

- assessment of impacts to Aboriginal heritage (both cultural and archaeological significance);
- consultation with Aboriginal communities, including Deerubbin Local Aboriginal Land Council, Gundungarra Local Aboriginal Land Council and registered Aboriginal stakeholders for the project, to assess impacts and develop mitigation measures;
- preparation and consultation of an archaeological assessment methodology. The methodology of assessment was distributed to registered Aboriginal stakeholders, discussed at an Aboriginal focus group meeting resulting in agreement by the stakeholders;
- evaluation of landscape features and potential archaeological significance;
- detailed archaeological assessment of the project to fully identify spatial extent and impacts;
- identification of mitigation and management measures;
- distribution of draft CHAR to Aboriginal stakeholders and an Aboriginal focus group meeting to discuss the CHAR results and agree on appropriate mitigation measures.

Specific requirements of the SEARs and Commonwealth's EPBC Act are outlined in the tables below.

Table 1. SEARs: Aboriginal Heritage

Secretary's Environmental Assessment Requirements	Where addressed in this document
impacts to *Aboriginal heritage* (including cultural and archaeological significance), in particular impacts to Aboriginal objects and potential archaeological deposits (PAD), should be assessed. The assessment shall be undertaken generally consistent with the Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011) and related guidelines and requirements (whilst taking into account s.115ZG of the EP&A Act). Where impacts are identified, the assessment shall:	Section 7 - Impact assessment
o be undertaken by a suitably qualified heritage consultant(s),	Section 1
o demonstrate effective consultation with Aboriginal communities in determining and assessing impacts and developing and selecting options and mitigation measures (including the final proposed measures) generally consistent with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW 2010)	Section 4 Appendix B
o undertake appropriate archaeological investigations generally in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010), to establish the full spatial extent and significance of any archaeological evidence across each site/area of PAD, and include the results of these excavations. If an alternative excavation method is proposed, it shall be developed in consultation with Office of Environment and Heritage,	Section 2 Section 3 Section 6
o assess and document the archaeological and cultural significance of cultural heritage values of affected sites, and	Section 4 Section 6
o detail proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures).	Section 8 Section 9

Table 2. EPBC: Aboriginal Heritage

Commonwealth EPBC Assessment Requirements	Where addressed
Information about indigenous heritage objects and values is to be provided to allow the Minister to make an informed decision on whether or not to approve, under Part 9 of the EPBC Act, the taking of the action for the purposes of each controlling provision. Specific information provided for indigenous heritage includes:	
o (4b) description of the indigenous heritage values of places,	Section 3
o (5d) If the conclusion is made that any relevant controlling provision or element of a relevant controlling provision will not be impacted by the proposed action, then justification must be provided for how this conclusion has been reached. This includes any threatened species or ecological communities that are likely to be present on site, heritage items/places likely to be on site and other relevant elements of the environment that may be impacted by the proposed action.	Section 7
o (5e) To support the assessment of local historic and indigenous heritage values, the EIS must include a full heritage impact assessment and the findings of the further program of archaeological survey that was foreshadowed in the referral for this project.,	Section 3 Section 5 Section 7
o (5g) Impacts to the environment (as defined in section 528) should include but not be limited to the following: removal and degradation of heritage items/places (historic, natural and indigenous);	Section 8 Section 9
o (7a) The EIS must provide details of the likely residual impacts upon a matter protected by a controlling provision after the proposed avoidance and mitigation measures have been taken into account. This includes: a. the reasons why avoidance or mitigation of impacts may not be reasonably achieved; and b. quantification of the extent and scope of significant residual impacts.	Section 7 Section 8 Section 9

Table 2A. EPBC Commonwealth Heritage Management Principles (Schedule 7B)

EPBC Heritage Management Principle:	How the proposal is consistent:
The objective in managing Commonwealth Heritage places is to identify, protect, conserve, present and transmit, to all generations, their Commonwealth Heritage values.	The CHAR identifies (Section 5.1) Aboriginal sites and values, outlines protections, conservation management strategies, and the transmittal of information (via reporting and artefact curation – Sections 7-9).
The management of Commonwealth Heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on their Commonwealth Heritage values.	The CHAR was prepared by a qualified archaeologists and Aboriginal heritage specialists. All heritage assessment and Aboriginal community consultation was in accordance with NSW Office of Environment and Heritage guidelines, Commonwealth EPBC requirements, SEARs and the Roads and Maritime PACHCI (Section 1). Aboriginal community consultation is ongoing for the duration of the project (Section 4 and 9).
The management of Commonwealth Heritage places should respect all heritage values of the place and seek to integrate, where appropriate, any Commonwealth, State, Territory and local government responsibilities for those places.	The management strategy for identified Aboriginal sites (Section 9) was developed with Aboriginal community and represents best practice by collecting heritage objects and cultural knowledge to inform long term management and increase an understanding of Aboriginal culture for current and future generations.
The management of Commonwealth Heritage places should ensure that their use and presentation is consistent with the conservation of their Commonwealth Heritage values.	The management strategy for identified Aboriginal sites (Section 9) was developed with Aboriginal community and represents best practice for conserving Aboriginal heritage information and values.
The management of Commonwealth Heritage places should make timely and appropriate provision for community involvement, especially by people who: (a) have a particular interest in, or associations with, the place; and(b) may be affected by the management of the place;	Aboriginal community have been involved in the identification (Section 3) significance assessment (Section 7) and mitigation (Section 9) for all Aboriginal heritage objects. All management recommendations have been prepared in consultation with the Aboriginal community (Section 4 and Section 9).
Indigenous people are the primary source of information on the value of their heritage and that the active participation of indigenous people in identification, assessment and management is integral to the effective protection of indigenous heritage values.	Consultation with the Aboriginal community regarding the value of heritage objects within the project area was a central feature of the CHAR (Section 4, Section 6 and Section 9) and included an Aboriginal focus group meeting (Appendix B).
The management of Commonwealth Heritage places should provide for regular monitoring, review and reporting on the conservation of Commonwealth Heritage values.	The management strategy for identified Aboriginal sites (Section 9) was developed with Aboriginal community and represents best practice for monitoring, review and report on the conservation of Aboriginal heritage values.

1.3 Summary

Aboriginal archaeological assessment of the project area found 28 Aboriginal archaeological sites within the project boundary. The sites were situated in well-defined topographic and geologic context enabling a clear determination of significance and spatial extent. Sites on elevated ridges were bound by contours separating relatively level ground from erosional gradients, while sites on terraces above waterways were bound by fluvial energy on the edges of creeks and erosional forces at the toe of slope. All sites within the project area relate to transitional or transitory activities and exhibited a moderate or low density of archaeological objects.

Archaeological significance of the identified Aboriginal sites is defined by the information content (as opposed to the number of artefacts) within each site. The range of sites identifies an Aboriginal cultural highway where various activities took place in the past (similar to contemporary roadway and occupation). Aboriginal sites with greater levels of significance offer detailed information about the Aboriginal highway along the ridge and specific meeting spots (like the junction of Elizabeth Drive and The Northern Road). Survey identified 20 Aboriginal archaeological sites of at least moderate significance. The remaining archaeological sites were generally remnant deposits affected by disturbance or erosion.

Recommendations include salvage excavation program prior to construction works for the 20 Aboriginal sites exhibiting moderate significance. A management strategy (heritage management plan) is also outlined to: facilitate the preconstruction mitigation plan, enable the transition to construction and then guide ongoing construction program. Aboriginal stakeholders have been consulted regarding the mitigation plan and ongoing heritage management plan to ensure upfront agreement regarding impacts to Aboriginal heritage and appropriate management of Aboriginal heritage.

2 Landscape Context

2.1 Landform, geology and soils

The project area is located on the Cumberland Plain, a low lying and gently undulating subregion of the Sydney Basin. The Sydney Basin is a large geological feature stretching from Batemans Bay in the south to Newcastle in the north and Lithgow in the west. The formation of the basin began between 250 to 300 million years ago when river deltas gradually replaced the ocean that had extended as far west as Lithgow (Clark and Jones 1991).

The project area traverses a north-south oriented ridge that forms the watershed separating the catchment areas of South Creek in the east and the Nepean River in the west (Figure 2). The ridge is characterised by gentle to moderately inclined slopes with narrow to broad crests and drainage lines. The eastern side of the project area contains several north-east flowing creeks including Badgerys Creek, Cosgroves Creek and Oaky Creek which join South Creek approximately 7 kilometres to the east. On the western side of the project area, several creeks including Duncans Creek and Mulgoa Creek flow north-west to join the Nepean River approximately 4.5 kilometres to the west.

The basal geology of the project area is dominated by Bringelly Shale (Rwb), part of the Late Triassic Wiannamatta Group of shales common to the Cumberland Plain (Figure 3). Bringelly Shale (Rwb) is composed of shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff (Clark and Jones 1991) and underlies the crests, slopes and drainage lines of the majority of the project area. More recent Quaternary Alluvium (Qal) is present along the low lying areas adjacent to Badgerys Creek. Quaternary Alluvium (Qal) comprises fine-grained sand, silt and clay that deposited in association with fluvial activity along the various creek corridors. In the north of the project area, a small deposit of Cranebrook Formation geology (Qpc) is present adjacent to Surveyors Creek. Cranebrook Formation (Qpc) geology is characterised by a basal layer of pebble and cobble clast gravels below sand, silt and clay. The gravels comprise clasts of quartz, quartzite, chert, porphyry, granite, hornfels, sandstone and silcrete. Cranebrook Formation geology contains raw material types that were utilised by past Aboriginal people. Areas where these materials were exposed at the surface, such as within creek channels, are likely to have been exploited by past Aboriginal people.

Three principal soil landscapes are present within the project area. The basal geology is overlain by South Creek soils within the immediate vicinity of major creeks, transitioning to Blacktown soils on crests and low rises and Luddenham soils on hills and ridge slopes (Figure 4). The alluvial South Creek soil landscape is characterised by flat landforms with incised channels that are subject to frequent episodes of inundation, erosion and aggradation. The landscape contains deep structured loams and clays overlying bedrock or relict soils. The South Creek soil landscape may retain archaeological deposit but due to its location on active floodplains, integrity of deposit may be compromised due to repeated episodes of erosion and deposition caused by fluvial activity.

The residual Blacktown soil landscape is located on gently undulating rises with broad rounded ridges and crests with gently inclined concave slopes. The landscape is characterised by shallow to moderately deep red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and drainage lines. Erosional susceptibility of this soil landscape is relatively low, but is increased where surface vegetation is not maintained (Bannerman, Hazleton, and Tille 1990). Blacktown soils are conducive to artefact survivability, however their acid chemistry quickly removes organics and their deflationary tendency often results in a temporal collapse, where archaeological objects from multiple time periods accumulated within a single cultural soil layer.

The erosional Luddenham soil landscape is situated on low rolling to steep hills with narrow convex ridges and crests, moderately inclined slopes and narrow drainage lines. The landscape comprises shallow dark podzolic soils or massive earthy clays on crests, moderately deep red podzolic soils on upper slopes and moderately deep yellow podzolic soils and prairie soils on lower slopes and drainage lines. The Luddenham soil landscape has a high erosional susceptibility with moderate surface movement potential. The steeper hill slopes of the Luddenham Soil Landscapes are subject to minor gully erosion and moderate sheet erosion in areas that have been stripped of vegetation. Aboriginal sites within these areas are likely to be disturbed low density scatters exposed by the eroding landscape. However, landforms and vegetation that create stability for the soil landscape could have preserved Aboriginal sites. The landforms associated with this soil landscape are generally the furthest away from water sources and associated resources. It is therefore likely that these areas were utilised in a different way to other landforms in the project area.

