APPENDIX G – Aboriginal Heritage Due Diligence Assessment

Albion Park Aboriginal Due Diligence Assessment

FINAL REPORT

Prepared for Transport for Tomorrow

10 August 2022

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Biosis project no.:	37610
File name:	37610.Albion.Park.Station.ADDA.FIN02.20220810

Citation: Biosis (2022). 37610.Albion.Park.Station.ADDA.FIN02.20220810. Report for Transport for Tomorrow. Windram. N, Mills. H. Biosis Pty Ltd. Wollongong, NSW. Project no 37610

Document control

Version	Internal reviewer	Date issued
Draft version 01	Joshua madden	07/07/2022
Final version 01	Joshua madden	08/07/2022
Final version 02	Joshua madden	10/08/2022

Acknowledgements

Biosis gratefully acknowledges the contributions of the following people and organisations (listed alphabetically) in preparing this report:

- Marsupial Lion: Glen Isbeter
- Transport for Tomorrow: Alan Karton.

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Glossary

AHIMS	Aboriginal Heritage Information Management System
Due diligence code	*Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*
EP&A Act	*Environmental Planning and Assessment Act 1979*
GSV	Ground Surface Visibility
Heritage NSW	Heritage NSW, Department of Planning and Environment
ICOMOS	International Council on Monuments and Sites
LEP	Local Environment Plan
LGA	Local Government Area
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
PAD	Potential Archaeological Deposit
Study area	Albion Park Substation
The Code	The *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*
DCP	The Shellharbour Development Control Plan 2021
	Wollongong City Council Development Control Plan 2009
LEP	The Shellharbour Environmental Control Plan 2013
	Wollongong City Council Local Environmental Plan 2009

Summary

Biosis Pty Ltd has been commissioned by Transport for Tomorrow (client) to undertake an Aboriginal Due Diligence Assessment for the proposed works at the Albion Park Substation and adjacent rail corridor, NSW (the study area).

The project involves the removal of trees and vegetation, installation of new DC feeder cables in a combination of CSR and GST from Albion Park Substation heading north by approximately 50 metres as well as the installation of new cables in and around the substation itself. Installation of pedestrian, IRCS and vehicle access, perimeter fencing, an earthing grid and earth stakes as well a minor filling of the water course in and around the Albion Park Substation, installation of down conductors and earthing stakes to about ten power poles extending about 800m north of Albion Park Substation and about ten power poles extending about 800m south of Albion Park Substation adjustments to OHW overlaps and the establishment of temporary construction and laydown areas within the rail corridor.

A search of the Aboriginal Heritage Information Management System found 118 previously registered Aboriginal sites within 1 kilometre of the study area. The search found that there are two recorded AHIMS sites located within close proximity to the eastern boundary of the study area. These are AHIMS 52-2-1802/ Wollingurry Creek 3, an isolated find, and AHIMS 52-5-0230/ Macquarie Rivulet 4, an artefact scatter site.

This assessment has found that the proximity of the study area to Lake Illawarra and various creeks and backswamps would have resulted in easy freshwater access and an abundance of marine resources for the Dharawal living the area. However, broad rail infrastructure disturbances and the isolated disturbances related to the existing infrastructure to be upgraded and expanded including targeted vegetation clearance and previous NDD excavations have likely removed or caused the displacement of any archaeological deposits which may have been located within the areas of proposed works across the study area. No Aboriginal objects, sites or areas of PAD were identified during the site inspection. The results of this assessment indicated that there is low potential for Aboriginal archaeological objects in the locations of the proposed works (see Section 1.4 for the proposed works detail).

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential.

Recommendation 2: Discovery of Unanticipated Aboriginal Objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying the Heritage NSW and Aboriginal stakeholders.

Recommendation 3: Discovery of Aboriginal Ancestral Remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains.

2. Notify the NSW Police and Heritage NSW' Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

1 Introduction

1.1 Project background

Biosis Pty Ltd has been commissioned by Transport for Tomorrow (client) to undertake an Aboriginal Due Diligence Assessment for the proposed works at the Albion Park Substation and adjacent rail corridor, NSW (the study area). The project involves the removal of trees and vegetation, installation of new DC feeder cables in a combination of CSR and GST from Albion Park Substation heading north by approximately 50 metres as well as the installation of new cables in and around the substation itself. Installation of pedestrian, IRCS and vehicle access, perimeter fencing, an earthing grid and earth stakes as well a minor filling of the water course in and around the Albion Park Substation, the installation of down conductors and earthing stakes to about ten power poles extending about 800m north of Albion Park Substation and about ten power poles extending about 800m south of Albion Park Substation. Additionally the, adjustments to OHW overlaps and the establishment of temporary construction and laydown areas within the rail corridor.

An assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) has been undertaken for the study area in order to inform responsibilities with regards to Aboriginal cultural heritage in the area. In addition to the basic tasks required for a due diligence assessment, an extended background review, as well as an archaeological survey in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b) (the code) was conducted, in order to adequately map areas of high, moderate and low archaeological sensitivity.

1.2 Location of the study area

The study area is located within the Shellharbour Local Government Area (LGA) and the Wollongong LGA, Parish of Terragong, County of Camden (refer to Figure 1). The study area incorporates a section of railway corridor within Lot 101 DP1002605 and Lot 3800 DP1064185 and is bounded by residential properties along Koona Street, Shearwater Boulevard, Sandpiper Drive, Riverside Crescent and Tallawarra Crescent to the east and industrial and commercial properties along Bateman Avenue Rivulet Crescent, Wollingurry Street and the Princes Highway to the west (refer to Figure 2).