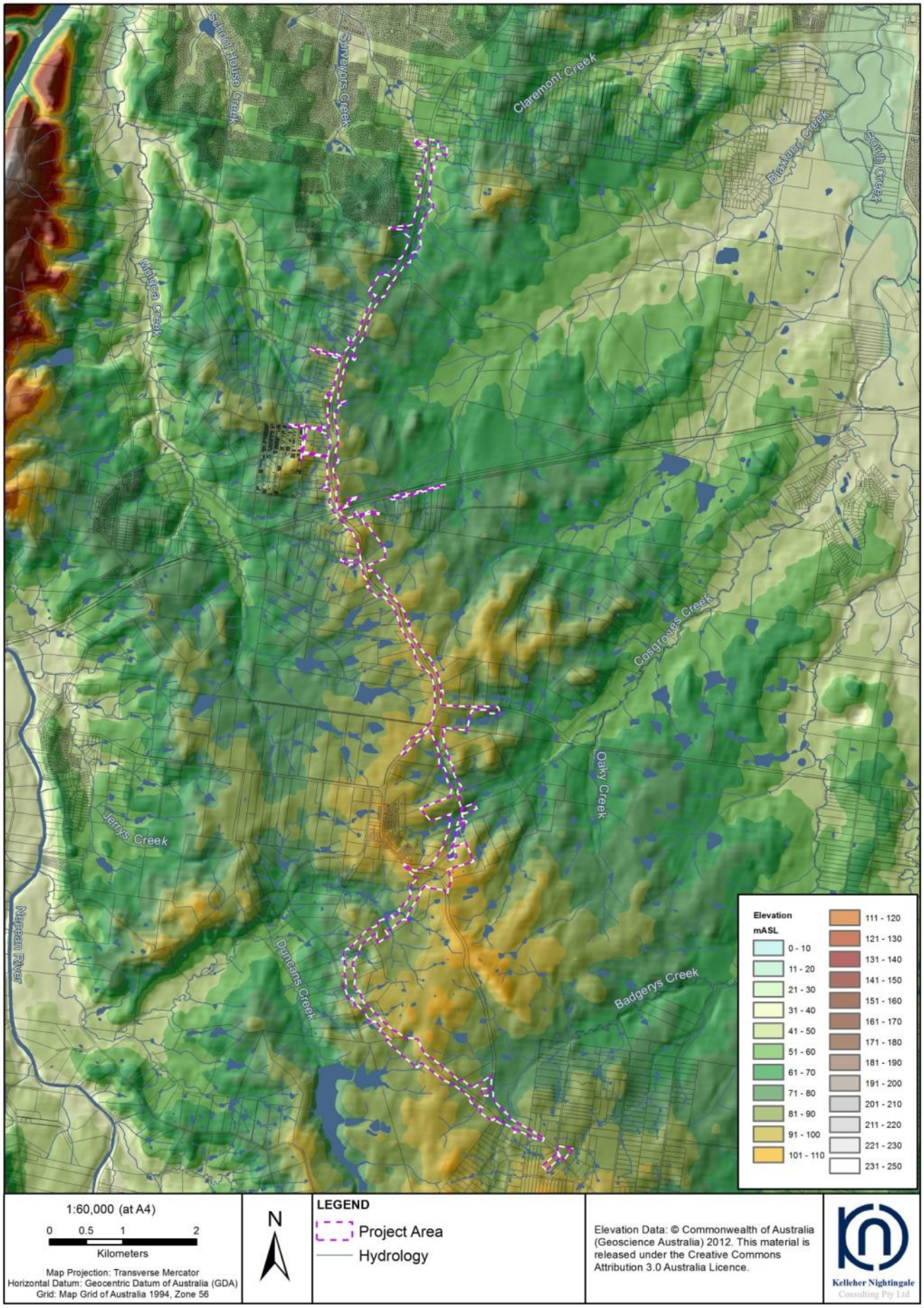

Figure 2. Landforms of the project area

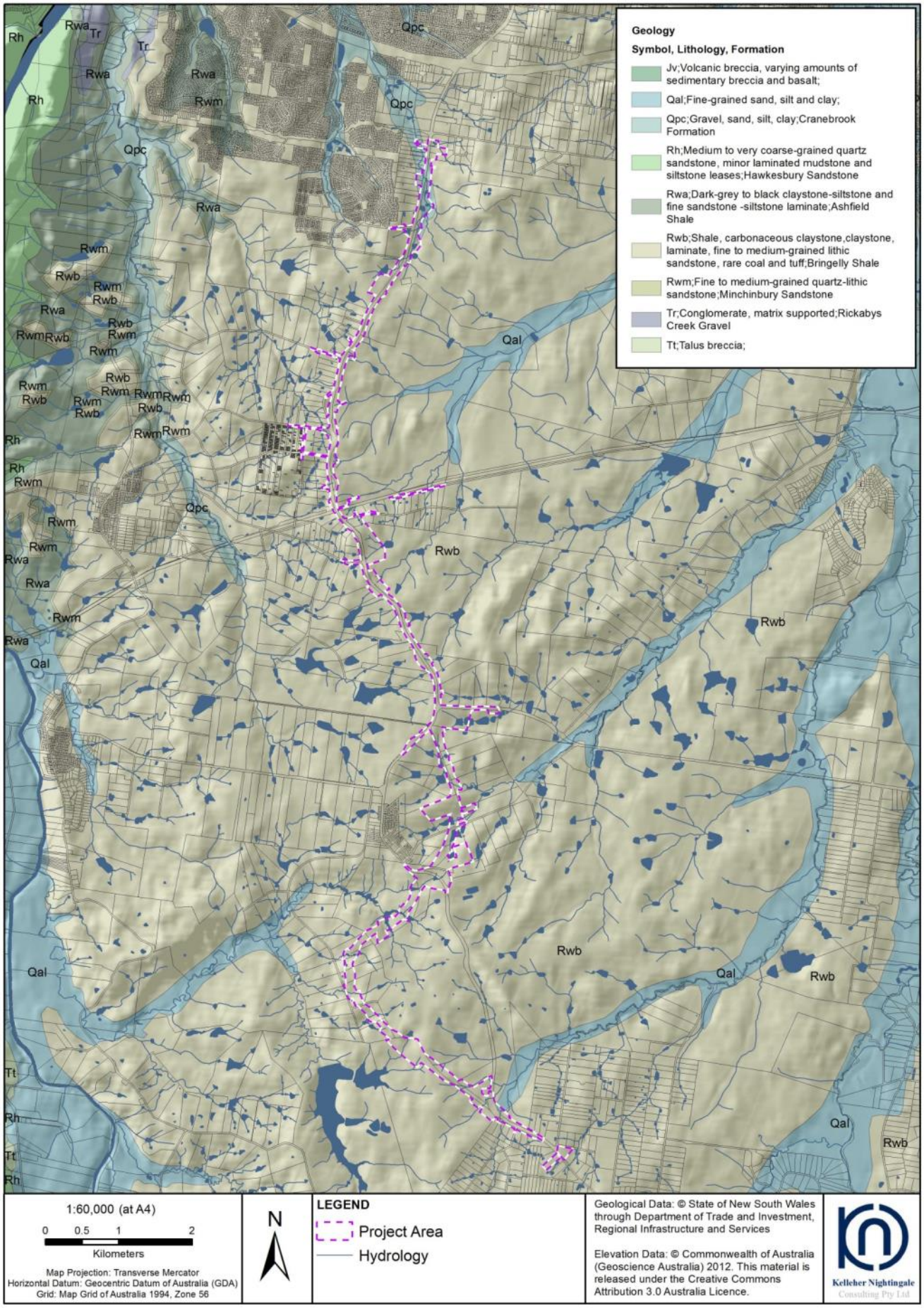

Figure 3. Geology of the project area

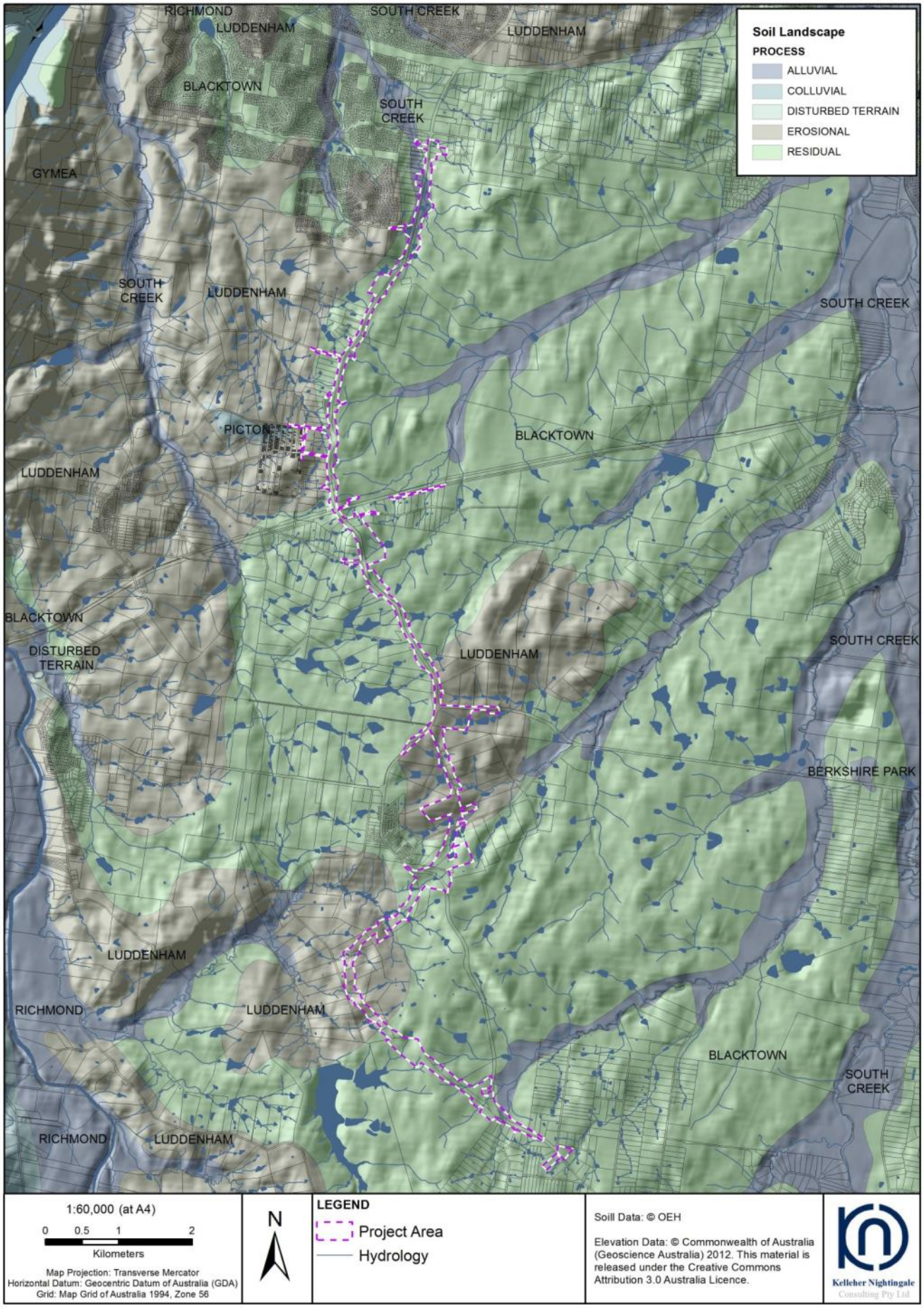

Figure 4. Soil landscapes of the project area

2.2 Vegetation and landuse history

The distribution of native vegetation within the project area has been affected by historic and contemporary European landuse practices in the region. Prior to 1788, a mixture of native vegetation communities would have extended across the entirety of the Cumberland Plain with distribution determined by a combination of factors including soil, terrain and climate. The clearance of native vegetation across the majority of the project area by European settlers has left only small areas of native vegetation. These areas are classified as Shale Plains Woodlands, Shale Hills Woodland and Alluvial Woodland.

Shale Plains Woodland is the most widely distributed native vegetation community on the Cumberland Plain and generally occurs on flat to gently sloping terrain and low elevation with soils derived from Wianamatta Shale or well drained Holocene Alluvium geology. Shale Plains Woodland is characterised by a canopy dominated by *Eucalyptus moluccana* (grey box) *and E. tereticornis* (forest red gum), a shrub stratum dominated by *Bursaria spinose* (blackthorn) and a ground stratum comprising a mixture of grasses.

Shale Hills Woodland generally occurs on higher elevations and steeper terrain than Shale Plains Woodland with soils derived from Wianamatta Shale geology. Shale Hills Woodland is characterised by a canopy dominated by *E. moluccana* (grey box and *E. tereticornis* (forest red gum), a small tree stratum of *Acacia implexa* (lightwood) and commonly occurring *Eucalyptus* species, a shrub stratum dominated by *Bursaria spinose* (blackthorn) and a ground stratum of grasses and herbs.

Alluvial Woodland is found adjacent or in close proximity to minor watercourses with draining soils derived from Wianamatta Shale geology. Alluvial Woodland commonly includes an upper tree stratum of *E. amplifolia* (cabbage gum) and *E. tereticornis* (forest red gum), a small tree stratum of *Acacia parramattensis* (Parramatta green wattle) and *Casuarina glauca* (swamp she-oak), an often sparse shrub stratum of dominated by *Bursaria spinose* (blackthorn) and an often dense ground stratum of grasses.

Landuse practices have had a variable impact on the landscape within the project area. The project area is predominantly cleared of native vegetation and utilised for grazing cattle and cultivating crops. A number of large dams have been constructed throughout the area within former creek channels, altering the area's hydrology and drainiage patterns. Several residential and agricultural structures are also present. The landscape within the areas of urban expansion at Glenmore Park and the township of Luddenham contain low density residential and commercial structures with associated utilities and infrastructure.

A portion of the project area is located within Australian Department of Defence lands that contain several sealed and unsealed roads, a graded perimeter track, various buildings, dams and a landscaped golf course.

Construction activities within other (public and private) road corridors and the Warragamba-Prospect water pipeline easement have modified the landscape by creating cuttings and artificial embankments in addition to modifying the course of several waterways. The project area also contains several above and below ground utility corridors.

2.3 Ethnohistoric context

The project area lies within a landscape which was important to, and intensively used by, past Aboriginal peoples (Attenbrow 2002). The arrival of European settlers began a cataclysmic series of events which radically changed the lifestyle of Aboriginal people on the Cumberland Plain. Contact with Europeans introduced diseases, such as smallpox, that drastically altered the size and structure of the Aboriginal population, whilst the expansion of settlements and establishment of farmland subsumed the traditional areas used to meet subsistence needs (Attenbrow 2002).

After their arrival in Sydney Cove in 1788, the British set about exploring the surrounding area. In the first three years of settlement many areas of the region were explored including Broken Bay, Botany Bay, Rose Hill (Parramatta), Prospect Hill and overland to the Nepean, Hawkesbury and Georges Rivers. During these explorations some of the British Officers, including Governor Phillip and Captain Watkin Tench, made a number of written observations regarding the local Aboriginal people that they met and travelled with (Attenbrow 2002:13).

Early historical observations described the Cumberland Plain as a mosaic of Aboriginal groups associated with particular areas of land. These groups were described as 'tribes' in many historical observations, when in fact they were more likely small territorial clans or local clans consisting of extended family groups, forming larger land-using bands linked through marriage and communal participation in subsistence gathering activities (Attenbrow 2002:22, Brook and Kohen 1991:2). The British noted a difference between the dialect of the Aboriginal people along the coast compared with those further inland on the Cumberland Plain. Captain Tench observed when two Aboriginal men from the coast conversed with an Aboriginal man further inland "they conversed on a par and understood each other perfectly, yet they spoke different dialects of the same language; many of the most common and necessary words used in life bearing no similitude, and others being slightly different" (Tench 1793:122).

None of the British observations from the late 18th and early 19th Century make reference to any name for the different dialects or wider language groups that they noted (Attenbrow 2002:33). It was only in the late 19th Century that the name Darug (also referred to as Daruk, Dharuk, Dharook, and Dharug) was used to refer to the language of the traditional inhabitants of the Cumberland Plain (Attenbrow 2002:33). In the early 20th Century, anthropologist/linguist R H Matthews noted that "the Dharuk speaking people adjoined the Thurrawal on the north, extending along the coast to the Hawkesbury River, and inland to what are now Windsor, Penrith, Campbelltown, and intervening towns" (Matthews 1901:155 [in Attenbrow 2002: 32]).

As well as differences in the dialect spoken between the coastal inhabitants and those further inland, the British also observed differences in subsistence activities. Brook and Kohen (1991:3) noted that "the Dharug people were apparently divided into two distinct sub-tribes: those along the coast, who lived on fish; those inland, who were frequently referred to as the 'woods tribes'". Tench recorded differences in the food eaten and methods used to acquire these resources between the inhabitants of the coast and those to the west of Rose Hill (Parramatta). On one occasion Tench observed a method of climbing trees for animals that involved cutting notches in the trunk and using these as toe-holds to climb the tree (Tench 1793:82).

Kohen (1986:77) explains that the Aboriginal people who lived between Parramatta and the Blue Mountains were not as dependant on fish and shellfish as groups closer to the coast, but relied on small animals and plant foods in addition to seasonally available freshwater mullet and eels. Tench (1793:230) observed that 'they depend but little on fish, as the river yields only millets and that their principal support is derived from small animals which they kill and some roots (a species of wild yam chiefly) which they dig out of the earth'. These wild yams were found in considerable quantities along the banks of the Nepean and Hawkesbury Rivers. Berries, Banksia flowers and wild honey were also recorded as foods of the local inhabitants (Collins 1798 [Kohen 1985:9]). A particularly important plant food was the Burrawong (*Macrozamia communis*), which provided a nutritious nut that was pounded and soaked in running water to leach out toxins before the flour-like extract was made into small cakes and baked over a fire (Kohen 1993:8).

Small animals provided the protein component of the Aboriginal diet on the Cumberland Plain, with hunting comprising a major economic role of the men. Along the river, traps and snares were set for bandicoots and wallabies, while decoys for snaring birds were also a commonly employed technique, 'these are formed of underwood and reeds, long and narrow, shaped like a mound raised over a grave, with a small aperture at one end for the admission of the prey' (Tench 1793 [Kohen 1985:9]). Possums and gliders were particularly common in the open woodland across the Cumberland Plain and probably formed the main sources of animal food. These were hunted in a number of ways, including smoking out the animal by lighting a fire in the base of a hollow tree, burning large tracts of land and gathering the stranded animals, as well as cutting toe-holds in trees mentioned above (Kohen 1993:10; Tench 1793:82).

3 Archaeological Assessment

3.1 Previous archaeological investigations

Archaeological investigations have taken place within and on the immediate boundary of the project area (Figure 5). These investigations have primarily involved pedestrian survey and desktop assessment, although some excavation programs have been carried out. In general, these investigations have been concentrated to the south as part of preparation for the Western Sydney Airport at Badgerys Creek or in the north as part of the residential developments at Glenmore Park and Mulgoa; however, archaeological investigations encompassing the current project area have been undertaken as part of the Stage 2 PACHCI assessment for the proposed Northern Road Upgrade. The results of investigations pertinent to the current assessment are presented below.

Western Sydney Airport, Badgerys Creek

An archaeological assessment was undertaken for the Western Sydney Airport in 1985. The assessment included a survey that covered approximately 70 hectares and targeted areas where predictive modelling had suggested archaeological sites would be most likely to occur and areas where surface visibility would have revealed artefacts if present. The survey identified one artefact scatter of five silcrete flakes and flaked pieces adjacent to Badgerys Creek. The assessment noted that additional artefact scatters were likely to occur along the banks of larger creeks and that several landforms in the vicinity of Badgerys Creek appeared to be relatively intact. The remainder of the area was assessed as being heavily disturbed by extensive landuse.

Navin Officer conducted an Aboriginal cultural heritage study in 1997 of the then proposed airport area as part of an assessment of potential sites for a second major airport for Sydney. The study included a survey of a representative sample of the topographic variation within the proposed airport area. The survey identified 111 archaeological sites comprising 58 artefact scatters, eight scarred trees, 44 isolated artefacts and one potential archaeological deposit. Artefact density within the artefact scatters was generally low, with the majority containing five or less artefacts. Higher artefact numbers and densities were noted at sites located within the valley floor and fluvial corridors. Non-artefactual rounded silcrete gravels were identified across the northern portion of the survey area and were assessed as potentially representing the remnants of an eroded surface source (Navin Officer 1997: 5-7).

The survey identified one artefact scatter (B6; AHIMS ID 45-5-2636) within the current project area. The site was located on a lower slope with a northern aspect, adjacent to Badgerys Creek. The artefacts comprised one mudstone multiplatform core fragment, one chert flake and one quartz flake. The site was assessed as being in generally poor condition with disturbance from cattle and motorcycles.

Navin Officer undertook an Aboriginal cultural heritage assessment of the Western Sydney Airport in 2015. The assessment included a test excavation program that targeted a representative selection of landform types within the area, to characterise the nature and extent of the subsurface archaeological resource. The test excavation pre-selected 38 potential test locations which were systematically surveyed and refined to a final 11 test locations where 114 test pits (1 x 0.5 metre) were excavated. Whilst two of the pre-selected areas were located within the current project area, they were not subsequently selected as final test pit locations and were not excavated.

A total of 91 stone artefacts were recovered during the test excavation program with the majority of test pits containing less than 10 artefacts. Artefacts recovered during the test excavation program were predominantly flakes with little to no dorsal cortex and which were generally small in size indicating a rationing of raw material.

The investigation found a direct correlation between landform and the presence of significant archaeological material, such that testing of the landscape was moot and reliability of artefact distribution on the Cumberland Plain can be established through landform assessment.

> It is now established that Aboriginal stone artefacts in subsurface contexts are distributed across the full spectrum of landscape variation. The areal incidence of this distribution is discontinuous and uneven, but broad and relative categories of artefact incidence can be reliably predicted according to landform types and variables. (Navin Officer 2015: 24)

The result show that a detailed survey combined with an archaeological landform assessment provided a true appreciation of the significance and extent of the archaeological resource.

The archaeological assessment for the Western Sydney Airport identified two general trends in the spatial distribution of artefacts recovered. Artefact density was generally low on ridgelines and crests. Relatively larger densities were generally found within 100 metres of a second order or greater streamline and lower order drainage lines were frequently sterile. Navin Officer concluded that data indicated that access to stable water sources were “the strongest deciding factor for Aboriginal groups in choosing where to focus their activities across the study location” (Navin Officer 2015: 129).

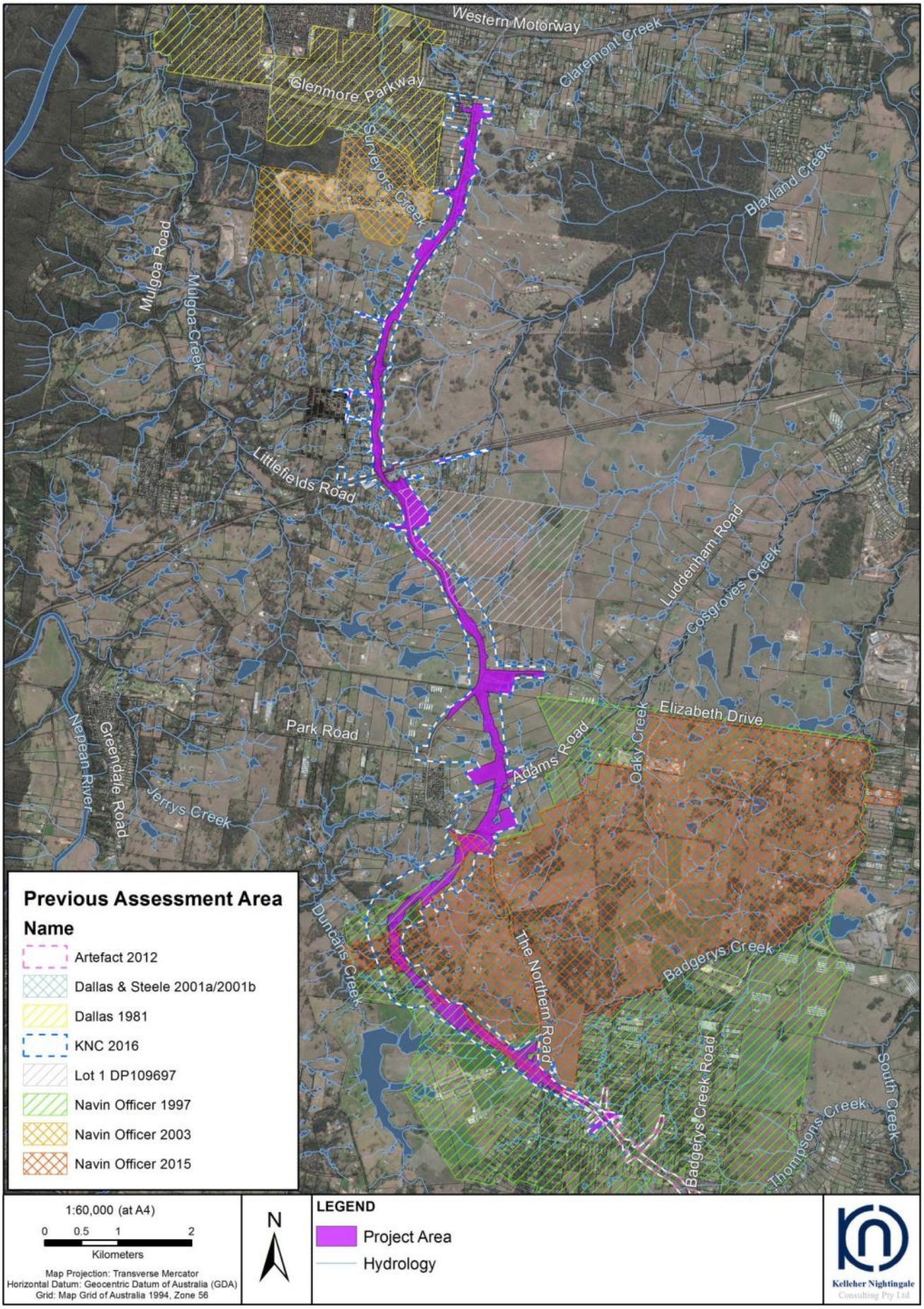

Figure 5. Previous archaeological investigations in the vicinity of the project area

Glenmore Park/Mulgoa Rise

Dallas undertook an archaeological survey of the South Penrith Development Site (the future suburb of Glenmore Park) in 1981. The survey encompassed an area of approximately 800 hectares on the southern side of the Western Motorway between Mulgoa Creek and The Northern Road. The survey identified 20 surface artefact scatters and seven isolated artefacts. The sites were located on elevated locations or hills adjacent to School House Creek or an unnamed tributary of Surveyors Creek. Modern land-use practices such as ploughing were found to have disturbed many of the identified sites along Surveyors Creek while sites near School House Creek were found to be more intact. Low density artefact scatters with five or less artefacts constituted half the identified sites and most sites had less than 10 artefacts. Artefacts were predominantly flakes and flaked pieces made from chert and silcrete with some examples of mudstone and quartz. One basalt edge-ground hatchet was also identified.

Dallas and Steele conducted an Aboriginal archaeological survey and assessment of a portion of Lot 6800 DP 1013970, Glenmore Park (Dallas and Steele 2001a). No Aboriginal stone artefacts or culturally modified trees were identified during the survey. The slopes adjacent to Surveyors Creek were considered to have been disturbed by landuse practices and were assessed as having low archaeological potential; however, one area of potential archaeological sensitivity was identified within the Surveyors Creek corridor.

A subsurface testing program of the area of potential archaeological sensitivity was undertaken by Dallas and Steele in 2001 (Dallas and Steele 2001b). The program comprised 18 test trenches (1 x 1 metre) that were excavated in successive 10 centimetre spits using a backhoe fitted with a flat (batter) bucket and five 1 x 1 metre test squares which were manually excavated in 5 centimetre spits using hand tools. Soil profiles were found to be relatively uniform across the area with a depth between 20 centimetres and 40 centimetres.

A total of 73 stone artefacts were recovered during the program. The artefacts were predominantly made from silcrete with smaller quantities of tuff and quartz also recovered. Artefacts recovered during the excavation were predominantly flakes and flake fragments whilst backed artefacts, cores, broken hatchet head fragments, retouched fragments and a scraper were also found. Artefacts were distributed in low densities across the tested area; however, one area contained a relatively higher artefact density and was interpreted as a knapping location.

The recovered stone material included a large volume of fragments which likely represented the remains of flaked material but could not be attributed to a formal artefact type. These fragments represented a stone type that did not naturally occur within the soil profile. The low density spatial distribution of artefacts and large quantities of stone fragments outside the knapping location were interpreted as reflecting the effect of natural process such as inundation from floodwaters and possible redeposition of material from upstream (Dallas and Steele 2001b: 47-48).

The Glenmore Park Southern Release Area, an area encompassing approximately 225 hectares west of the Northern Road, south of Ridgetop Drive and Mulgoa Nature Reserve, was assessed by Navin Officer in 2003. The assessment included a review of background information and a field survey. The survey identified eight archaeological sites and two areas of potential archaeological deposit. The sites were generally low density artefact scatters or isolated artefacts located on low hills or elevated positions adjacent to creeks. The artefacts were predominantly made from silcrete with minor quantities of chert, tuff and volcanic material also identified. Artefact types were primarily flakes and flaked pieces. A single backed artefact, scraper, core, grindstone and ground edge hatchet were also found.

Much of the original landscape of Glenmore Park was considered to have been drastically altered from past landuse. The central portion of Glenmore Park was disturbed through the quarrying operations and subsequent regeneration of the Mulgoa Quarry. Historical landuse for agricultural and pastoral purposes had resulted in widespread vegetation clearance of much of the land, with some remnant vegetation in the south and isolated possible old growth trees across the landscape.

Lot 1 DP109697, Luddenham

A number of archaeological sites were recorded on the AHIMS database within Lot 1 DP109697, Luddenham, during an archaeological field survey for an unknown project. The recorded sites comprise three artefact scatters and three isolated artefacts. The sites were predominantly situated on creek flats or low lying slopes in close proximity to two north east flowing creek systems, while one isolated artefact was located on the crest of a small knoll. The artefacts found at the sites were mainly flakes and flaked pieces with one blade core and one flake with retouch also noted. The artefacts were made from silcrete, chert and tuff.

The sites were considered to be in poor condition and in most cases it was considered that the areas around the identified sites displayed low likelihood of retaining archaeological deposit, due to factors including historical disturbance and the location of the sites along a watercourse that would have been regularly waterlogged and retained standing water for long periods of time. The sites located on the more elevated locations near the watercourse were considered to have better archaeological potential.

The Northern Road Upgrade - Old Northern Road Narellan to Mersey Road Bringelly

In 2012, Artefact Heritage conducted an Aboriginal archaeological survey and cultural heritage assessment of The Northern Road between Old Northern Road at Narellan and Mersey Road at Bringelly as part of the planning for the future road upgrade.

The survey identified 23 Aboriginal archaeological sites within the survey area that consisted of 10 artefact scatters, 11 isolated artefacts, one scarred tree and one possible scarred tree. The majority of artefact scatters and isolated artefacts were found on lower hillslopes; however, sites were also identified in smaller quantities on flat, hillslope, upper hillslope, lower ridgeline, terrace and creek flat landforms. The scarred tree and possible scarred tree were identified on flat landforms. Ground visibility was very low due to thick grass cover and sections of the survey area were disturbed by modern landuse practices such as road corridors, around structures and dams.

Stone artefacts were primarily made from silcrete, with small quantities of artefacts of silicified tuff, chert, mudstone, quartz and quartzite. The majority of stone artefacts were flakes, flake pieces and broken flakes; however, other stone artefact types were noted included cores, backed blades and a scraper.

3.2 The Northern Road Upgrade: Aboriginal archaeological survey report

An Aboriginal archaeological survey assessment of the project area was undertaken as part of the Stage 2 PACHCI assessment for The Northern Road Upgrade between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park (KNC 2016). A full coverage survey of the project area was carried out in 2015 and 2016 by a team comprising representatives from the Deerubbin Local Aboriginal Land Council, Gandangara Local Aboriginal Land Council and archaeologists from KNC.

Digital and printed maps of the project area were used for reference. Handheld GPS receivers were used to register archaeological sites. The team closely inspected exposed ground, such as unsealed tracks or eroded surfaces, for artefacts and any old growth trees for evidence of Aboriginal bark removal. The survey also focused on establishing a detailed appreciation of archaeologically sensitive landforms to assist in identifying the full spatial extent of identified archaeological sites.

As a result of the survey, 28 Aboriginal archaeological sites were identified within the project area (see section 5.1, Table 4). The sites comprised 23 artefact scatters and five isolated artefacts. The sites were predominantly found on the crests and upper slopes of a north-south ridgeline or on lower slopes and elevated locations adjacent to creeks. Artefacts were predominantly silcrete and silicified tuff with smaller quantities of quartz, medium grained siliceous material, chert and mudstone. The majority of recorded artefact types were flakes or flake fragments with small numbers of cores, utilised flakes and retouched flakes.

The spatial extent of sites was well defined by topography. Ground surface visibility was variable across the project area. The majority of the project area had moderate ground surface visibility with intermittent vegetation cover of the immediate ground surface. In areas where the ground cover had been disturbed by modern landuse practices such as excavated drainage channels, damming, vehicle and cattle tracks or natural process such as erosion and fluvial activity, ground surface visibility was generally high.

4 Aboriginal Community Consultation and Participation

4.1 Aboriginal stakeholder consultation

Roads and Maritime is committed to effective consultation with Aboriginal communities regarding Roads and Maritime activities and their potential for impact on Aboriginal cultural heritage. The Roads and Maritime PACHCI was developed to provide a consistent means of effective consultation with Aboriginal communities regarding activities which may impact on Aboriginal cultural heritage and a consistent assessment process for Roads and Maritime activities across NSW.

The aim of consultation is to integrate cultural and archaeological knowledge and ensure registered stakeholders have information to make decisions on Aboriginal cultural heritage. For the preparation of this CHAR, consultation with Aboriginal people has been undertaken in accordance with the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (OEH 2010a) and the requirements of Clause 80C of *the National Parks and Wildlife Regulation 2009*.

Roads and Maritime advertised (Appendix A) and contacted potential Aboriginal stakeholders identified from government agency notification responses. Roads and Maritime invited Aboriginal people who hold knowledge relevant to determining the cultural heritage significance of Aboriginal objects and Aboriginal places in the area in which the proposed activity was to occur to register an interest in a process of community consultation. Investigations for The Northern Road Upgrade between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park have included consultation with 61 Aboriginal community groups and individuals as listed in Table 3.

Table 3. Registered Aboriginal stakeholders

REGISTERED STAKEHOLDER GROUPS AND INDIVIDUALS			
Group	**Representative / Contact**	**Group**	**Representative / Contact**
A1 Indigenous Services	Carolyn Hickey	Gunjewong Cultural Heritage Aboriginal Corporation	Cherie Carroll Turrise
Aboriginal Archaeology Services	Andrew Williams	Gunyuu	Darlene Hoskins-McKenzie
Amanda Hickey Cultural Services	Amanda Hickey	Kamilaroi-Yankuntjatjara Working Group	Phil Khan
Biamanga	Seli Stoer	Kullila Site Management	Paul Charles
Bidawal	Richard Andy	Liverpool City Councils Aboriginal Consultative Committee	Norma Burrows
Bilinga	Ms Wandai Kirkbright	Munyunga	Suzanne McKenzie
Bilinga	Simalene Carriage	Muragadi Heritage Indigenous Corporation	Jesse Johnson
Corroboree Aboriginal Corporation	Steve Johnson	Murramarang	Roxanne Smith
Cubbitch Barta Native Title Claimants Aboriginal Corporation	Glenda Chalker	Murri Bidgee Mullangari Aboriginal Corporation	Darleen Johnson
Cullendulla	Corey Smith	Murrin	Tarlarra Te-kowhai
Darug Aboriginal Cultural Heritage Assessments	Gordon Morton	Murrumbal	Levi McKenzie-Kirkbright
Darug Aboriginal Land Care	Des Dyer	Murrumbul	Levi McKenzie
Darug Custodian Aboriginal Corporation	Justine Coplin	National Koori Management	Ali Maher
Darug Land Observations	Gordon Workman	Ngarigo	Newton Bond
Darug Land Observations	Jamie Workman	Ngunawal	Dean Delponte
Darug Tribal Aboriginal Corporation	John Riley	Ngunawal	Edward Stewart
Deerubbin LALC	Kevin Cavanagh	Nundagurri	Newton Carriage
Djiringanji	Keith Nye	Rane	Tony Williams
Duncan Falk Consultancy	Duncan Falk	Tharawal LALC	Rebbeca Ede
Galaga	Wendy Smith	Thauaira	Shane Carriage
Gandangara LALC	Brad Maybury	Tocomwall	Danny Franks
Gangangarra	Kim Carriage	Walbunja	Hika Te Kowhai
Goobah Developments	Basil Smith	Walgalu	Ronald Stewart

REGISTERED STAKEHOLDER GROUPS AND INDIVIDUALS			
Group	**Representative / Contact**	**Group**	**Representative / Contact**
Gundungurra Tribal Technical Services	Peter Foster	Wandandian	William Bond
Gundungurra Tribal Technical Services	Christopher Payne	Warragil	Aaron Slater
Gundungurra Tribal Technical Services	Larry Hoskins	Warragil Cultural Services	Aaron Slater
Gundungurra Tribal Technical Services	David Bell	Widescope Indigenous Group	Steven Hickey
Gundungurra Tribal Technical Services	Pimmy Johnson Bell	Wingikara	Robert Brown
Gundungurra Tribal Technical Services	Teangi Mereki Foster	Wingikara	Hayley Bell
Gundungurra Tribal Technical Services	Sam Wickman		

*One additional Aboriginal group/individual has registered for consultation on this project and has chosen to withhold their details in accordance with item 4.1.5 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*

The formal consultation process has included:

- advertising for registered stakeholders (refer Appendix A);
- government agency notification letters;
- notification of closing date for registration;
- provision of proposed archaeological assessment methodology (20/01/2016) (allowing 28 day review) outlining the methodology to prepare the CHAR;
- ongoing compilation of registrants list, through continuing to register individuals and groups for consultation on the project;
- provision of draft CHAR for review;
- Aboriginal focus group meeting to discuss assessment methodology, investigation results, CHAR and detailed mitigation strategies (27/04/16);
- ongoing consultation with the local Aboriginal community.

4.2 Aboriginal Stakeholder Comments

A copy of the draft CHAR was provided to Aboriginal stakeholders for a 28 day review and comment period. Comments were received from Tocomwall and Darug Land Observations and have been incorporated into the assessment and included in Appendix B.

5 Summary and analysis of background information

The archaeological and cultural heritage values of the project area were previously identified as part of the PACHCI Stage 2 archaeological assessment (see section 3.2). The assessment included a review of background information, including identification of previously recorded Aboriginal sites registered on the AHIMS database, predictive modelling, Aboriginal community consultation and a full coverage archaeological field survey.

The PACHCI Stage 2 archaeological assessment identified 28 Aboriginal archaeological sites within the current project area (Table 4). The locations of these sites are shown on Figures 6-9.

Table 4. Identified Aboriginal cultural heritage values within the project area

Site Name	AHIMS Site ID	Site Features	GDA Easting	GDA Northing
B 6	45-5-2636	Artefact	This	[redacted]
TNR AFT 06	45-5-4785	Artefact	This	[redacted]2
TNR AFT 07	45-5-4784	Artefact	This	[redacted]
TNR AFT 08	45-5-4789	Artefact	This	[redacted]
TNR AFT 10	45-5-4781	Artefact	This	[redacted]
TNR AFT 11	45-5-4780	Artefact	This	[redacted]
TNR AFT 12	45-5-4778	Artefact	This	[redacted]
TNR AFT 13	45-5-4779	Artefact	This	[redacted]
TNR AFT 14	45-5-4786	Artefact	This	[redacted]
TNR AFT 16	45-5-4796	Artefact	This	[redacted]
TNR AFT 17	45-5-4787	Artefact	This	[redacted]
TNR AFT 19	45-5-4790	Artefact	This	[redacted]
TNR AFT 20	45-5-4792	Artefact	This	[redacted]
TNR AFT 22	45-5-4793	Artefact	This	[redacted]
TNR AFT 23	45-5-4794	Artefact	This	[redacted]
TNR AFT 24	45-5-4795	Artefact	This	[redacted]
TNR AFT 25	45-5-4791	Artefact	This	[redacted]
TNR AFT 26	45-5-4798	Artefact	This	[redacted]
TNR AFT 27	45-5-4799	Artefact	This	This
TNR AFT 29	45-5-4801	Artefact	This	[redacted]
TNR AFT 30	45-5-4797	Artefact	This	[redacted]
TNR AFT 31	45-5-4802	Artefact	This	[redacted]
TNR AFT 33	tbc	Artefact	This	[redacted]
TNR IF 01	45-5-4805	Artefact	This	[redacted]
TNR IF 02	45-5-4806	Artefact	This	[redacted]
TNR IF 03	45-5-4807	Artefact	This	[redacted]
TNR IF 04	45-5-4808	Artefact	This	[redacted]
TNR IF 05	45-5-4809	Artefact	This	[redacted]

5.1 Aboriginal sites within the project area – site descriptions

Site name: B 6
AHIMS site ID: 45-5-2636

Site B 6 was identified by Navin Officer in 1997 during a field survey for the proposed Badgerys Creek airport. The site consisted of a minor surface artefact scatter located on a lower slope with a northerly aspect adjacent to Badgerys Creek. The artefacts comprised one mudstone multiplatform core piece, one chert flake and one quartz flake. The site was revisited by KNC in 2015 as part of the field survey for The Northern Road Upgrade Stage 2 PACHCI. The site was located within This information has been and within adjacent areas of The Northern Road corridor (Figure 9).

Moderate depth of soil was evident across the gently sloping raised areas adjacent to Badgerys Creek; however, modern disturbance from road construction, drainage cuttings and the installation of utilities had disturbed the landform in the vicinity of The Northern Road and effectively divided the site. The remainder of the site area had low levels of disturbance and were assessed as having moderate archaeological potential.

Site name: TNR AFT 06
AHIMS site ID: 45-5-4785

Site TNR AFT 06 was located on a creek flat approximately 140 metres east of an unnamed north flowing tributary of Surveyors Creek (Figure 6). The site was located This information has been redacted , Glenmore Parkway and Wentworth Road.