1.3 Planning approvals

The proposed development will be assessed against Division 5.1 of the *Environmental Planning and Assessment Act 1979* NSW (EP&A Act). Other relevant legislation and planning instruments that will inform the assessment include:

- *National Parks and Wildlife Act 1974* (NSW) *(*NPW Act).
- *National Parks and Wildlife Amendment Act 2010* (NSW).
- *Shellharbour Local Environmental Plan 2013* (LEP).
- *The Shellharbour Development Control Plan 2021 (DCP)*
- *Wollongong City Council Local Environmental Plan 2009 (LEP)*
- *Wollongong City Council Development Control Plan 2009 (DCP)*

1.4 Proposed works

The proposed works would be undertaken within the rail corridor from about 500m north of Albion Park Station to about 100m north of the Haywards Bay Drive overbridge, including works at Albion Park Substation. The proposed scope of works would include (see Photo 1 and Photo 2 and Photo 3 below and Appendix 3):

- Removal of trees and other vegetation
- Installation of new DC feeder cables in a combination of CSR and GST from Albion Park Substation to about 50m to the north
- Installation of new cables in and around Albion Park Substation
- Construction of external IRCS access platform at Albion Park Substation
- Minor filling of a water course around Albion Park Substation
- Installation of earthing grid and earth stakes around Albion Park Substation
- Installation of perimeter fencing (about 3600mm in height plus 300mm barbed wire), including foundations, around Albion Park Substation
- Installation of pedestrian and vehicular access gates at Albion Park Substation
- Installation of down conductors and earthing stakes to about ten power poles extending about 800m north of Albion Park Substation and about ten power poles extending about 800m south of Albion Park Substation.
- Adjustments to OHW overlaps.
- Establishment of a temporary construction compound and laydown areas within the rail corridor.
- The excavations of two boreholes within the substation boundary. Each of the boreholes would be 80mm in diameter and extend to a depth of 8-10m. The proposed boreholes would be in the location of the previous non-destructive excavations undertaken as part of a previous exempt development.

1.5 Scope of the assessment

The following is a summary of the major objectives of the assessment:

- Conduct background research in order to recognise any identifiable trends in site distribution and location, including a search of the Aboriginal Heritage Information Management System (AHIMS).
- Undertake archaeological survey as per requirement 5 of the code, with particular focus on landforms with high potential for heritage places within the study area, as identified through background research.
- Record and assess sites identified during the survey in compliance with the guidelines endorsed by Heritage NSW.
- Determine levels of archaeological and cultural significance of the study area.
- Make recommendations to mitigate and manage any cultural heritage values identified within the study area.

1.6 Aboriginal consultation

Consultation is not a formal requirement of the due diligence process, therefore Aboriginal community consultation in accordance with consultation requirements has not been completed.

Photo 1 Pole locations for earthing works in blue. North from Substation (Source: Marsupial Lion)

Photo 2 Pole locations for earthing works in blue. South from Substation (Source: Marsupial Lion)