One silicified tuff medial flake fragment was identified within a 15 x 5 metre area of sheet erosion adjacent to a vehicle track on the north eastern side of small area of regrowth eucalypts. The site extent was identified by defined contours of the creek flat; however, modern disturbance from the construction of a road had bisected the site. The remainder of the site area had low levels of disturbance from vegetation clearance and erosion. Moderate depth of soil was evident across the landform and the site was assessed containing a moderate value archaeological deposit.

Site name: TNR AFT 07
AHIMS site ID: 45-5-4784

Site TNR AFT 07 was situated on a gentle lower hillslope approximately This of a north flowing tributary of Surveyors Creek (Figure 6). The site is located within a creek junction complex and associated with TNR AFT 08. The site was located within This information has been redacted The Northern Road and This of The Northern Road and Bradley Street. information

One silcrete flake fragment was identified within a 5 x 5 metre area of sheet erosion. Site boundaries were clearly defined by a triangular formation of the creek, dam and road. Modern disturbance was limited to vegetation clearance and erosion. Moderate depth of soil exhibiting a standard deflationary matrix allowing artefacts to remain in situ was evident across the landform and the site was assessed as containing a moderate value archaeological deposit.

Site name: TNR AFT 08
AHIMS site ID: 45-5-4789

Site TNR AFT 08 was located on a lower slope adjacent to the eastern bank of a north flowing tributary of Surveyors Creek (Figure 6). The site is This information has been redacted The Northern Road and Bradley Street.

The site contained 13 artefacts that were located in four surface concentrations. The first concentration consisted of six artefacts of silcrete and silicified tuff that were identified across a 30 x 50 metre area of sheet erosion. The artefacts included two retouched flakes and one utilised flake. The second concentration contained three silcrete artefacts that were identified in area of regrowth trees on the southern side of a dam. The artefacts comprised one flake, one proximal flake and one piece of debitage that had been heat affected. Dressed sandstone blocks were noted in the area and may have been the remains of a historical structure in the vicinity of the site.

The third surface concentration consisted of two silcrete artefacts that were identified on a 10 x 8 metre area of sheet erosion within a minor north west flowing drainage line. The artefacts comprised one flake and one medial flake fragment. The fourth surface concentration comprised one silcrete split flake and one silicified tuff flake that were identified in an area of low grass south of the north west flowing drainage line.

The site had variable levels of ground surface visibility due to vegetation cover and erosion. The spatial extent of the site was well defined by the creek, minor drainage lines, flood level and slope gradient. These areas exhibited low

disturbance, moderate depth of soil and a soil matrix conducive for artefact survivability. The subsurface archaeological deposit was assessed as moderate archaeological value in the areas unaffected by significant soil erosion and past landuse practices.

Site name: TNR AFT 10
AHIMS site ID: 45-5-4781

Site TNR AFT 10 was located on a ridge crest This information has been redacted Th The Northern Road and Grover Crescent (Figure 6). The site was bound by The Northern Road to the west and steep slopes forming the This information has been redacted . The site sits on a drainage channel feeding Blaxland Creek.

Two silicified tuff distal flake fragments were identified approximately 50 metres apart within a graded corridor running adjacent to a perimeter fence. The site boundaries were well defined by the upper contours along the road, which then fall relatively steeply to the east. The site contained significant areas of disturbance from erosion, the grading of the track, vehicle activity and dumped soil adjacent to a perimeter fence. Due to the high levels of disturbance the archaeological value of the site was considered low.

Site name: TNR AFT 11
AHIMS site ID: 45-5-4780

Site TNR AFT 11 encompassed the upper slopes and crest of a localised high point overlooking This (Figure 7). The site is located This information has been redacted The Northern Road and Longview Road.

Two surface artefacts were identified within a graded corridor adjacent to a perimeter fence. The artefacts consisted of one silicified tuff retouched medial flake fragment and one silcrete retouched flake fragment. Ground surface visibility was variable across the site with good visibility within the graded corridor and poor visibility in the remaining grass covered areas. The western edge of the site was heavily disturbed due to erosion, grading, vegetation clearance and vehicle use; however, the remainder of the site (especially the hill top) had a low level of disturbance and moderate archaeological potential. The spatial extent of the site was clearly defined by the upper contours of the hill top.

Site name: TNR AFT 12
AHIMS site ID: 45-5-4778

Site TNR AFT 12 encompassed the upper slopes and crest of a ridge overlooking the headwaters of This (Figure 7). The site was located within the This information has been redacted The site was approximately Th . One isolated artefact and four surface concentrations of artefacts were identified within the site area. The spatial extent of the site was defined by the contours of the crest and upper slopes. The site was bisected by the current road.

One silcrete proximal fragment was identified on the gently inclined northerly lower slope approximately This . The artefact was located within This information has been .

Surface Artefact Scatter 1 was located on a north facing upper slope This information has been redacted . The artefacts were found between a vehicle track and perimeter fence on sheet erosion exposure. The artefacts comprised one silicified tuff retouched proximal flake and one silcrete proximal flake.

Surface Artefact Scatter 2 was located on the ridge crest approximately This information has been redacted . The scatter was situated on a vehicle track This information has been redacted . The artefact scatter contained two artefacts consisting of one silcrete angular fragment and one silcrete proximal fragment.

Surface Artefact Scatter 3 was located on the ridge crest approximately This information has been redacted . The scatter comprised four stone artefacts that were identified across a small exposure on an overgrown vehicle track and an area of sheet exposure. The artefacts consisted of two silcrete angular fragments, one medial flake fragment and one flake fragment.

Surface Artefact Scatter 4 was located on This information has been redacted The artefact scatter contained two silcrete angular fragments.

Site TNR AFT 12 contained variable levels of disturbance. Site areas associated with the road corridor, vehicle access tracks, and perimeter fence were disturbed and exhibited low archaeological potential; however, the remaining portions of the site exhibited a low overall level of disturbance and moderate archaeological value. The hill top displayed a variable but spatially defined landform, exhibiting moderate archaeological value related to location and distribution of artefacts.

Site name: TNR AFT 13
AHIMS site ID: 45-5-4779

Site TNR AFT 13 was situated This information has been redacted (Figure 7). Th is inf

The site contained two silcrete angular fragments within a well-defined ridge top location. Ground surface visibility was limited by grass cover and a small pocket of trees. Modern disturbance was limited to vegetation clearance. Moderate depth and structured soil matric indicated a relatively intact archaeological deposit. Archaeological deposit was limited to the defined upper contours on both sides of the road (similar to TNR AFT 14). The site displayed moderate archaeological value related to artefact distributions along the ridge.

Site name: TNR AFT 14
AHIMS site ID: 45-5-4786

TNR AFT 14 was situated on This information has been redacted (Figure 7). The site was situated This . information

The site contained one silcrete flake and one silcrete angular fragment within a spatially well-defined ridge top location. Ground surface visibility was limited by grass cover and small pockets of trees. Modern disturbance was limited to vegetation clearance and erosion along tracks. Archaeological deposit was limited to the defined upper contours on both sides of the road (similar to TNR AFT 13). The site displayed moderate archaeological value related to artefact distributions along the ridge.

Site name: TNR AFT 16
AHIMS site ID: 45-5-4796

Site TNR AFT 16 was located on This information has been redacted (Figure 8). The site was situated within This information has been redacted The site is part of the natural junction of two ridges: This information has been . The site is part of a complex of sites including TNR AFT 15 (located outside of the project boundary).

One silcrete flake was identified within a drainage ditch that was located between a paddock fence line and sealed driveway. While the findspot was moderately disturbed by the construction of the driveway and ditch, the remainder of the ridge crest site area had low levels of disturbance and based on landform was assessed as having moderate archaeological value. The site area was defined by the upper ridgeline contours containing artefacts and an intact soil structure.

Site name: TNR AFT 17
AHIMS site ID: 45-5-4787

Site TNR AFT 17 was locate This information has been redacted (Figure 8). This information has been redacted

Eight stone artefacts were identified within two surface exposures on the eastern edge of the large dam and comprised flakes, flake fragments and a unifacially flaked cobble. The artefacts were made from silicified tuff, medium grained siliceous material and silcrete. Ground surface visibility was good within areas of sheet erosion and low in areas covered by vegetation. The site extent was defined by the dam construction and toe of slope, clearly demarking the archaeological deposit. Moderate value archaeological deposit was identified within the undisturbed toe slope.

Site name: TNR AFT 19
AHIMS site ID: 45-5-4790

Site TNR AFT 19 was situated This information has been redacted (Figure 8). The site was This information has been redacted .

The site contained one silcrete flake fragment and one chert flaked cobble. The area had been cleared of native vegetation and was utilised for grazing livestock. Ground surface visibility was good within areas of sheet erosion. The site extent was clearly defined by flood levels and toe of slope, demarking the archaeological deposit. Edges of the site had been disturbed by sheet erosion and fluvial activity; however, the remaining areas were assessed as having moderate archaeological value.

Site name: TNR AFT 20
AHIMS site ID: 45-5-4792

Site TNR AFT 20 encompassed a This information has been redacted (Figure 8). The site was located This information has been redacted

The site contained six silcrete artefacts: one core, two flakes and three flake fragments all located alone the toe of the slope. The site area had been cleared of native vegetation and was utilised for grazing livestock. Site extent was defined This information has been redacted . Moderate depth of soil was evident across the landform and the site was assessed as having moderate archaeological value.

Site name: TNR AFT 22
AHIMS site ID: 45-5-4793

Site TNR AFT 22 was situated on This information has been redacted (Figure 8). The site was located This information has been redacted

The site is well defined by hill top contours with silcrete artefacts visible in cuttings along Eaton Road: two silcrete flakes and two silcrete flake fragments. The hill top is part of the ridge facilitating the current road and was clearly a transit way for past Aboriginal people. The hill top soil structure is a closed system of erosion where soils deflate and erode relatively in situ, making the hill archaeologically valuable. Moderate depth of soil was evident across the landform and the site was assessed as having at least moderate archaeological value.

Site name: TNR AFT 23
AHIMS site ID: 45-5-4794

Site TNR AFT 23 was located This information has been redacted k (Figure 8). The site was located This information has been redacted

Two surface artefacts comprising one silcrete distal flake fragment and one silicified tuff proximal fragment were identified within a deeply ploughed/ mounded field. Ground surface visibility was high due to recent ploughing and weed removal. The site had been heavily disturbed by modern land-use practices and was considered to display low archaeological potential.

Site name: TNR AFT 24
AHIMS site ID: 45-5-4795

Site TNR AFT 24 was located on the crest and slope of a western spur overlooking the junction of two west flowing creeks (Figure 8). The site was situated within Lot 2 DP854626 and Lot 1 DP851626 approximately 360 metres south west of the southern junction of The Northern Road and Eaton Road. The site extends over the top of hill slope defined by north and south contours and drops down on the east bank of the Duncans Creek system.

The site contains three silcrete artefacts: one medium sized core, two flake fragments. Artefacts were found along exposures boarder tracks across the spur top and near Duncans Creek. The site was in close proximity to several other sites (TNR AFT 25, TNR AFT 26 and TNR AFT 27) that were identified on the crests and slopes adjacent to this unnamed north west flowing creek system. The overall area displays low levels of disturbance and soils have at least moderate intactness. The area had been cleared of native vegetation and was utilised for pastoralism. The site exhibits moderate archaeological value due to its location in close proximity to resources and low level of disturbance.

Site name: TNR AFT 25
AHIMS site ID: 45-5-4791

Site TNR AFT 25 was located on a This information has been redacted (Figure 8). The site was situated This information has been redacted .

Three silcrete artefacts comprising one core, one core fragment and one angular fragment were identified within an eroded bank that had been cut into the hillslope. The site was in close proximity to several other sites (TNR AFT 24, TNR AFT 26 and TNR AFT 27) that were identified on the crests and slopes adjacent to this unnamed north west flowing creek system. The site had been disturbed by the construction of the dam and extensive gully erosion. The site was assessed as having low archaeological potential due to the highly disturbed context.

Site name: TNR AFT 26
AHIMS site ID: 45-5-4798

Site TNR AFT 26 was situated on This information has been redacted (Figure 8). The site was located within This information has been redacted The site area is spatially defined the hill top contours of the spur overlooking This information has been redacted on the eastern margin.

Five artefacts comprising flakes and angular fragments made of quartz and silicified tuff were identified within a sheet erosion scour adjacent to a creek bank. The site was in close proximity to several other sites (TNR AFT 24, TNR AFT 25 and TNR AFT 27) that were identified on the crests and slopes adjacent This information has . The TNR AFT 26 site area had been affected past vegetation clearance and variable levels of disturbance. Areas within close proximity to dams and creek lines were generally disturbed by erosion and past construction activities whilst the elevated gently sloping areas adjacent to the creeks had low levels of disturbance with relatively good soil profiles. The site was assessed as having moderate archaeological value.

Site name: TNR AFT 27
AHIMS site ID: 45-5-4799

Site TNR AFT 27 was located on This information has been redacted (Figure 8). The site extended across the southern boundary This information has been redacted . The spatial extent of the site is clearly defined by the contours of the hill top and foreshore exposure linking the hill top to creek.

One silcrete flake located on a lower north eastern slope approximately This information has been and one silcrete flake located on the hill just below the crest. The artefacts were identified on sheet erosion scars along contour intervals. The site was in close proximity to several other sites (TNR AFT 24, TNR AFT 25 and TNR AFT 26) that were identified on the crests and slopes adjacent This information has . The TNR AFT 27 site area had been affected by past vegetation clearance and showed variable levels of disturbance. Areas within close proximity to dams and creek lines were generally disturbed by erosion and past construction activities whilst the elevated gently sloping areas adjacent to the creeks had lower level disturbance. Soil matrix was a closed deflationary system with notable aggradation indicating intact subsoil. The site exhibited moderate archaeological value due to intactness, artefacts and topography.

Site name: TNR AFT 29
AHIMS site ID: 45-5-4801

Site TNR AFT 29 was located This information has been redacted (Figure 9). The site was located This information has been redacted

Four silcrte artefacts: one core, one core fragment and two flake fragments were identified in cuttings This . Surface visibility was variable across the site with good visibility along tracks and poor information visibility within areas with vegetation cover. The site area was well defined by the remnant spur top, exhibiting no contemporary disturbance (buildings, lot levelling). The southern portion of the site was moderately disturbed by the construction activities associated with an electricity easement and various buildings. The remaining portions of the site had low levels of disturbance from vegetation clearance and limited erosion along tracks. A moderate depth of soil was evident in these areas and the site was assessed as having moderate archaeological value.

Site name: TNR AFT 30
AHIMS site ID: 45-5-4797

Site TNR AFT 30 was located on the This information has been redacted (Figure 9). The site was located This information has been redacted. The extent of the site was limited This (similar to TNR AFT 31).

Two artefacts consisting of one quartz bipolar core and one silicified tuff angular fragment were identified within a sheet erosion exposure on the northern slope of the spur. Modern disturbance was limited to vegetation clearance and erosion along tracks. Moderate depth of soil was evident across the landform and the area was assessed as having moderate archaeological value and was notable for its spatial definition.

Site name: TNR AFT 31
AHIMS site ID: 45-5-4802

Site TNR AFT 31 was located This information has been redacted (Figure 9). The site was located This information has been redacted The extent of the site was limited to the archaeological deposit on the crest (similar to TNR AFT 30).

One silcrete flake was located along a fence line exposure on the crest. Modern disturbance was limited to vegetation clearance, erosion along tracks and the construction of fencing and moderate depth of soil was evident across the landform. The site was assessed as having moderate archaeological potential.

Site name: TNR AFT 33
AHIMS site ID: tbc

TNR AFT 33 was a situated on This information has been redacted (Figure 7). The site was This information has been redacted. The spatial extent of the site was limited to the crest and upper slope landforms with low levels of modern disturbance.

Ground surface visibility was limited by grass cover and small pockets of trees. Modern disturbance was limited to vegetation clearance and erosion along tracks. Archaeological deposit was limited to the defined upper contours on both sides of the road. The site was assessed as having moderate archaeological value and was notable for its spatial definition.

Site name: TNR IF 01
AHIMS site ID: 45-5-4805

Site TNR IF 01 was identified within This information has been redacted (Figure 6). One silcrete flake was located This information has been redacted The area was heavily disturbed by past road construction and the site was assessed as having low archaeological value.

Site name: TNR IF 02
AHIMS site ID: 45-5-4806

Site TNR IF 02 was situated on This information has been redacted (Figure 6). The site was located This information has been redacted. One dark purple/red silcrete flake fragment was identified in a disturbed gravel setting. The site had been disturbed by past road construction and landscaping. The site was assessed as having low archaeological potential.

Site name: TNR IF 03
AHIMS site ID: 45-5-4807

Site TNR IF 03 was situated This information has been redacted (Figures 6 and 7). The site was located This information has been redacted. One silcrete core fragment was found at the site on the eastern edge of a vehicle track This information has been redacted. The site had been disturbed by past landuse practices and was assessed as having low archaeological value.

Site name: TNR IF 04
AHIMS site ID: 45-5-4808

Site TNR IF 04 was located This information has been redacted (Figures 7 and 8). The site was located This information has been redacted. The site is situated in a disturbed road corridor. The specific isolated artefact was identified within a disturbed ditch adjacent to This information and was assessed as having low archaeological value.

Site name: TNR IF 05
AHIMS site ID: 45-5-4809

Site TNR IF 05 was This information has been redacted (Figure 6). The site was This information has been redacted. One silcrete proximal fragment was identified artefact within a sheet eroded exposure. The site had been disturbed by erosion and past land use. The site was assessed as having low archaeological potential.

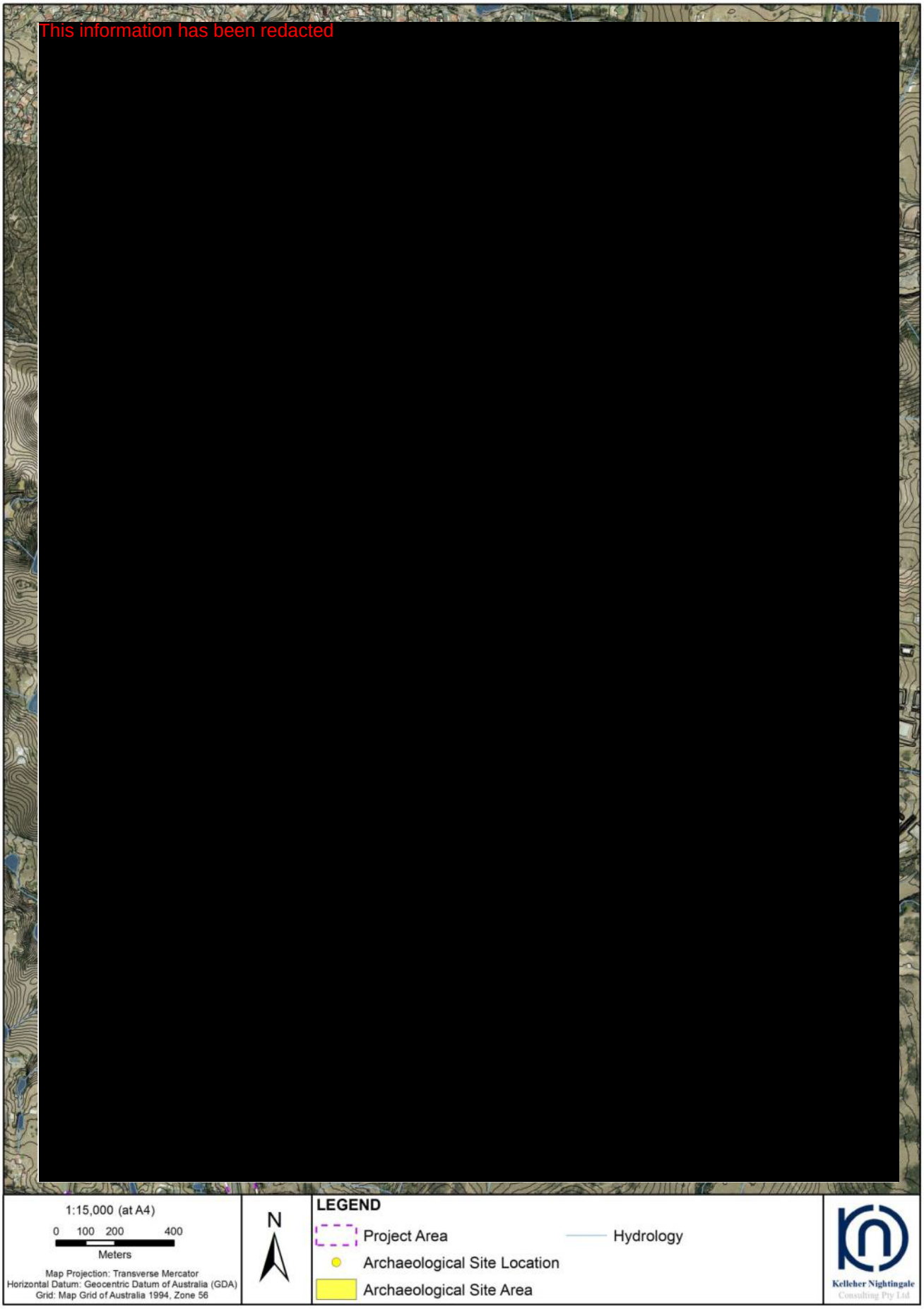

Figure 6. Archaeological sites within project area: Map 1

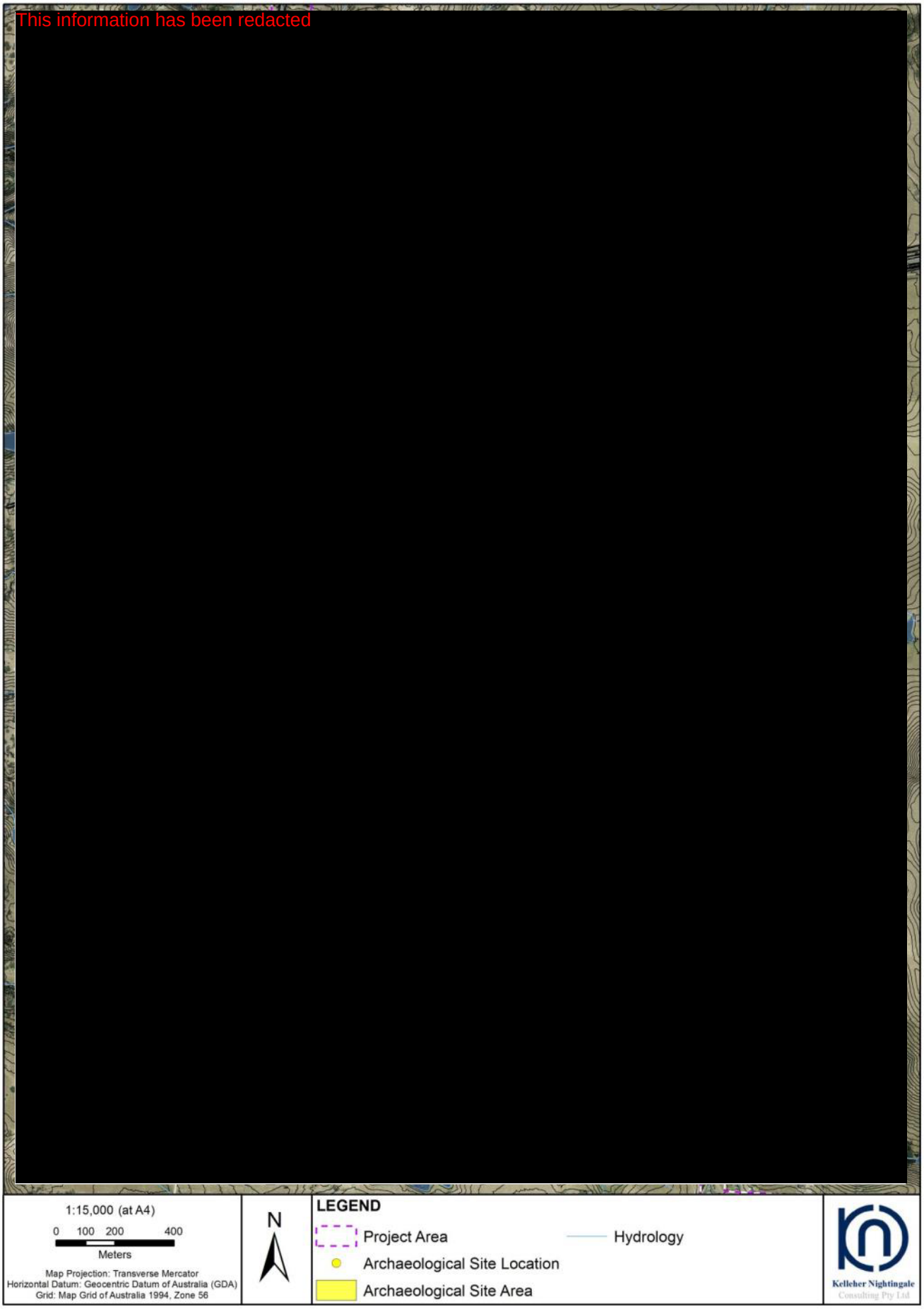

Figure 7. Archaeological sites within project area: Map 2

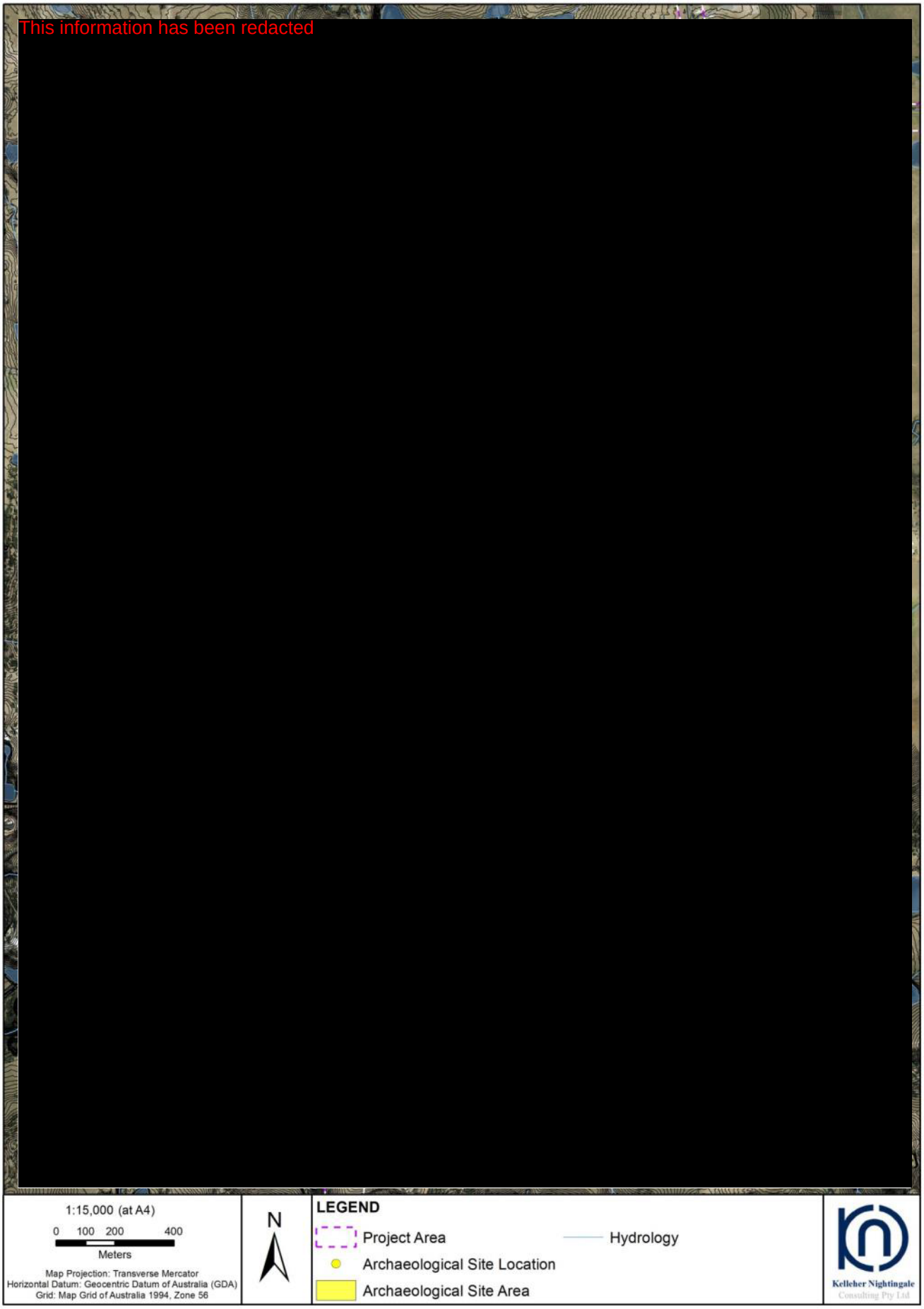

Figure 8. Archaeological sites within project area: Map 3

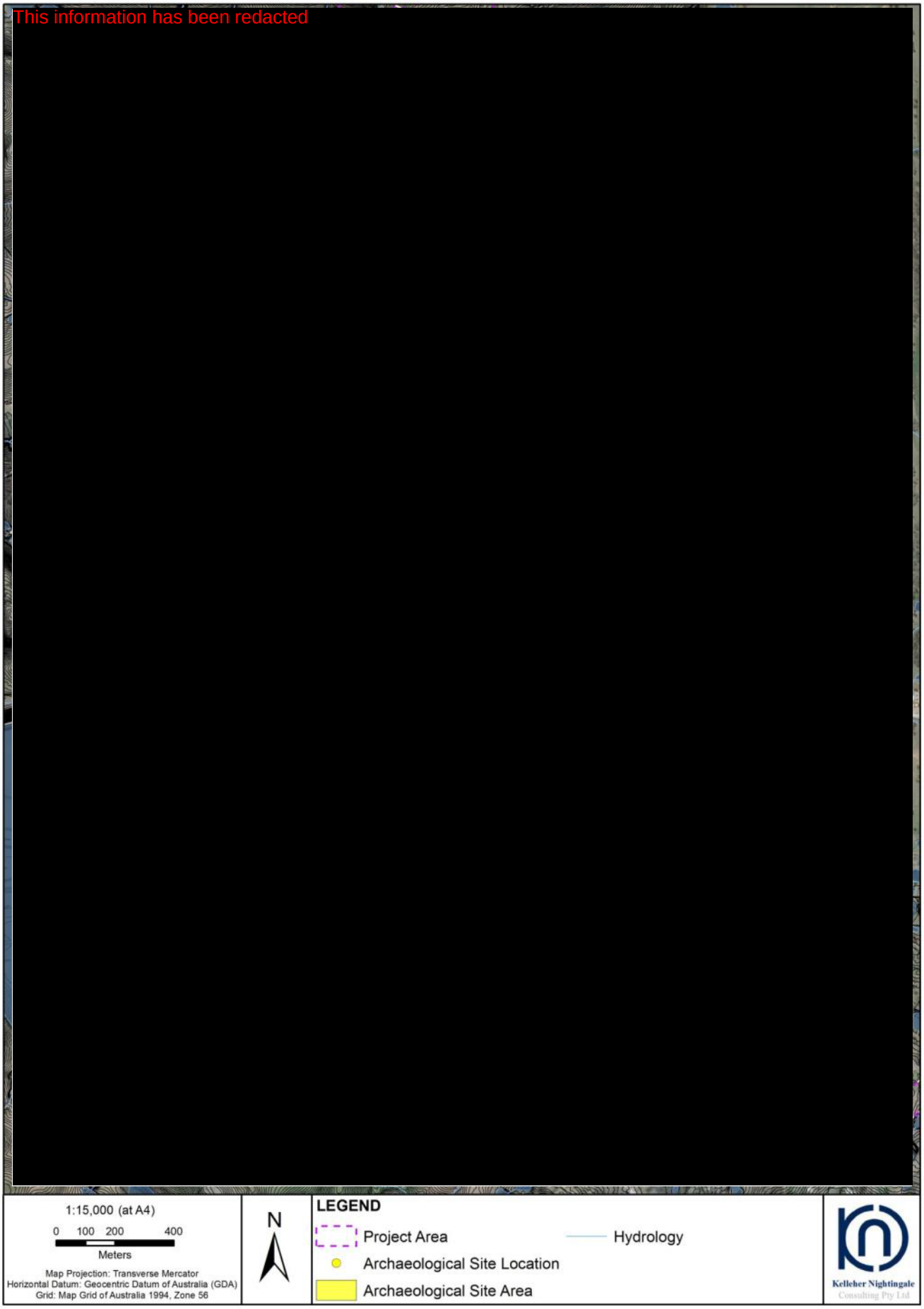

Figure 9. Archaeological sites within project area: Map 4

6 Cultural Heritage Values and Statement of Significance

6.1 Significance assessment criteria

One of the primary steps in the process of cultural heritage management is the assessment of significance. Not all sites are equally significant and not all are worthy of equal consideration and management (Sullivan and Bowdler 1984; Pearson and Sullivan 1995:7). The determination of significance can be a difficult process as the social and scientific context within which these decisions are made is subject to change (Sullivan and Bowdler 1984). This does not lessen the value of the heritage approach, but enriches both the process and the long term outcomes for future generations as the nature of what is conserved and why, also changes over time.

The assessment of significance is a key step in the process of impact assessment for a proposed activity as the significance or value of an object, site or place will be reflected in resultant recommendations for conservation, management or mitigation.

The *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010) requires significance assessment according to criteria established in the *Australia ICOMOS Burra Charter*, 1999 (Australia ICOMOS 1999). The *Burra Charter* and its accompanying guidelines are considered best practice standard for cultural heritage management, specifically conservation, in Australia.

Guidelines to the *Burra Charter* set out four criteria for the assessment of cultural significance:

- Aesthetic value - relates to the sense of the beauty of a place, object, site or item;
- Historic value - relates to the association of a place, object, site or item with historical events, people, activities or periods;
- Scientific value - scientific (or research) value relates to the importance of the data available for a place, object, site or item, based on its rarity, quality or representativeness, as well as on the degree to which the place (object, site or item) may contribute further substantial information; and
- Social value - relates to the qualities for which a place, object, site or item has become a focus of spiritual, political, national or other cultural sentiment to a group of people. In accordance with the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*, the social or cultural value of a place (object, site or item) may be related to spiritual, traditional, historical or contemporary associations. "Social or cultural value can only be identified though consultation with Aboriginal people" (OEH 2011:8).

The assessment of these values are brought together to form a comprehensive assessment of significance.

6.2 Statement of significance

The project area contains 28 identified Aboriginal archaeological sites containing Aboriginal objects as defined under the *National Parks and Wildlife Act 1974*. The significance of recorded Aboriginal archaeological sites within the project area ranges from low to moderate, with the majority having been assessed as being of moderate significance. This assessment is based on a consideration of the research potential, connectivity (association with other sites), representativeness, intactness and rarity. Significance of sites within the project area is shown in Table 5. Specific Aboriginal stakeholder comments and cultural values will be incorporated into the overall significance assessment as provided.

The identified level of moderate significance is predominantly driven by the fact that artefact scatters along the ridge (The Northern Road) are spatially connected by the landform itself, but also represent connections through thousands of years of time. These connections offer insights into past cultural continuums depicting the movements and actions of past Aboriginal people, enabling an understanding of how past people spatially organised their culture - and most tantalising how past peoples perceived the world around them. Recent research of such landscape continuums has found a strong association between contemporary use/perceptions of landscape and past Aboriginal landscapes. If a body of land was useful for a specific activity in the past (e.g. travel) that same body of land is most often perceived in the same way in the present. The significance of The Northern Roads' Aboriginal heritage has much to do with what it can tell us (via a continuum of knowledge over many thousands of years) about how the modern world utilises a landscape.