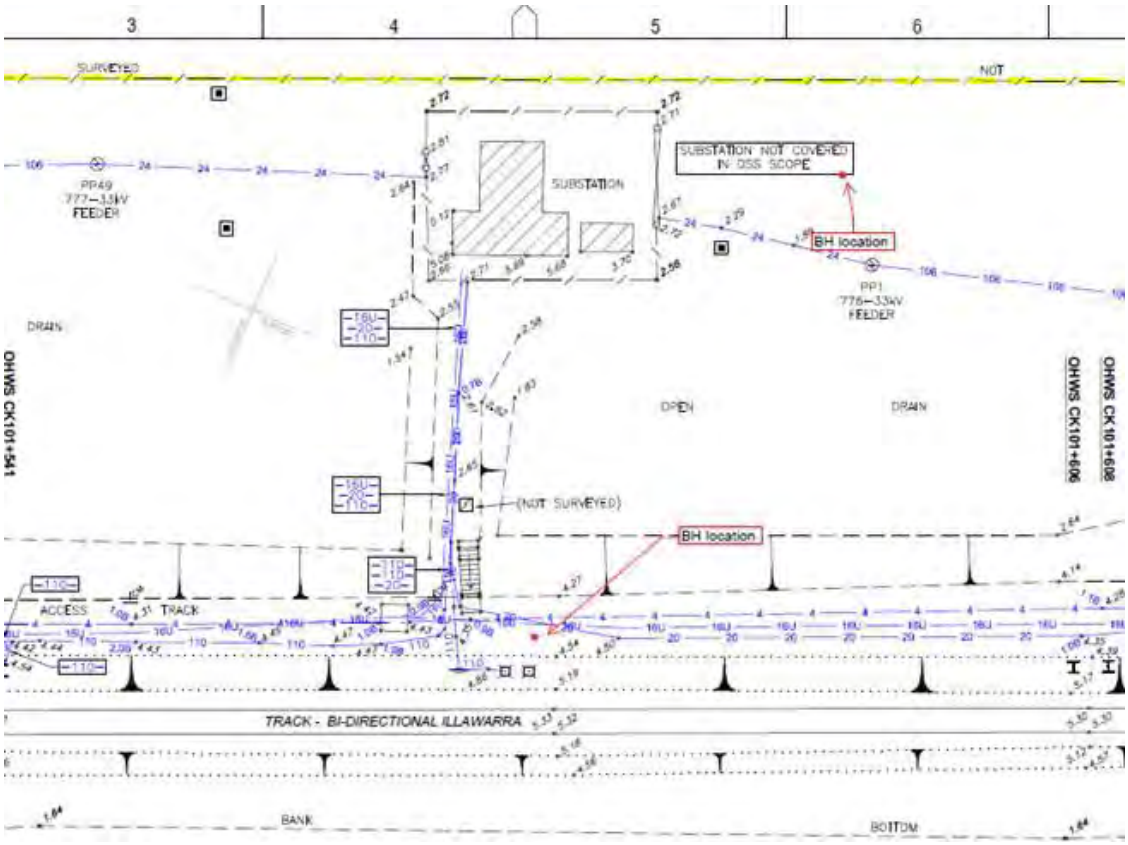
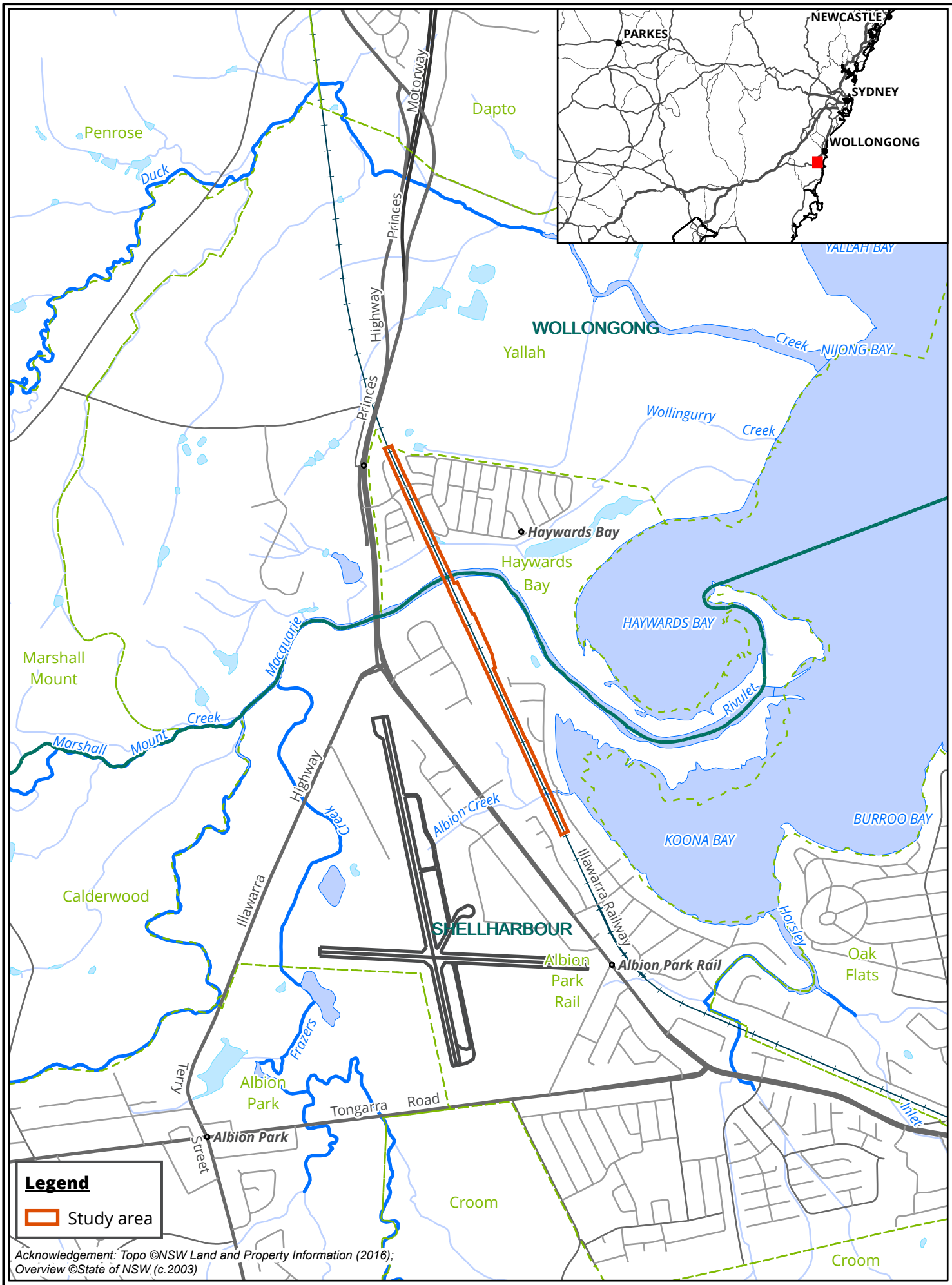


Photo 3 Location of two boreholes to be undertaken within locations subject to NDD locations (Source: Transport for Tomorrow)



Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)

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Figure 1 Location of the study area

Matter: 37610
Date: 11 July 2022,
Drawn by: MK, Checked by: JM, Last edited by: lharley
Location:P:\37600s\37610\Mapping\37610_AlbionPark_ADDA, Layout: 37610_ADDA_F1_Locality

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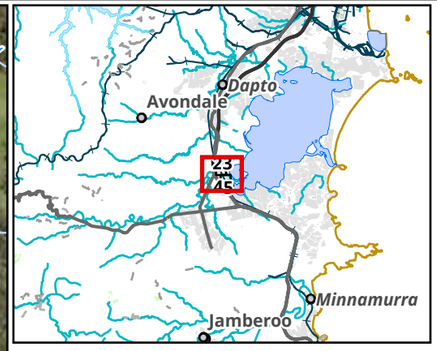
Metres
Scale 1:25,000@ A4, GDA 1994 MGA Zone 56

N



Legend

- Study area
- Lot

Figure 2 Study area detail

0 60 120 180 240 300

Metres

Scale: 1:8,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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Matter: 37610, Date: 11 July 2022,
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2 Desktop assessment

A brief desktop assessment has been undertaken to review existing archaeological studies for the study area and surrounding region. This information has been synthesised to develop some Aboriginal site predictive statements for the study area and identify known Aboriginal sites and/or places recorded in the study area. This desktop assessment has been prepared in accordance with requirements 1 to 4 of the code.

2.1 Landscape context

The study area is located upon a railway corridor approximately 2 kilometres long between Albion Park Rail and Dapto train stations, the surrounding area is comprised of residential development directly to the east, and heavy industrial and commercial development directly to the west. A stretch of bridge built above the Macquarie Rivulet separates the study area into two halves, with the rivulet itself running into Lake Illawarra, the body of which lies at its closest approximately 170 metres to the east of the study area. The immediate landscape is appropriately flat for the infrastructure it supports, however approximately 1 kilometre towards the west the land takes on a more rugged topography.