6.3 Significance of connectivity – The Northern Road's Aboriginal heritage

The archaeological sites associated with the project represent an important extended type of connectivity, where all of the sites are located on or near the spine of a low north-south ridge (The Northern Road) stretching over 16 kilometres. The reason The Northern Road was built on the ridgeline was the same reason the Aboriginal sites are located on the ridge – the landform itself facilitates intrinsic transitory movements suitable for cultural activity. This naturally formed cultural highway enables an assessment of past transitory behaviour through the study of Aboriginal sites (representing past movements on the ridgeline over several thousand years). Moreover, the collection of archaeological sites has a greater scientific and socio-cultural assessment value than piecemealed assessments. In effect the *en masse* archaeological information represents a higher information value than each individual site – the group is more valuable than any individual part. In this regard the projects' collection of impacted archaeological sites are rare as an assessment group, because the group offers a statistically significant level of information about an area (the south west Cumberland Plain) where little large scale, connectable or representative information exists. Information obtained through the proposed salvaging of artefacts at key locations along this continuum (road corridor) will greatly enhance our cultural and archaeological understanding of the area and allow for significant interpretation of past events and better management of Aboriginal heritage. Improved management would then allow for future conservation outcomes, where culturally and statistically significant archaeological sites can be identified *and their value empirically established* in advance of proposals, thus enabling informed planning. The information exhibited and collected by salvaging The Northern Road's Aboriginal archaeological sites will provide a baseline for understanding, interpreting and conserving the region's Aboriginal cultural heritage.

Table 5. Significance of Aboriginal sites within the project area

Significance	Site	Justification
Moderate	B 6 (45-5-2636) TNR AFT 06 (45-5-4785) TNR AFT 07 (45-5-4784) TNR AFT 08 (45-5-4789) TNR AFT 11 (45-5-4780) TNR AFT 12 (45-5-4778) TNR AFT 13 (45-5-4779) TNR AFT 14 (45-5-4786) TNR AFT 16 (45-5-4796) TNR AFT 17 (45-5-4787) TNR AFT 19 (45-5-4790) TNR AFT 20 (45-5-4792) TNR AFT 22 (45-5-4793) TNR AFT 24 (45-5-4795) TNR AFT 26 (45-5-4798) TNR AFT 27 (45-5-4799) TNR AFT 29 (45-5-4801) TNR AFT 30 (45-5-4797) TNR AFT 31 (45-5-4802) TNR AFT 33 (tbc)	• These sites offer good research potential as they represent intact archaeological deposits within the project area • Further investigation would add to our understanding of Aboriginal activities in a transitional landscape between the Cumberland Plain and Nepean River
Low	TNR AFT 10 (45-5-4781) TNR AFT 23 (45-5-4794) TNR AFT 25 (45-5-4791) TNR IF 01 (45-5-4805) TNR IF 02 (45-5-4806) TNR IF 03 (45-5-4807) TNR IF 04 (45-5-4808) TNR IF 05 (45-5-4809)	• These sites are highly disturbed and the surrounding area showed very little potential for further archaeology • Every Aboriginal site is important to the local Aboriginal community, however, there are more intact or better examples of this site type within the project area and wider local area • Any change or loss of these sites is unlikely to diminish the overall Aboriginal cultural heritage values of the project area and wider local area

7 Impact Assessment and Mitigation Strategies

7.1 Proposed activity

Roads and Maritime is seeking approval to upgrade about 16 kilometres of The Northern Road between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park. The entirety of the project area will be impacted by road construction. In total 28 Aboriginal archaeological sites will be at least partially impacted by road construction. Proposed impacts to sites identified within the project area detailed in Table 6 and shown in Figure 10.

7.2 Avoiding and/or mitigating harm

All 28 identified Aboriginal cultural and archaeological sites identified within or near the project area have been considered by Roads and Maritime in relation to the proposed road upgrade and associated activities. While conservation is the best approach when considering Aboriginal heritage, some level of impact is unfortunately unavoidable due to the requirements of the road upgrade.

The CHAR evaluated the potential harm of the project on Aboriginal archaeological heritage in terms of Ecologically Sustainable Development (ESD). The ESD assessment of Aboriginal heritage evaluated: long-term and short-term considerations, precautionary environmental impacts, maintenance and enhancement for future generations and cost/benefit of impacting on archaeological objects. In this regard, alternative designs and conservation principles have been considered by Roads and Maritime to limit the cumulative harm of Aboriginal heritage. Where significant sites were identified, where possible the design has been modified to limit the impact to the identified cultural places and archaeological sites. For example, the project alignment took into consideration the location of known Aboriginal cultural heritage sites and values. The project design was able to avoid impact to seven archaeological sites through realignment (cf. KNC 2016). Furthermore, the refined project design has limited the impact to 16 archaeological sites (see Table 6, partial impact). The remaining 12 archaeological sites will be wholly impacted by the project.

The scientific value of archaeological sites is linked to the physical information the sites contain. The loss of intrinsic Aboriginal cultural value of impacted sites cannot be offset; however the salvaged information will increase our understanding, strengthen our interpretations and improve ongoing and future management of Aboriginal heritage in the surrounding area. While the spatial extent and presence of archaeological deposits is well understood in the southern Cumberland Plain (we know where it is), an understanding of the activities related to Aboriginal occupation is less well known due to limited large scale excavation data. In this light, the project offers an opportunity to significantly advance the interpretation and management of Aboriginal heritage of the surrounding area by providing a baseline foundation for future heritage assessments.

Mitigation measures are recommended for sites exhibiting at least moderate heritage significance within the project area (Table 8).

Twenty archaeological sites require mitigation because they exhibit: at least moderately intact archaeological deposit, relatively intact soil structure, information bearing archaeological objects and Aboriginal cultural value. Recovery of information through archaeological salvage excavation will partially offset the loss caused by the upgrade works by increasing our understanding, strengthening our interpretation and bettering our recognition of Aboriginal heritage within an area where little previous documented information exists.

Eight archaeological sites require no mitigation because they are: only partially impacted by construction, highly disturbed or contain no secondary archaeological information.

7.3 Residual Impacts

It is expected that some limited residual impact will exist for Aboriginal archaeological sites following completion of the proposed mitigation measures, which include archaeological salvage excavation (Table 8 and Appendix C). While the proposed mitigation for impacted sites will contribute to our understanding, strengthen our interpretations and improve ongoing and future management of Aboriginal heritage in the surrounding area, the salvage work will have a residual impact to the heritage value of sites by physically removing artefacts.

Table 6. Impact of project and mitigation measures

Site Name	Assessed Significance	Impact Assessment	Mitigation Strategy
B 6	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 06	Moderate	Total Impact	Archaeological salvage excavation. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 07	Moderate	Total Impact	Archaeological salvage excavation. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 08	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 10	Low-moderate	Partial Impact	Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 11	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 12	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 13	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 14	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 16	Moderate	Total Impact	Archaeological salvage excavation. Relevant project approval required prior to commencement of works affecting the site.

Site Name	Assessed Significance	Impact Assessment	Mitigation Strategy
TNR AFT 17	Moderate	Total Impact	Archaeological salvage excavation. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 19	Moderate	Total Impact	Archaeological salvage excavation. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 20	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 22	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 23	Low	Total Impact	Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 24	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 25	Low	Total Impact	Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 26	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 27	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 29	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.

Site Name	Assessed Significance	Impact Assessment	Mitigation Strategy
TNR AFT 30	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 31	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR AFT 33	Moderate	Partial Impact	Barrier fencing to be erected on the project approval boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the project boundary. Portion of site area outside of project boundary should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact. Archaeological salvage excavation of impacted portion of site. Relevant project approval required prior to commencement of works affecting the site.
TNR IF 01	Low	Total Impact	Relevant project approval required prior to commencement of works affecting the site.
TNR IF 02	Low	Total Impact	Relevant project approval required prior to commencement of works affecting the site.
TNR IF 03	Low	Total Impact	Relevant project approval required prior to commencement of works affecting the site.
TNR IF 04	Low	Total Impact	Relevant project approval required prior to commencement of works affecting the site.
TNR IF 05	Low	Total Impact	Relevant project approval required prior to commencement of works affecting the site.

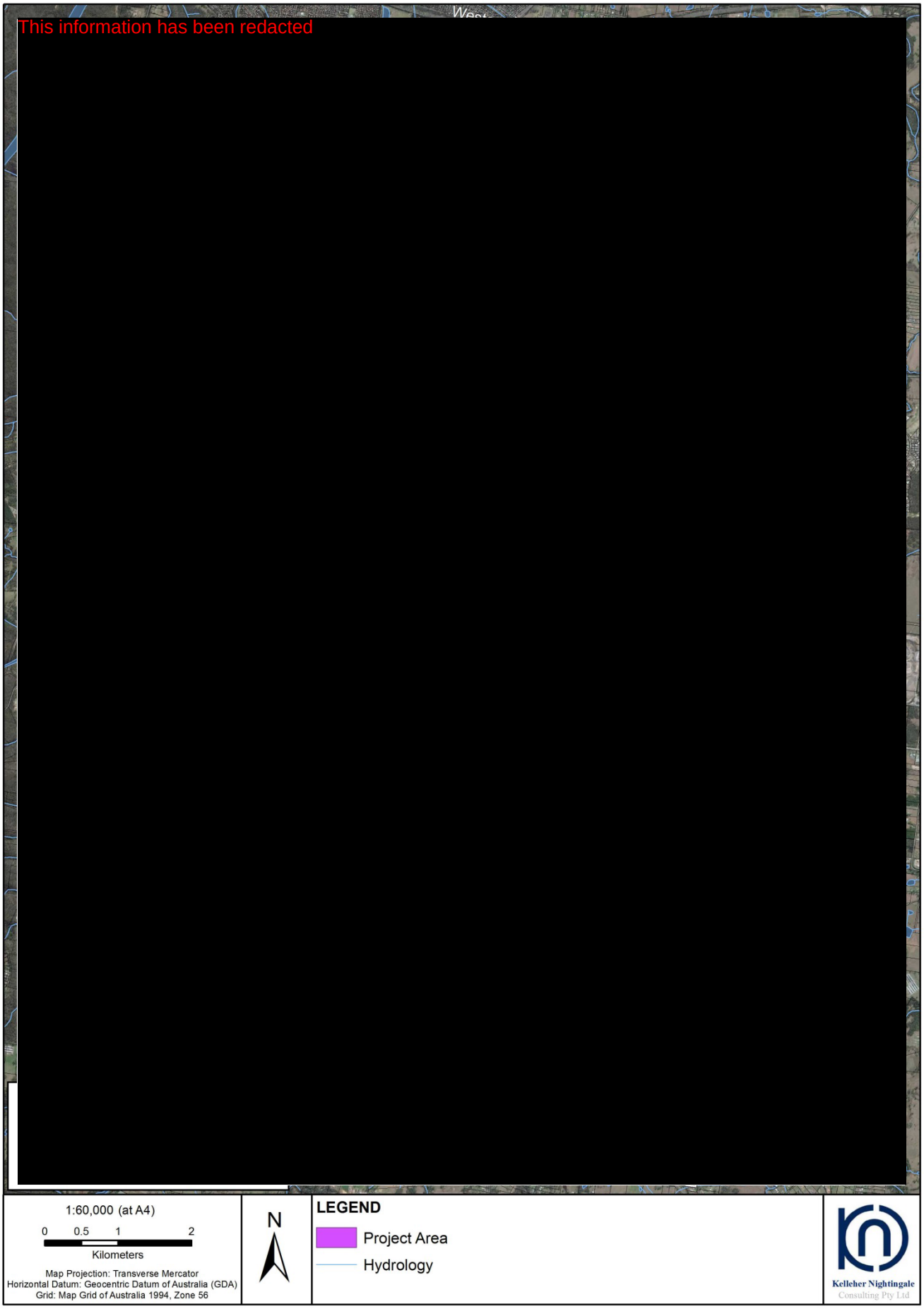

Figure 10. The Northern Road Upgrade between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park - impacted Aboriginal archaeological sites

8 Management Outcomes

The following general management outcomes will be implemented in accordance with the management procedures for the proposal as outlined in Chapter 9.

8.1 Conservation of portion of Aboriginal archaeological sites outside impact area

The archaeological sites in Table 7 would be partially impacted by the project. The location of the portions of these sites to be conserved should be identified in the Construction Environmental Management Plan, Construction Heritage Sites Map and Project Inductions to ensure they are not inadvertently damaged as a result of construction works.

In addition, the portion of the site outside the project boundary should be fenced off prior to the commencement of construction works to ensure that the area is not inadvertently affected as a result of construction work. At a minimum the fencing should clearly define the project boundary in relation to the archaeological site. Fencing would be maintained throughout the duration of works.

Salvage excavation is required for the impacted portion of the sites with moderate significance and must be completed prior to any activities which may harm Aboriginal objects at these site locations (see section 8.2). Salvage excavation can only occur after project approval is obtained. Salvage excavation must be completed prior to any activities which may harm Aboriginal objects at these site locations. Salvage excavation activities would be undertaken in accordance with the methodology attached as Appendix C.

Table 7. Aboriginal sites partially impacted by road construction

Archaeological sites partially impacted		
Archaeological Sites (requiring fencing for non-impacted portion)	B 6 TNR AFT 08 TNR AFT 10 TNR AFT 11 TNR AFT 12 TNR AFT 13 TNR AFT 14 TNR AFT 20	TNR AFT 22 TNR AFT 24 TNR AFT 26 TNR AFT 27 TNR AFT 29 TNR AFT 30 TNR AFT 31 TNR AFT 33

8.2 Mitigation through archaeological salvage excavation

The archaeological sites in Table 8 are of moderate Aboriginal heritage significance and will be impacted by the project. These sites require archaeological salvage excavation to mitigate the impacts. Salvage excavation can only occur after project approval is obtained.

Salvage excavation must be completed prior to any activities which may harm Aboriginal objects at these site locations. Salvage excavation activities would be undertaken in accordance with the methodology attached as Appendix C.

Table 8. Aboriginal sites requiring mitigation (salvage excavation)

Archaeological sites requiring mitigation		
Archaeological Sites (requiring salvage)	TNR AFT 06 TNR AFT 07 TNR AFT 16	TNR AFT 17 TNR AFT 19
Archaeological Sites - Partially impacted (requiring salvage excavation of impacted portion)	B 6 TNR AFT 08 TNR AFT 11 TNR AFT 12 TNR AFT 13 TNR AFT 14 TNR AFT 20 TNR AFT 22	TNR AFT 24 TNR AFT 26 TNR AFT 27 TNR AFT 29 TNR AFT 30 TNR AFT 31 TNR AFT 33

8.3 No archaeological mitigation required

No archaeological mitigation is required for the sites in Table 9. Sites may only be impacted after project approval is obtained.

Table 9. Aboriginal sites with no further archaeological mitigation required

No further archaeological mitigation required	
Archaeological Sites (no archaeological mitigation)	TNR AFT 10 TNR AFT 23 TNR AFT 25 TNR IF 01 TNR IF 02 TNR IF 03 TNR IF 04 TNR IF 05

9 Management Procedures

9.1 Management Policy for Aboriginal Heritage

The policy for the management and conservation of Aboriginal heritage in relation to salvage activities and construction activities (or fencing, geotechnical investigations, minor clearing, establishing site compounds, adjustment to services/utilities etc.) is described below:

Responsibility for compliance with Management Policy

1. The Proponent must ensure all of its employees, contractors and subcontractors and agents are made aware of and comply with this management policy.
2. The Proponent must appoint a suitably qualified and experienced environmental manager who is responsible for overseeing the activities related to this management policy.
3. The Proponent must appoint a suitably qualified and experienced Archaeologist who is responsible for overseeing, for and on behalf of the Proponent, the archaeological activities relating to the project.
4. All site staff must be trained in cultural heritage site awareness prior to works starting on site. Toolbox talks throughout construction will include cultural heritage content

Operational constraints

5. Where archaeological excavation has been nominated for impacted sites, no construction activities (or fencing, geotechnical investigations, minor clearing, establishing site compounds, adjustment to services/utilities etc.) can occur on the lands to be investigated until the relevant archaeological excavation at the nominated site have been completed. This restriction only relates to the specifically identified portion of an archaeological site to be excavated and not the entire archaeological site (unless specified). Construction activities may proceed on the portion of a site not designated for salvage provided they do not impact or impede the archaeological excavation and that the area to be excavated is identified in consultation with the Archaeologist prior to the commencement of those construction activities.
6. Prior to the commencement of early works activity (e.g. fencing, minor clearing, establishing site compounds etc.) a construction heritage site map identifying Aboriginal sites to be excavated must be prepared. The construction heritage site map should be prepared to the satisfaction of Roads and Maritime.
7. All employees, contractors, subcontractors and agents carrying out early works activities (e.g. fencing, minor clearing, geotechnical investigations, establishing site compounds etc.) must undertake a Project induction (including the distribution of a construction heritage site map) to ensure that they have an understanding and are aware of the Aboriginal heritage issues affecting the activity.

Areas of Aboriginal archaeological sites and objects to be impacted

8. The areas of archaeological sites and objects identified as being impacted by construction activities are listed in Table 6 of this report and are in accordance with the Project Approval.

Human Remains

9. This management policy does not authorise any damage of human remains.
10. If potential human remains are disturbed the Proponent must follow the procedures outlined in section 9.3 below.

Salvage Activities

11. Archaeological salvage excavation where appropriate must be carried out in accordance with the methodology specified in Appendix C and the Project Approval.

Involvement of Aboriginal groups and/or individuals

12. Opportunity may be provided to the registered Aboriginal stakeholders to be involved in the following activities:
    a. assist with the salvage excavation.

Conservation of salvaged Aboriginal objects

13. Department of Planning and Environment (DP&E), as the approval authority, will be consulted;
14. Aboriginal objects will be transferred to the Australian Museum in accordance with legislative requirements, *Australian Museum Archaeological Collection Deposition Policy v1.0 January 2012;*
15. In the event the Australian Museum is unable to accept the objects, the objects will be transferred in accordance with a Care Agreement or similar agreement to an Aboriginal community;
16. In the event that neither the Australian Museum nor the Aboriginal community are able to accept the archaeological objects, KNC will seek a Care Agreement or similar agreement to curate the objects.