2.2 Geology, soils and landforms

Lake Illawarra was formed from the drowning of the Macquarie Rivulet valley during the raising of Holocene sea levels (6-7,000 years ago); the estuary was subsequently formed behind the large sand barrier that now forms the Windang Peninsula. Lake Illawarra is the largest estuarine lagoon on the south coast of NSW, covering an area of 33 square kilometres and extending over 9 kilometres in length and 5 kilometres in width. It receives salt water from the Pacific Ocean and fresh water from the Illawarra Escarpment (Roy 1984). Lake Illawarra is classified as an early Intermediate Barrier Estuary or an estuarine lagoon. Barrier estuaries are characterised by 'narrow elongated entrance channels with broad tidal and back barrier sand flats' (Roy 1984, p.5). During the low sea levels before 7,000 BP erosion of the lake bed was occurring. This process is not completed and successive depositional phases have led to a cumulative build-up of sediments above the bedrock floor of the lake basin (Public Works 1992, p.4).

The geological units underlying the study area include the Pleistocene undifferentiated regolith of the Cenozoic Sedimentary province, which is made up of clay, silt fluvial and marine sand, The Alluvial floodplain deposits which is made up of silt, very fine to medium grained lithic to quartz rich sand and clay. Alluvial backswamp deposits made up of organic rich mud, peat, silt and clay, Alluvial palaeochannel deposits made up of poorly sorted gravels, clayey sand and variably magnetic pisoliths, and Berry siltstone of the Permo-Triassic Basins made up of mid to dark grey siltstone, grades upsequence to very fine grained sandstone, highly fossiliferous and sporadic dropped pebbles (Figure 4).

Stream order is recognised as a factor which assists the development of predictive modelling in Sydney Basin Aboriginal archaeology, and has seen extensive use in the Sydney region, most notably by Jo McDonald Cultural Heritage Management (JMCHM 2000, JMCHM 2005a, JMCHM 2005b, JMCHM 2008). Predictive models which have been developed for the region have a tendency to favour high order streams as the locations of campsites as they would have been more likely to provide a stable source of water and by extension other resources which would have been used by Aboriginal groups.

The stream order system used for this assessment was originally developed by Strahler (1952). It functions by adding two streams of equal order at their confluence to form a higher order stream, as shown in Photo 3. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

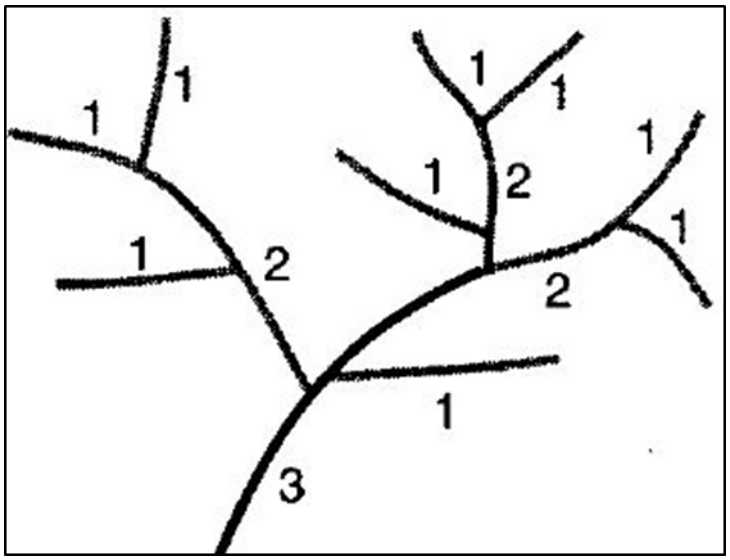


Photo 4 Diagram showing Strahler stream order (Source: Ritter, Kochel, & Miller 1995, pp. 151)

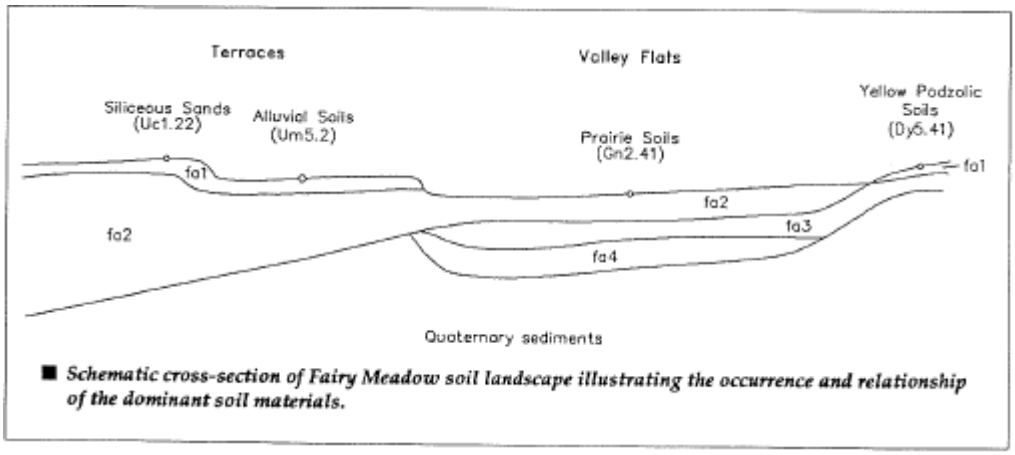
The study area is located along the southern boundary of Lake Illawarra and is bisected by the fifth order Macquarie Rivulet and a number of first order creeks including Albion Creek. The study area is located within a flood plain and numerous backswamps. The numerous water sources, whether perennial or non-perennial, would have provided both a source of fresh water for Aboriginal people in the local area, as well as encouraged the growth and presence of floral and faunal resources in this location.

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. They are defined by a combination of soils, topography, vegetation and weathering conditions. Soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure.

The Fairy Meadow Soil Landscape is dominant within the study area. It is characterised as a gently undulating broad alluvial plain. It is a discontinuous distribution of clay. Silt and sand deposited by flowing floodwater, in this instance likely by the Macquarie Rivulet. This type of soil landscape typically produces fertile soil.

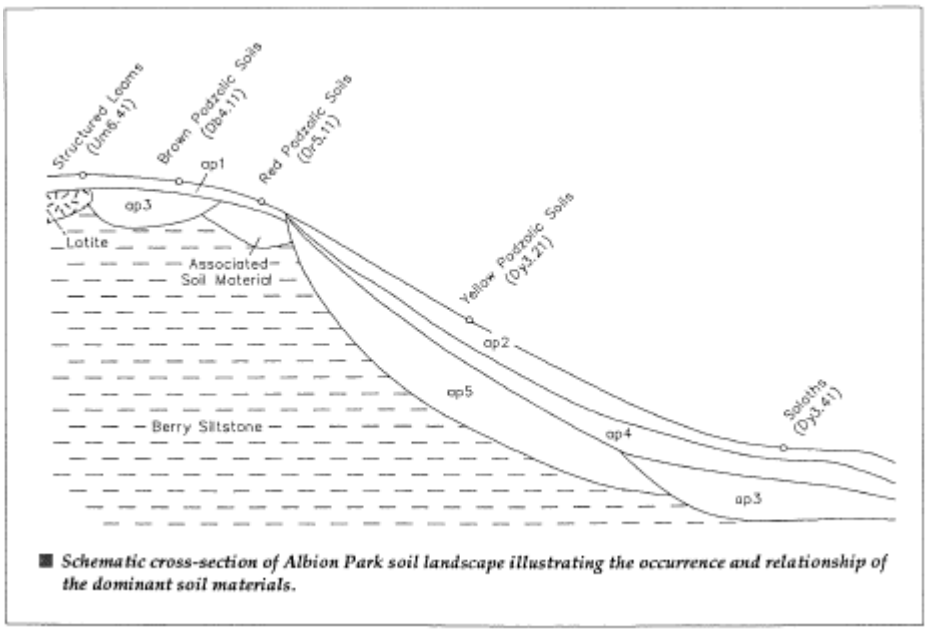
The Albion Park soil landscape is present to the far north of the study area. It is characterised as short steep upper slopes grading into long gently foot slopes on Berry Formation on the Coastal Plain. The soil are moderately deep and suffer the limitation of waterlogging.

A portion of the study area towards the southern extent is considered disturbed terrain. The topography varies from level plains to undulating terrain and has been disturbed by human activity to a depth of at least 100 centimetres. The original soil has been removed, greatly disturbed or buried. Most of these areas have been levelled to slopes of approximately 5%. Landfill includes soil, rock, building and waste material. The original vegetation has been completely cleared. As such, this soil landscape will not have a landscape characteristic table.



■ *Schematic cross-section of Fairy Meadow soil landscape illustrating the occurrence and relationship of the dominant soil materials.*

Photo 5 Schematic cross-section of Fairy Meadow soil landscape



■ *Schematic cross-section of Albion Park soil landscape illustrating the occurrence and relationship of the dominant soil materials.*

Photo 6 Schematic cross-section of Albion Park soil landscape

Legend

Study area

Geological units

- P__gu,Bumbo Latite Member
- Pshb,Berry Siltstone
- Pshr,Broughton Formation
- QH_af,Alluvial floodplain deposits
- QH_ebw,Estuarine basin and bay (subaqueous)
- QH_eci,Estuarine in-channel bar and beach deposits
- QH_edw,Estuarine fluvial delta front (subaqueous)
- QH_er,Estuarine shoreline ridge and dune
- QP_at,Alluvial terrace deposits
- QP_u,Pleistocene undifferentiated regolith
- Q_ab,Alluvial backswamp deposits
- Q_acb,Alluvial channel deposits - in-channel bar
- Q_acw,Alluvial channel deposits - subaqueous
- Q_al,Alluvial levee/overbank deposits
- Q_ap,Alluvial palaeochannel deposits
- Q_av,Alluvial valley deposits
- Q_avf,Alluvial fan deposits

Figure 3 Geological units in the vicinity of the study area

0 200 400 600 800 1,000 N

Metres
Scale: 1:20,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56

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Legend

- Study area
- Contour (2m)