Reporting requirements

17. A written archaeological excavation report must be provided to Roads and Maritime within a reasonable time in accordance with the Project Approval following the completion of the archaeological program.

Notification and reporting about incidents that breach this management policy

18. Incident reporting requirements in accordance with the Project Approval is to include Aboriginal heritage.

9.2 Procedures for Handling Human Remains

- **Note that Project Approvals do not include the destruction of Aboriginal remains**

This section outlines the procedure for handling human remains in accordance with the Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the *Heritage Act 1977* (NSW Heritage Office 1998) and the Aboriginal Cultural Heritage Standards and Guidelines Kit (NPWS 1997). In the event that construction activity reveals possible human skeletal material (remains), the following procedure is to be followed:

1. as soon as remains are exposed, all work is to halt at that location immediately and the Project environmental manager on site is to be immediately notified to allow assessment and management;
    i. stop all activities; and
    ii. secure the site.
2. contact police, the discovery of human remains triggers a process which assumes that they are associated with a crime. The NSW Police retain carriage of the process until such time as the remains are confirmed to be Aboriginal or historic;
3. DP&E, as the approval authority, will be notified when human remains are found;
4. once the police process is complete and if remains are not associated with a contemporary crime contact DP&E. DP&E will determine the process, in consultation with OEH and/or the Heritage Office as appropriate;
    i. if the remains are identified as Aboriginal, the site is to be secured and DP&E and all Aboriginal stakeholders are to be notified in writing. DP&E will act in consultation with OEH as appropriate. OEH will be notified in writing according to DP&E instructions; or
    ii. if the remains are identified as non-Aboriginal (historical) remains, the site is to be secured and the DP&E is to be contacted. DP&E will act in consultation with the Heritage Division as appropriate. The Heritage Division will be notified in writing according to DP&E instructions;
5. once the police process is complete and if the remains are identified as not being human work can recommence once the appropriate clearances have been given.

9.3 Procedure for proposed changes to Approved Projects

RMS recognises that during the construction of the project design alterations or other changes to the Approved Project may be required.

A proposed change to the Approved Project (such as an alteration of the current design, the location of ancillary facilities) within the project corridor may result in a:

- Reduced impact to Aboriginal cultural heritage; or an
- Increased impact to Aboriginal cultural heritage.

Note: the use of the word impact in this section is defined as an impact on the significance of Aboriginal cultural heritage rather than simply an increased physical impact.

To ensure consistency with the Approved Project and this document any change in the overall impact on Aboriginal cultural heritage will need to be considered. The process to determine consistency is outlined in section 9.3.1 below.

Where a proposed change to the Approved Project occurs outside of the project boundary considered for the EIS further heritage assessment will be required to determine if there would be an impact on Aboriginal cultural heritage and whether this represents a modification to the Approved Project (outlined below).

9.3.1 Changes in heritage impact

Where the Proponent seeks to make a change to the design and construction of the Approved Project which changes the assessed impact on Aboriginal cultural heritage the Proponent will need to prepare an assessment of the new impacts of this work in consultation with the appointed Archaeologist. The continued involvement of the Aboriginal stakeholders in this process is outlined in section 9.4.

- New impacts consistent with previously identified impacts

If a proposed change to the Approved Project is considered to have a neutral or lesser significant impact on Aboriginal cultural heritage than that identified in this document it would be considered a consistent impact.

If the proposed change is considered to be consistent with the Approved Project Roads and Maritime may approve the change with no requirements to seek further approval. However, in certain circumstances, further consultation with Aboriginal stakeholders may still be required (see section 9.4 below).

- New impacts inconsistent with previously identified impacts

If a proposed change to the Approved Project is considered to have a more significant impact on Aboriginal cultural heritage than that identified in the EIS it would be considered an inconsistent impact.

If the proposed change is considered inconsistent with the assessed impact on Aboriginal cultural heritage, as detailed in the Project Approval, Roads and Maritime would require an amendment to the mitigation measures agreed in this report. If this proposed change is considered inconsistent with the Approved Project Roads and Maritime would require a modification of the Approved Project. Further consultation with Aboriginal stakeholders will be undertaken (see 9.4 below).

9.4 Process for continued consultation with Aboriginal stakeholders

The extent to which Roads and Maritime will continue to consult with Aboriginal stakeholders is dependent upon the level of impact and whether the area was assessed as part of the EIS. The types of potential impacts are identified as reduced impacts, increased impacts or unknown impacts.

a) Reduced or neutral impact
If as a result of alterations to the project design a previously identified impact to an Aboriginal heritage item is reduced or neutral then no further consultation is required.

If as a result of alterations to the project design an impact to an Aboriginal heritage item is proposed that results in a reduced impact on the overall heritage significance of the project area (i.e. the cumulative impact is reduced), then further consultation with Aboriginal stakeholders will be undertaken. This consultation may entail a phone call and phone log of comments received or the provision of a report for comment (10 working days).

b) Increased Impact
Where as a result of alterations to the project design an impact on Aboriginal heritage is considered to be greater than identified by the Approved Project further consultation will be undertaken. This consultation will either entail a phone call and phone log of comments received or the provision of a report for comment (10 working days).

c) Unknown impacts: Assessment process
Where a proposed change is an area located outside of the project boundary assessed as part of the Approved Project the impact on Aboriginal cultural heritage is considered to be unknown. This area would require preliminary assessment to determine any impacts upon Aboriginal heritage. Should no impacts be identified then no consultation with Aboriginal stakeholders is required. Should potential impacts be identified consultation with Aboriginal stakeholders will be undertaken. This consultation will entail the provision of a report for stakeholder comment (10 working days) detailing the impacts and mitigation strategies proposed.

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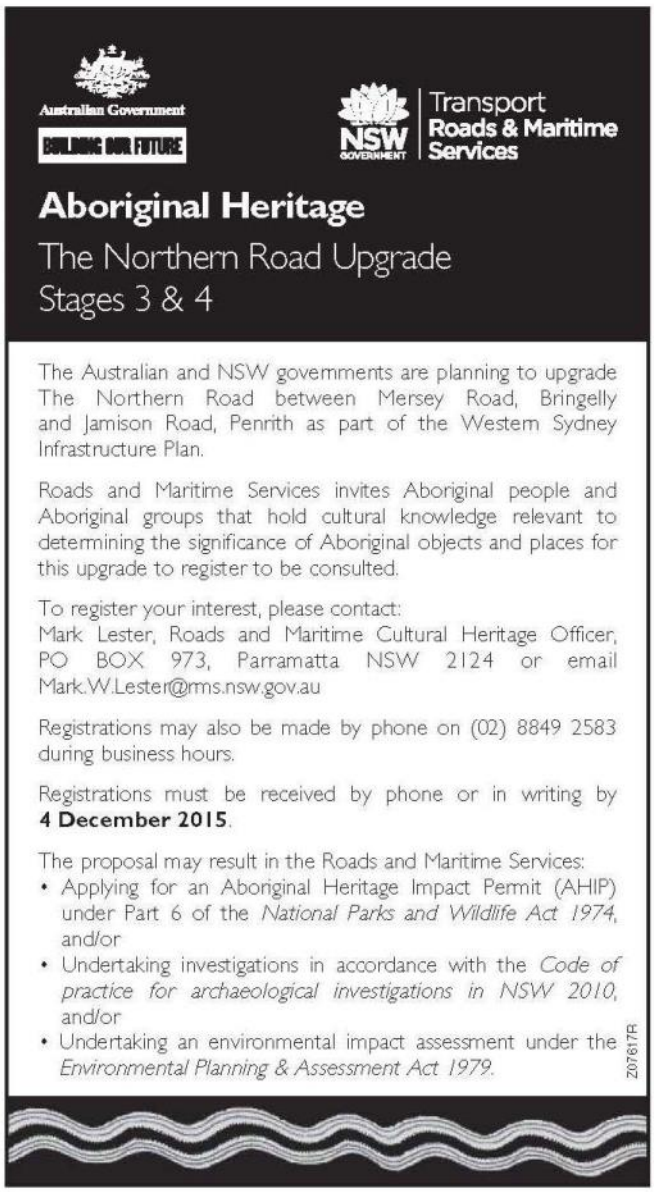
Appendix A Advertisement for registration of interest



Australian Government
BUILDING OUR FUTURE

NSW GOVERNMENT Transport Roads & Maritime Services

Aboriginal Heritage

The Northern Road Upgrade
Stages 3 & 4

The Australian and NSW governments are planning to upgrade The Northern Road between Mersey Road, Bringelly and Jamison Road, Penrith as part of the Western Sydney Infrastructure Plan.

Roads and Maritime Services invites Aboriginal people and Aboriginal groups that hold cultural knowledge relevant to determining the significance of Aboriginal objects and places for this upgrade to register to be consulted.

To register your interest, please contact:
Mark Lester, Roads and Maritime Cultural Heritage Officer, PO BOX 973, Parramatta NSW 2124 or email Mark.W.Lester@rms.nsw.gov.au

Registrations may also be made by phone on (02) 8849 2583 during business hours.

Registrations must be received by phone or in writing by **4 December 2015**.

The proposal may result in the Roads and Maritime Services:

- Applying for an Aboriginal Heritage Impact Permit (AHIP) under Part 6 of the *National Parks and Wildlife Act 1974*, and/or
- Undertaking investigations in accordance with the *Code of practice for archaeological investigations in NSW 2010*, and/or
- Undertaking an environmental impact assessment under the *Environmental Planning & Assessment Act 1979*.

Z07617R

Appeared in: *Penrith City Gazette* (19/11/2015, page 24 – closing date 2/12/2015)
Penrith Press (19/11/2015, page 15 – closing date 4/12/2015)
The Koori Mail (18/11/2015, page 11 – closing date 2/12/2015)
The Western Weekender (20/11/2015, page 24 – closing date 4/12/2015)

Appendix B Aboriginal Stakeholder Comments

DARUG LAND OBSERVATIONS PTY LTD
ABN 27 602 765 453

Email: daruglandobservations@gmail.com
PO BOX 571 PLUMPTON NSW 2761
Mobile: 0420 591 138 / 0413 687 279

13th April, 2016

Mark Lester
Aboriginal Cultural Heritage Officer
Roads and Maritime Services
Level 11, 27-31 Argyle Street
PARRAMATTA NSW 2150

Dear Mark,

RE: The Northern Road Upgrade – Stages 3 & 4
Glenmore Parkway, Glenmore Park to Mersey Road, Bringelly

Aboriginal Cultural Heritage Assessment Report

Darug Land Observations Pty Ltd has reviewed the proposed draft Aboriginal Cultural Heritage Assessment report (ACHAR) and supports the draft methodology for the proposed 17km upgrade of the Northern Road between the Glenmore Parkway, Glenmore Park to Mersey Road, Bringelly.

In relation to the long-term storage of recovered artefacts, if any, Darug Land Observations Pty Ltd strongly believes that the recovered artefacts should be re-buried on Country (the study area).

Darug Land Observations Pty Ltd would like to receive a copy of the Section 90 Aboriginal Heritage Impact Permit (AHIP).

Furthermore, Darug Land Observations Pty Ltd would be involved in the monitoring of the topsoil removal and all other form of works to be carried out on the site.

Yours sincerely,

Jamie Workman

Uncle Gordon Workman

Matthew Kelleher

From: Danny Franks <danny@tocomwall.com.au>
Sent: Tuesday, 12 April 2016 10:33 AM
To: Mark.W.LESTER@rms.nsw.gov.au
Cc: Scott Franks; Matthew Kelleher; Jakub Czastka
Subject: RE: (Draft Cultural Heritage Assessment Report) Northern Road Upgrade Glenmore Parkway to Mersey Road.

Morning Mark,

A point I would like to make clear as it is not only irritating me but is the completely wrong terminology and shouldn't be referred to as such. I have seen the term "aboriginal Highway" strewn throughout the report. It is well known that sites and especially trading routes are referred to as "SONG LINES". This is the most culturally accurate term and better defines the connectivity between the sites that have been recorded. These people are not just in transit. They are communicating and trading resources. There is an information network here that needs to be better understood.

My job is to ensure that there is something left for future generations. I have been apart of this work for the past 20+ years and have seen endless amounts of significant sites be demolished purely because an archaeologist doesn't understand the intrinsic or complexity of understanding a hunter gatherer society. The ability to distinguish between socio-political bands (mobs) is absolutely necessary when it comes to understanding the individual Cultures (a culture is conceptualised from the surrounding ecology and environment, it is what moulds an individuals cognitive functions and how we perceive and react to such, that creates a culture) that each mob exhibits. Each mob had a unique individualistic and unique way of reacting to climatic conditions or even fashioning materials that made them individuals. This I believe can be found in the material remains that are being excavated. Mathew has a number of times touched on the cognitive functions of social archaeology which is mainly the due diligence of a social anthropologist that should be undertaken, so he must be given praise.

Previous studies that have taken place throughout these areas clearly show in their ethnographic research that there were sub clans scattered throughput these regions that this Highway upgrade is flowing through. You have to take into consideration not only the elevations, as these play an important role in specific site localities but also the ecotones found during any environmental sampling. Specific members of these tribes had permission and the knowledge of how to use and source these resources.Putting it simply, Women had permission and the knowledge to reduce plant material into medicinal properties. Men had permission and as part of ritualistic practices depending on which stage of there initiation they were at, had the ability to use certain sedimentary rocks as well as hunt and eat specific mammals. The higher the silicious impregnation of these sedimentary types the higher cultural value they held, as they are easier to work. The nearest resource zone would have to be Plumpton ridge as it is rich in this material. It should be easy to distinguish as it has a unique composition, You could employ a drop off analysis throughout this study area to see exactly how far this material has travelled and traded between sites.

Regards

Danny Franks
Cultural Heritage Manager

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1

Transport Roads & Maritime Services

Meeting minutes

Name of meeting: Aboriginal Focus Group Meeting 1

Location of meeting: Novotel Parramatta

Meeting facilitator: Mark Lester

Date: 27th April 2016 **Time:**10am – 1pm

Attendees: Gordon Morton, Philip Khan, Steven Hickey, Darleen Johnson, Fiona Ryan, Carolyn Hickey, A. Williams, N. Burrows, Glenda Chalker, Libby Coplin, Barry Gunther, Mark Lester, Matthew Kelleher, Vernon Stanton, Anthony Broekhuyse, Dexter Isaaks, Shirley Luong, Nicholas Psaila, Christine Koutsantonis

Subject: The Northern Road Upgrade Mersey Road to Jamison Road

MEETING MINUTES

1) **Introduction**
   - ML introduction and apologies
   - GM – acknowledgment of traditional land owners
   - All attendees introduced themselves
2) Objectives of meeting
   - ML – explained The Northern Road was broken up into various stages but advised that to avoid confusion the stages should be ignored and the road be viewed as one section from Mersey Road to Jamison Road.
3) Project Proposal
   - VS – explained which sections of The Northern Road where covered in each CHAR report.
   - VS – presented TNR3 proposal. Covered key dates including lodging an AHIP mid 2016, obtaining project approval around November 2016.
   - TW – raised a question regarding impacts to Adams Rd and Mersey Rd
   - VS – advised the question would be answered in the section covered by DI
   - No further questions were raised for TNR3.
   - DI - presented TNR proposal for Mersey Road to Glenmore Parkway
   - TW – Questioned if the 6-8 lanes were primarily to service the area?
   - DI – Answered by explaining that whilst the airport was a primary factor, the growth centres also contributed to the lane capacity proposed.
   - TW – Questioned what infrastructure was planned for the area suggesting several major developments he had heard of including light rail and a science park
   - DI – confirmed a science park has been proposed north of the airport. TfNSW are managing a rail strategy for the area.

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- DI – Regarding the earlier question TW asked referring to the impacts on Adams Rd, a bridge will be built over Adams Road.
- Glenda – wanted some details on the M12
- DI – a proposed motorway that would link the airport that is connected to the M7 and TNR
- VS & CK – leave after confirming there are no further questions for TNR3.

4) Field Survey report results, proposed Archaeological investigation methodologies and proposed AHIP application
   - MK – explained that the process of determining potential routes considered the impacts on Aboriginal Heritage. All options considered had similar impacts on Aboriginal Heritage.
   - MK - Reinforced what ML spoke about earlier that the focus needs to be on one area despite two reports being prepared.
   - MK - A total of 33 sites identified, 31 from Mersey Road to Glenmore Parkway and 2 from Glenmore Parkway to Jamison Road
   - MK - Spoke of the history behind TNR, being a route for Aboriginals and then European settlers as a result of being located on a ridge.
   - MK – fly through video of the site providing a quick overview of the study area – including key features and outlining Aboriginal Heritage sites.
   - MK – confirmed that the M4 contained Aboriginal Heritage sites but they were covered in a separate AHIP.
   - MK – covered the first two sites north of Glenmore Parkway. Including one that was located within the property boundary of Penrith Golf and Recreation Club.
   - Glenda – raised concerns about the Golf Club being made aware of the site
   - MK – confirmed the site has been registered and a recommendation can be made to the RMS to notify the Golf Course.
   - BG – RMS will inform the golf course of their legislative requirements.
   - TW – recommended soil samples be taken because there could be petrification
   - MK – nothing old as petrification.
   - Norma – arrives and introduces herself.
   - MK – continues to cover remaining sites.
   - BG – questions a site that has been split in two by a road and asks whether it should be classed as one or two sites.
   - MK – explains that as it originally was one site it should still be classed as one site despite the road dividing it into two sections.
   - Glenda – where is all the excess soil taken from the road construction
   - MK – road designers try to minimise any soil import/export but balancing cut/fill to minimise costs.
   - BG – when was TNR built
   - SH – 1850
   - MK – it was being used prior to 1850 but just as a track
   - MK – explains that the new alignment for TNR by deferring into greenfields experiences a different higher density of Aboriginal Heritage.

- MK – reveals sandstone was found south of Elizabeth Drive which has the potential to lead to tools being food as sandstone was used for tool grinding and sharpening but no evidence was found of such activities.
- MK – explained the largest and best preserved sites were found at sites 24, 26 & 27.