Strahler Order

- 1
- 2
- 3
- 4
- 5

Figure 4 Hydrology and topography in the vicinity of the study area

0 200 400 600 800 1,000 N

Metres
Scale: 1:20,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56

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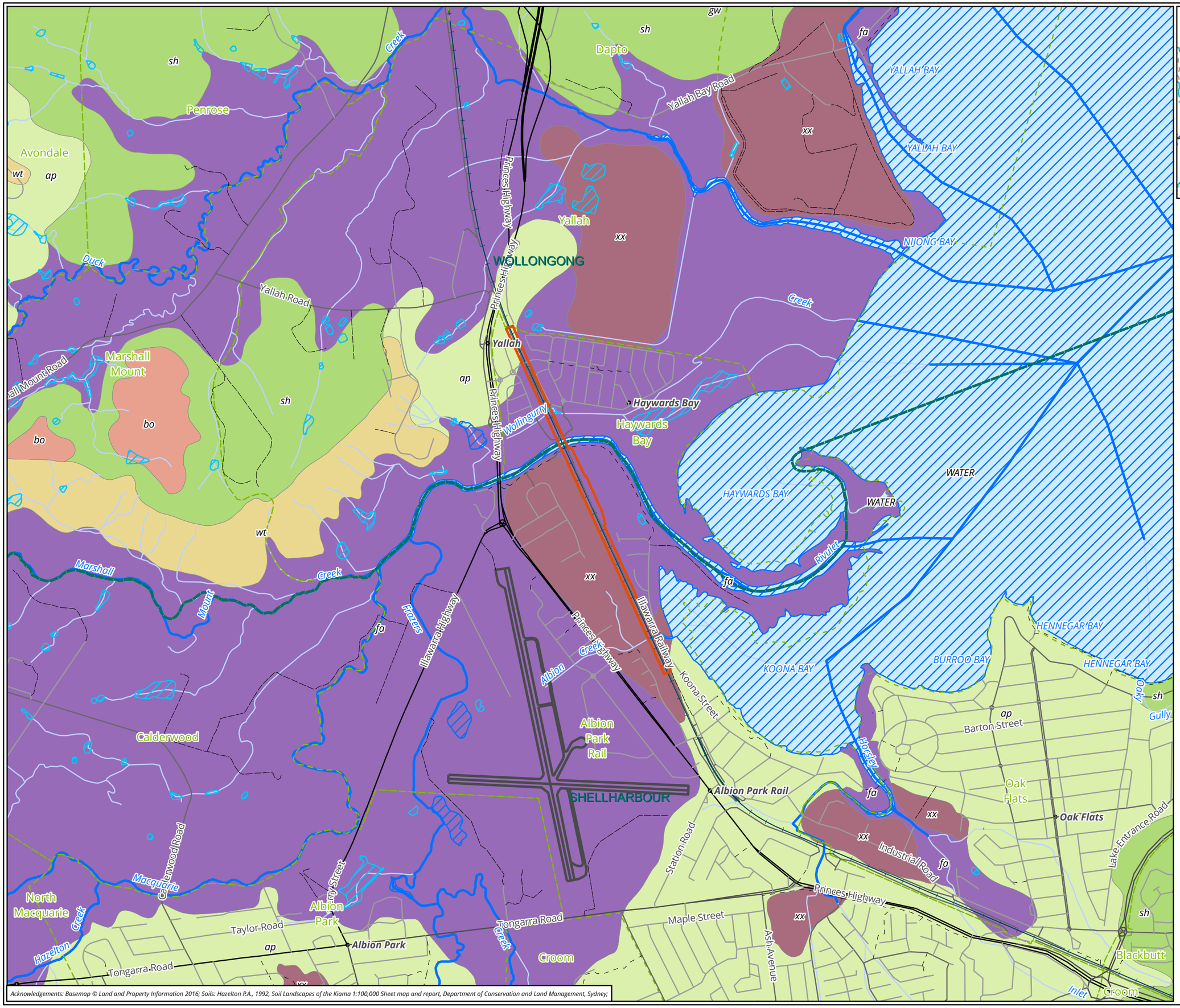

Legend

Study area

Soil landscape units

- ap - ALBION PARK
- bo - BOMBO
- fa - FAIRY MEADOW
- gw - GWYNNEVILLE
- sh - SHELLHARBOUR
- WATER - WATER
- wt - WATTAMOLLA ROAD
- xx - DISTURBED TERRAIN

Figure 7 Soil landscapes in the vicinity of the study area

0 200 400 600 800 1,000 N

Metres

Scale: 1:20,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

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Acknowledgements: Basemap © Land and Property Information 2016; Soils: Hazelton P.A., 1992, Soil Landscapes of the Kiama 1:100,000 Sheet map and report, Department of Conservation and Land Management, Sydney;

2.3 Flora and fauna

The wider region includes distinct ecological zones, including open forest and open woodland, with riparian vegetation extending along many of the watercourses. Each ecological zone hosts a different array of floral and faunal species, many of which would have been utilised according to seasonal availability. Aboriginal inhabitants of the region would have had access to a wide range of avian, terrestrial and aquatic fauna and repeated firing of the vegetation would have opened up the foliage allowing ease of access through and between different resource zones.

Plant resources were used in a variety of ways. Fibres were twisted into string, which was used for many purposes, including the weaving of nets, baskets and fishing lines. String was also used for personal adornment. Bark was used in the provision of shelter; a large sheet of bark being propped against a stick to form a gunyah (Attenbrow 2002).

The Fairy Meadow landscape is known to hold low open-forests and woodlands which include: Woollybutt *Eucalyptus longifolia,* Cabbage Gum *Eucalypus amplifolia,,* Forest Red Gum *Eucalyptus tereticornis,* Swamp Oak *Casuarina glauca,* River Oak *Casuarina cunninghamiana,* Rough-Barked Apple *Angophora floribunda*, Forest Oak *Allocasuarina torulosa,* Two-Veined Hickory *Acacia binervata*, Decorative Paperbark *Melaleuca decora,* Prickly-Leaved Paperbark *Melaleuca stypheliodes,* and Northern Boobialla *Myoporum acuminatum,* Blackbutt *Eucalyptus pilularis,* and Thin-Leaved Stringybark *Eucalypus eugenioides* grow in more freely drained areas.

The Albion Park landscape was known to hold tall open-forests. The common species of flora include: Thin-Leaved Stringbark *Eucalyptus eugenioides,* Cabbage Gum *Eucalyptus amplifolia,* Northern Boobialla *Myoporum acuminatum,* Forest Red Gum *Eucalyptus tereticornis,* Woollybutt *Eucalyptus longifolia,* Decorative Paperbark *Melaleuca decora),* and the Prickly-Leaved Paperbark *Melaleuca stypheliodes* grow on poorer drained areas.

As well as being important food sources, animal products were also used for tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to have been used to make fastening cord, while 'bone points', which would have functioned as awls or piercers, are often an abundant part of the archaeological record. Animals such as Brush-tailed Possums were highly prized for their fur, with possum skin cloaks worn fastened over one shoulder and under the other. Kangaroo teeth were incorporated into decorative items, such as head bands (Attenbrow 2002).

A variety of faunal species would likely have inhabited the area (Atlas of Living Australia 2022). This includes mammal species such as the Short-beaked Echidna *Tachyglossus aculeatus,* Common Brushtail Possum *Trichosurus vulpecula*, Common Wombat *Vombatus ursinus*, Eastern Grey Kangaroo *Macropus giganteus* and the Swamp Wallaby *Wallabia bicolor*. Bird species that may have been present include the Australian Magpie *Gymnorhina tibicen*, Masked Lapwing *Vanellus (Lobipluvia) miles*, Grey duck *Anas (Anas) superciliosa*, Grey Butcherbird *Cracticus torquatus*, Galah *Eolophus roseicapilla* and Australian Pelican *Pelecanus conspicillatus*. The Red-bellied Black Snake *Pseudechis porphyriacus* and Eastern Blue-tongue *Tiliqua scincoides* have also been recorded in the area.