5) Community comments/ Cultural Values

- BG – Did you reveal the impacts to each site?
- MK – explained that not all sites were completely located in the study area.
- Glenda- suggested all private owners be contacted by RMS and be made aware of the site and their legislative responsibilities.
- BG – wanted MK to confirm if some would be salvaged.
- MK – all the sites presented today are recommended for salvage or mitigation.
- BG – How long will the salvage take?
- MK – it depends on how many excavation teams but approximately several months.
- ML – how many Aboriginal representatives would be needed?
- MK – until it is determined and what will be salvaged it is difficult to determine how many people will be needed. The quantity of people needed will depend on how the project is staged. Ideally two teams of 4 Aboriginal representatives each meaning a total of 8 representatives. There won't be any work for at least a year.
- TW – raised concerns about non-local Aboriginal works applying for work
- ML – we try to use local Aboriginals but we are not required by legislation to.
- MK – to TW if you have any valuable information regarding sites please bring it forward.
- SH – is there any potential for an Aboriginal Offset.
- BG – it's difficult because of such a diverse community. A framework needs to be setup first.
- PC – if Aboriginal Groups don't attend salvage works can RMS make sure they call someone in to replace them so there is still Aboriginal representatives present.
- ML – confirmed that if Aboriginal representatives don't attend salvage they try their best to replace them. Key factor is the amount of notice given.
- Glenda – 60 stakeholders have registered how do you determine which ones get work
- BG – preference is given to local people and people who have attended today have shown they are committed. RMS tries to be fair in the amount of work given.
- NB – raised concerns about loss of information through different salvage groups sharing information. Suggested a booklet or log book be used so the information and knowledge can be shared between groups. Also believed that it would assist when developing the final report.
- MK – said they have tried using log books in the past with mixed success but recommended NB send in comments and effort can be made to try to incorporate the suggestions.
- SH- wanted to confirm what the responsibility of a site officer was.
- BG – they are to assist with the labour work and bring cultural knowledge.
- CH- suggested there be a cultural leader.
- NB – reiterated the importance of getting Aboriginal Stakeholders to attend the final meeting.

- LB – wants to see a copy of the final report or even the final draft.

6) OEH Care and Control Permit
   - ML – asked the group what their view was on Care and Control. No comments were made. ML suggested return to country was the most common response. General agreement this was the best option.

7) General business and review of outcomes and actions
   - Comments due by the 4th May and late in May for each respective CHAR.
   - MK – when the CHAR is finalized it will go into the EIS and Aboriginal Stakeholders will get an update via email at least one every 6 months. Aboriginal Stakeholders to call MK, ML or BG if they have any questions.
   - ML – Thanked everyone and concluded meeting 12:30pm.

ACTION	RESPONSIBILITY	STATUS
RMS to inform golf course of site	**Vernon Stanton**	
Glenda wants a copy of the 2nd CHAR	Christine Koutsantonis	ML – believes it may already have been sent.

Appendix C Salvage Excavation Methodology

Methodology

Research Aims

The main aims of the proposed salvage excavation program are:

- To salvage a representative sample of the identified archaeological sites prior to construction impact.
- To analyse the salvaged archaeological material to gain and conserve knowledge and understanding of the scientific and cultural information exhibited by the activities associated with landforms within the project area.
- Analysis of the geomorphological history of the project area, specifically examining the impacts of fluvial and erosional forces on the archaeological record (taphonomy and chronology).
- Retrieve a suitable quantity of artefacts for a regional analysis.

The further scientific aim of the salvage excavation program would be to determine the subsurface integrity, extent, spatial distribution and nature of the cultural deposit and the specific types of associated archaeological/cultural activities.

- Determining the integrity of the deposit involves assessing the degree of disturbance which is present.
- Determining the statistical extent of the sites and/or activity areas involves identifying the boundaries associated with the identified archaeological deposit.
- Assessing the spatial distribution involves identifying the presence/absence of archaeological material across the identified archaeological sites.
- The nature of the sites refers to the type of activities indicated by the artefactual material (e.g. primary production, domestic knapping, hunting camps). The goal would be to retrieve entire assemblages from specific activities if such activities were present.
- Retrieved assemblages would be compared with the results from other relevant archaeological projects in order to assess significance.

Research Question

The results of the proposed salvage excavation would increase our understanding of subsurface archaeology of the project area, specifically related to the large scale connectivity between sites along and near the ridge associated with The Northern Road. Research will focus on identifying a range of activity areas, which characterised the larger landscape of the ridge. In particular, research would be conducted at archaeological sites across the range of landforms present within the project area addressing questions about past activity events and survivability of the deposit. In addition, assessment techniques will address how natural processes and modern landuse practices impact on archaeological sites within the local area. This information is of critical importance for determining empirical scientific value.

> **Question 1**: What cultural activities are archaeologically identifiable across the project area and what is the effect of natural and human disturbance on the preservation of these Aboriginal archaeological sites?

What can we expect?

It is anticipated that differences in stone tool assemblages may be related to different cultural activities (e.g. primary reduction vs maintenance flaking). The science of archaeology is paramount to any research question and it is important to stress that the goal for the salvage program for all excavated sites is straight forward: to retrieve a viable sample for comparative analysis using established techniques (see Field Methods below). In this regard interpretation would not precede data collection. The proposed archaeological program would systematically sample the relevant areas using standard techniques with the outcome being a viable, robust and comparable sample. Analysis of the sample would follow and interpretations would be made distinctly separate from the results.

> **Question 2**: Based on a statistical suitable sample - do variations in the lithic assemblage represent cultural activities, raw material sourcing or combinations of cultural and environmental factors?

Geoarchaeology

The archaeological program proposed in this research design will salvage the significant archaeology, but equally important is the aim to assess the geoarchaeological context. Archaeological investigations in the Cumberland Plain have often encountered quantities of archaeological objects but generally not placed these objects into a geomorphic context. Specifically the geomorphic integrity of archaeological deposit needs to be further investigated in such potentially fluctuating environments especially where artefacts are retrieved using bulk excavation techniques. A research study by Dr. Anthony Barham and Dr. Matthew Kelleher suggests that the archaeological significance is degraded in these fluctuating environments because poor depositional integrity undermines the potential cultural information (Kelleher and Barham 2006).

Area of undeveloped land on the Cumberland Plain continues to decline, and archaeological survey and salvage continue to rapidly acquire more data, a methodological "tipping point" has been reached in archaeological resource management. Acquiring more data by long-established methods will not represent best practice. Available information shows that the data already gathered through archaeological mitigation (survey, subsurface sampling and salvage excavations) need to be better contextualized. New 'best practice' protocols for acquiring archaeological information need to be developed. A key of the proposed excavation program therefore is to work towards the "nesting" of archaeological and geomorphic information into enhanced and better integrated research and conservation frameworks.

Likewise new methods of calibrating soil loss rates, soil mixing (Chappell 2003; Heimsath et al. 1997; 1999, 2001a, 2001b) and cosmogenic and radiometric dating of soils and rock surfaces (Nishiizumi et al. 1986, 1993) have yet to be applied systematically to archaeological contexts despite the very real potential for now solving long standing issues over the age of lithic assemblages. These methods cannot be easily applied after salvage has been completed. Use of such techniques has to be planned into research designs. It is possible that we can begin to address some resource and knowledge gaps by implementing more advanced excavation protocols.

The Cumberland Plain, like much of south east Australia, has been subject to dramatic fluctuations in aridity and rainfall, river discharge (including a long-term trend of declining river flows) and associated episodes of vegetation and soil regolith instability over the last 120,000 years (ka). These oscillations would have caused substantial changes in sediment storage both on hillslopes and in floodplains. Cycles of soil stripping on hillslopes, alternating with episodes of stability and soil development, were first identified in Eastern Australia over 50 years ago at sites on the Cumberland Plain. In floodplains, periods of sediment storage and alluvial sediment accumulation have probably alternated with incision and evacuation of previous floodplain sediments. These cycles, and their frequency, may have had profound effects on the present spatial distribution, visibility and nature of open landscape archaeological sites. When interpreting the depositional record archaeologists need to take on board these important controlling factors on site age, site preservation and site patterning across the landscape. The substantial transect that is the project area represents an opportunity to begin addressing these questions within a single assessment. The single assessment represents value over multiple small scale approaches, because it offers an eminently comparable sample.

At present the archaeological methods being used for mitigation have become preoccupied with recovering lithic artefact assemblages and analysing these important sources of evidence independent of the environmental and stratigraphic contexts from which the lithic artefacts derive. Many research questions asked of lithic assemblages cannot be answered without ancillary data and evidence e.g. the effects of past geomorphic and soil process on the taphonomy of artefact scatters, and the age of the deposits from which they derive. In this light, field methods used for salvage excavation will aim to establish the relationship between object and deposit, a crucial and basic part of any excavation.

Archaeological Salvage Areas

Salvage excavation would be undertaken at impacted archaeological sites with at least moderate archaeological significance. Salvage excavation of these sites would focus on the extraction of collections of artefacts related to activity areas and geomorphic information.

FIELD METHODS

The goal of the field excavation program is to recover significant assemblages of artefacts and investigate the geomorphic processes that contribute to site taphonomy.

Salvage Program

In order to achieve the most robust and comparable result, KNC advocates open area salvage excavation. The first phase in open area salvage is to establish the statistical boundaries of the previously identified archaeological deposit. This approach is designed to salvage the spatial properties of the site as shown in the lithic continuum. In other words, recording the spread of activities across the site/landscape.

Phase 1

A series of 1 x 1 metre squares are excavated on a transect grid overlain on each site to mark the spread of lithics and related geomorphic activity. Geocentric Datum of Australia 1994 (GDA94) coordinates would be recorded for each square to enable three dimensional modelling. Statistical salvage following this method is highly beneficial because it creates a robust inter-site sample, sufficiently random, critical for regional comparative analysis. No other method is as efficient or effective.

Phase 1 excavation would require a minimum of 15 m^2 per site (range 15-40 m^2) for a project total of 490 m^2 (see Table 10).

First Quadrant

The initial excavation unit of each 1 m^2 Phase 1 square will involve the excavation of a 50 cm x 50 cm test square in the northwest quadrant of the 1 m^2. The remaining three quadrants will be excavated in accordance with general salvage excavation methodology (below). The results of the first quadrant will be used to calibrate an archaeological model for the region.

Individual excavation squares measuring 1 m^2 would be hand excavated in stratigraphic units (Unit A, Unit B, etc.). Squares would be excavated until the basal layer or culturally sterile deposit is reached (usually 25-35 centimetres). All excavated deposit would be wet sieved using nested 5.0 millimetre sieves and 2.5 millimetre sieves *and* 1.0 millimetre sieves to be used to determine intactness of deposit.

The location of each excavated square would be identified on a surveyed plan of the site. Stratigraphic sections detailing the stratigraphy and features within the excavated deposit would be drawn and all squares would be photographed. The stratigraphy of all excavated areas would be fully documented and appropriate records archived.

Carbon samples (minimum of 15 samples) will be collected and analysed for material relating to both the archaeology and geomorphology. Where appropriate, cosmogenic and radiometric dating of soils and rock surfaces will be applied to collected soil samples (after Nishiizumi et al. 1986, 1993). Allowance must include two OSL core sample dates.

Core Samples

Core samples measuring at least 0.5m deep will be collected as part of Phase 1 and archived using a 50 millimetre hand corer to describe a cross section of the project area (around 40 samples will be required). In addition, thin section profiles (where feasible) would also be collected from open areas. The stratigraphy of all areas would be fully documented and appropriate records would be archived.

Phase 2

Where information bearing deposits are identified at Phase 1, a series of 9 x 1 m^2 expansion squares (3 x 3 metre area, including original Phase 1 square) would be excavated around those deposits. Information bearing deposits are identified by triggers such as:

- significant quantities of artefacts
- objects exhibiting a range of diagnostic characteristics
- variations in raw material
- unusual artefacts
- soils horizons with good condition and integrity
- chronological material and/or taphonomic indicators.

In this context chronologic material is anything that can be used to date artefacts or deposit: charcoal or charcoal bearing deposit (e.g. hearth ash), sandy deposit, gravels (e.g. aluminium feldspar). It is anticipated that approximately two 9 m^2 excavation areas would be undertaken at each of the salvaged sites. 9 m^2 excavations would only be undertaken where Phase 2 excavations are required (based on triggers above). A full 9 m^2 area would be excavated in all instances where Phase 2 investigations are undertaken.

Phase 3

Open area salvage of significant deposit follows the Phase 2 expansion squares and would expand to encompass entire activity areas. Phase 3 excavations are required where the Phase 2 triggers are found to extend beyond the 3 x 3

metre Phase 2 excavation area. The location of Phase 3 open area investigations would be based on Phase 1 and 2 results.

An additional 25-50 m^2 (combination of Phase 2 and Phase 3) would be excavated for each salvage location (example site B6: Phase 1: 25 m^2 and Phase 2-3: 50 m^2 = total for example site A: 75 m^2) (Table 10).

Table 10. Salvage summary requirements

Item	Description Archaeological salvage area	Phase 1 Qty	Phases 2-3 Qty
P 1	Archaeological salvage		
P 1.1	B6	25 m^2	50 m^2
P 1.2	TNR AFT 06	25 m	50 m^2
P 1.3	TNR AFT 07	15 m^2	25 m^2
P 1.4	TNR AFT 08	40 m^2	50 m^2
P 1.5	TNR AFT 11	15 m^2	25 m^2
P 1.6	TNR AFT 12	20 m^2	40 m^2
P 1.7	TNR AFT 13	25 m^2	50 m^2
P 1.8	TNR AFT 14	25 m^2	50 m^2
P 1.9	TNR AFT 16	20 m^2	40 m^2
P 1.10	TNR AFT 17	15 m^2	25 m^2
P 1.11	TNR AFT 19	25 m^2	50 m^2
P 1.12	TNR AFT 20	15 m^2	25 m^2
P 1.13	TNR AFT 22	25 m^2	50 m^2
P 1.14	TNR AFT 24	40 m^2	50 m^2
P 1.15	TNR AFT 26	25 m^2	50 m^2
P 1.16	TNR AFT 27	25 m^2	50 m^2
P 1.17	TNR AFT 29	15 m^2	25 m^2
P 1.18	TNR AFT 30	15 m^2	25 m^2
P 1.19	TNR AFT 31	25 m^2	50 m^2
P 1.20	TNR AFT 33	40 m^2	50 m^2
P 2	Archaeological core sample		
P.2.1	50 millimetre x 0.5m core sample	40	
P 2.2	Carbon samples for radiometric dating	15	
P 3	Salvage reporting		
P 3.1	Review of construction environmental management plans	1	
P 3.2	Identification and marking out heritage conservation areas	8	
P 3.2	Salvage excavation report geomorphic reporting and flood modelling	1	
P 4	Artefact storage		
P 4.1	Preparation and storage of salvaged objects with the Australian Museum	1	

Analysis

Artefacts would be analysed on a comparable level with previous analyses of excavated assemblages. Information derived from this analysis; in particular the identification of specific artefact types and their distributions and associations; would be used to put together interpretations about how sites were used, where sites were located across the landscape, the age of sites and to assess cultural heritage values. By comparing different areas it would be possible to determine whether there were differences in the kinds of activities carried out and if different activities were related to different landforms.

The geoarchaeological assessment will focus on the integrity of the deposit and the ramifications of geomorphic change for: artefact survivability, interspatial assessments and scientific significance. Output will include a derived archaeological flood model for the project area.

A range of stone artefacts may be present across the salvage areas and the analysis would expand accordingly to account for artefact variability. All information would be recorded in database form (MS Excel). Various types of evidence would be used to determine the kinds of activities that were carried out. A short description of the proposed analysis is outlined below.

- Field analysis would record basic data, such as material type, number and any significant technological characteristics, such as backing or bipolar techniques; added to this would be any provenance data such as pit ID and spit number. The purpose of the field recording is twofold: 1) establish a basic recording of artefacts retrieved and 2) to allow on-going assessment of the excavation regime (e.g. whether higher stratigraphic resolution is required while digging).
- Detailed (laboratory) analysis would entail recording a larger number of characteristics for each individual artefact. These details would be recorded in matrices suitable for comparative analysis (e.g. multivariate and univariate) of the excavated assemblage on a local and regional basis.
- Lithic characteristics to be recorded cover a range of basic information but are not limited to these categories (see example below). For transparency, terms and category types would in large part be derived from Holdaway and Stern (2004).

Sample Categories		
Record Number	% Cortex	Flake Type
Pit ID	Length	Termination Type
Spit Number	Width	Core Type
Count	Thickness	Number of Scars (Core)
Raw Material	Weight	Scar Type (Core)
Colour	Modification	Shape of Flake
Quality	Reduction Type	Platform Type

- A detailed explanation and glossary would be provided with the final excavation report.
- Minimum Number of Flake (MNF) calculations formulated by Hiscock (2002) would be undertaken where applicable (although past experience indicates MNF calculations would not be required for this excavation program).

The analysis of artefacts recovered during the excavation program would be undertaken in a transparent and replicable fashion so as to permit the comparison of the entire excavated assemblage with data from other areas. This would also allow for an interpretation of the project area's archaeological significance.

Field Team

KNC directors, Dr Matthew Kelleher and Alison Nightingale, would be responsible for the salvage excavation program. Dr Matthew Kelleher would direct the excavation component of the Aboriginal archaeological assessment. Matthew has extensive experience in managing archaeological excavations and research projects. Matthew would also be the principal contact for the overall Aboriginal archaeological assessment for the project.

Salvage Excavation Requirements Summary

- 475m^2 Phase 1 salvage excavation
- 830m^2 Phases 2-3 salvage excavation
- Hand excavation of all squares
- Hand excavation by stratigraphic unit
- Northwest quadrant (50cm x 50cm) of each Phase 1 square excavated separately for comparative analysis
- Wet sieving of all deposit
- Sieve size must be nested in three layers: 5mm, 2.5mm and 1mm to capture micro debitage
- Allowance for 15 radio carbon dates
- Allowance for two OSL core sample dates
- 25x 0.5m deep 50mm wide core samples, analysis and archive
- Thin section collection, analysis and archive
- Archaeological excavation report
- Geomorphological assessment report
- GIS flood model for project area