2.4 Land use history

Historical aerial imagery allows for modern developments within the study area to be identified. Aerial imagery dated to 1963 shows the Illawarra Railway constructed within the length of the study area, crossing the Macquarie Rivulet and Wollingurry Creek (Photo 7). To the north of the rivulet, Haywards Bay Drive transects the study area and trees line the railway. A moderate level of residential development and extensive vegetation clearance has occurred within the wider area. By 1974, little change has occurred within the study area (Photo 8). Further residential construction in the wider area has taken place.

Photo 7 **Aerial image dated to 1963 with the study area outlined in orange (Source: NSW Spatial Services)**

Photo 8 Aerial image dated to 1974 with the study area outlined in orange (Source: NSW Spatial Services)

Aerial imagery from 1990 shows new tree plantings in areas of the study area bounding the Illawarra Railway to the south of the Macquarie Rivulet (Photo 9). In the same area, a railway crossing is visible, shown from a road approaching the rail line from the west and associated markings on the land to the east. More recent images from 2002 show little further development within the study area, which is now bounded by an increased quantity of industrial and residential properties (Photo 10).

Photo 9 **Aerial image dated to 1990 with the study area outlined in orange (Source: NSW Spatial Services)**

Photo 10 Aerial image dated to 2002 with the study area outlined in orange (Source: NSW Spatial Services)

3 Aboriginal context

3.1 Ethnohistory and contact history

Despite a proliferation of known Aboriginal sites there is considerable ongoing debate about the nature, territory and range of pre-contact Aboriginal language groups in the Illawarra region. These debates have arisen largely due to the lack of ethnographic and linguistic information recorded at the time of European contact. By the time colonial diarists, missionaries and proto-anthropologists began making detailed records of Aboriginal people in the late 19th Century; pre-European Aboriginal groups had been broken up and reconfigured by European settlement activity. The following information relating to Aboriginal people on the Illawarra is based on such early detailed records.

Although there are conflicting views between historical sources of the exact boundaries of tribal groups in the region, the linguistic evidence does identify distinct language groups at the time of European contact. Based on this information it appears that the current study area was situated within the Wodi Wodi group, a subdivision of the larger Tharawal (also Dharawal, Darawal, Carawal, Turawal, Thurawal) linguistic group. The named groups (often referred to as 'clans', 'bands' or 'tribes') belonging to the Tharawal/Dharawal language group included also the following: Gweagal, Norongerraga, Illawarra, Threawal, Tagary, Wandeandega and Ory-ang-ora (Tindale 1974).

Ethnographic evidence considered by Sefton (1980, pp.2-29) indicates population mobility on the Woronora Plateau with frequent contact between the neighbouring Gandangarra, Cobrakall (Liverpool and Cabramatta) and Wodi Wodi (Illawarra). It was noted by early settlers that the Aboriginal groups moved frequently from the tablelands and all parts of Illawarra to the shores of Lake Illawarra where they utilised a wide range of fish and fowl which could support a large group for ceremonial purposes (Sefton 1980, p.13). Aboriginal people would have travelled across the landscape in response to seasonal availability of resources. Interactions between different types of social groupings would have varied with seasons and resource availability. It has been noted that interactions between the groups inhabiting the many resource zones of the Sydney Basin (coastal and inland) would have varied but were continuous. This is reflected in the relatively homogenous observable cultural features such as art motifs, technology and resource use (McDonald 1992).

The first recorded contact between Aboriginal and European peoples occurred in 1770, when Captain Cook sailed down the east coast of Australia in the Endeavour and observed cook fires and Aboriginal people carrying canoes along the coast (Organ 1990). The next recorded contact occurred in 1796, when Flinders and Bass travelled along the coast in the Tom Thumb (Organ 1990) An expedition from Jervis Bay by George William Evans, in which the expedition met several groups of Aboriginal people on the way through the Wollongong area in 1812, was also documented (Organ 1990).

The first European explorers to enter the Lake Illawarra area were Flinders and Bass during their search for a large river south of Botany Bay in 1796 (Humphreys 2005, p.3). Flinders wrote about the "Canoe River" referring to the Lake Illawarra entrance and Aboriginal canoes were a noted mode of transport on the lake in 1830's (Organ 1990: 348). An earlier settler to the region, John Brown described a King Hooka who was regarded as a great Aboriginal chief of large parts of Lake Illawarra. Hooka had access to considerable food resources including fish, kangaroo, wallaby and pademelon. Brown recounts how Hooka would then invite other Illawarra chiefs and people to Lake Illawarra to participate in large food gathering events such as wallaby drives. These events would end in feasts and ceremonial events that greatly increased the popularity of Hooka (Organ 1990, pp.354-355). Hooka was killed in a dispute in 1842 and buried at Langs Point opposite Hooka Island.

By the first decades of the 20th century re-settlement and other forced relocation of Aboriginal people such as their placement in missions and reserves, had effectively removed permanent and traditional Aboriginal presence within the Shellharbour Council area (Navin Officer 2000, p.19). Many local families moved further away following seasonal work or family connections, however Lake Illawarra remains an important local place for the Aboriginal community.

3.2 Regional context

A number of Aboriginal cultural heritage investigations have been conducted for the Illawarra region. Models for predicting the location and type of Aboriginal sites with a general applicability to the Lake Illawarra region and thus relevant to the study area have also been formulated, some as a part of these investigations and others from cultural heritage investigations for relatively large developments.

Sefton (1980) undertook an archaeological survey of the proposed transmission line routes in the West Dapto-Yallah Area of the City of Wollongong, approximately 7 kilometres from the current study area. Two archaeological sites were identified during this survey. Registered site, Yallah Site 1 (AHIMS# 52-5-0123), consisted of one isolated artefact that was located on the northern bank of a tributary of Duck Creek, made from fossilised wood. Yallah Site 2 (AHIMS# 52-5-0122) was located within 150 metres of Lake Illawarra on a lower slope and is a sparse scatter of seven artefacts made from chert, jasper and rhyolite. The site was located on a gradual slope, and has been previously disturbed by quarrying, erosion and underground services (Sefton 1980b, pp. 10). Both sites are within the close proximity to reliable, permanent sources of water on flat elevated grounds.

Haglund (1983) completed an archaeological excavation on the foothills of the Illawarra escarpment approximately 15 kilometres west from the study area. An initial foot survey of the area identified two new archaeological sites. Both were stone artefact scatters along a creek bank. Subsequent test excavation commenced. In total, six test pits were excavated evenly at each site on areas containing archaeological potential. This assemblage included predominately chert lithics, including cores are flakes, and petrified wood with some silcrete lithics as well. Low artefact levels, suggests Haglund, are the result of disturbance to the site in the form of erosional effects and modern construction.

Sefton's (1984) study formed part of the Local Environmental Study prior to the Stage 1 of the West Dapto Release Area (WDRA) development in Horsley, 7.5 kilometres north west of the study area. A copy of the Sefton report could not be obtained, but a summary has been provided from the Australian Museum Business Services (AMBS) study (2006).

The following key elements constitute Sefton's site predictive model of the WDRA:

- Archaeological sites at Bass Point provide evidence of Pleistocene occupation, and there is no evidence to suggest West Dapto could not have been occupied at this time.
- It is possible that stratified occupational deposit could be located in the Pleistocene sediments of the flood plains at West Dapto. Stratified occupational deposit of Holocene age is also likely (and more possible) to occur in the floodplain sediments.
- Ethnohistorical records suggest two major zones of exploitation: (1) the coastal zone, including the shoreline, off shore islands and Lake Illawarra; and (2) the inland zone, including undulating tablelands. Groups who used both areas were small, mobile, and associated with a locality, but also ranged over larger areas. On this basis, it could be expected that the West Dapto area could have been exploited from both east and west directions, in addition to tracks along ridgelines.
- The Lake Illawarra shoreline presents restricted areas for campsites relative to the concentrated resources. Midden sites may not represent base camps (occupation sites) but instead preferred sites

for resource exploitation. These preferred sites are expected to occur within 2 kilometers of the Lake Illawarra shoreline, and would have been established around the lake shore.

- The resources of West Dapto (flora, fauna, available water) would have made the locality attractive to occupation and exploitation. However, resources would have been scattered and at low density in comparison to the lake, and the locality was probably not economically self-contained. Base camps would not have been suitable for exploitation of these resources.
- Stone materials are not sourced within the area, with the exception of latite cobbles and occasional quartz pebbles. Consequently, stone would have been conserved at camp sites.
- Tracks connecting the coast to the interior would be expected through the West Dapto area, due to its geographic location between the two. Aboriginal tracks are usually along ridges, and consequently, sites could be expected in the saddles of ridges.
- Along the eastern coastal plain and the foothills of the escarpment to the west, sites are likely to occur on ridgelines or on dry level land within 100 metres of a creek line.
- In the foothills of the Escarpment to the west, sites may also occur further away from water on saddles of the Marshall Mount spur and on level areas of smaller ridgelines along the escarpment slopes and foothills.
- Extractive sites will also be located in West Dapto. These would occur as scarred trees, isolated large cores, tools of latite or small isolated stone artefacts. These sites may occur in all landform contexts, although scarred trees could only be identified in areas where trees have not been fired or cleared.
- It is not expected that latite quarry sites will occur at West Dapto. Although these tools have been located in adjacent areas on the shores of Lake Illawarra, those tools have been prepared from pebbles or cobbles and not from quarried materials (AMBS 2006, pp. 87–88).

The following four areas were identified in WDRA as having high archaeological potential:

- All level areas of the Western foothills zone and the Coastal Plain within 100 metres of a creek located on:
  - Quaternary deposited flood plains.
  - Budgong Sandstone.
  - Berry Siltstone.
- Saddles on the ridges of Marshall Point spur.
- Level areas in the Forest Creek Valley in the Escarpment Protection Zone.
- Level areas of the escarpment slopes on the topographic benches and bluffs.

Three main categories of sites being of potential significance were also identified:

- Stratified occupational deposits: may occur in the flood plain deposits of West Dapto, these deposits would have significant research potential and would be rare. Such a site may contain stone artefacts, food refuse and charcoal, which could be dated to establish a chronology of occupation of West Dapto. This would be significant to the public and be of educational significance. If the site were of Pleistocene age, it would be of major heritage significance to the Australian people, such as that identified at Bass Point.
- Surface camp sites: these unstratified deposits are likely to contain stone artefacts, and possibly, remnants of shell and charcoal. Bone is unlikely to have survived. These sites may provide information on settlement patterns, economic exploitation and stone tool manufacture and

maintenance. These sites have research potential, but it is also predicted that they will be the most common site type at West Dapto.

- Scarred trees: although the identification of scarred trees is recognized to be problematic, any found in West Dapto will be of research potential (i.e. study of individual tree scars, relationship with other site types). Scarred trees are rare in the North Illawarra as in most areas, mature native trees have been burnt, and the rarity of scarred trees increases their significance (AMBS 2006, pp. 90).

Donlon and Sefton (1988) completed an archaeological excavation at Judbooley Park, Windang Peninsula, located approximately 5.5 kilometres east of the study area. The excavation was due to an unexpected find that occurred during earthworks on the lake edge between Judbooley Avenue and the northern foreshores of Lake Illawarra. Skeletal remains were uncovered with flaked stone artefacts and midden deposit (Donlon & Sefton 1988). The site is believed to be associated with an additional burial located 36 metres away from the site. Due to the unearthing of the skeletal remains with earthworking equipment, it could not be determined if the remains were buried with the midden and stone deposit or within 5 metres. The skeletal remains consisted of a mandible, a vertebra, the right innominate bone, and the left and right femur (Donlon & Sefton 1988). The shell deposit's density was recorded at 217 per metre cubed, with 20% of the shell discovered not counted due to poor condition. 18 shell species were discovered, with the most common being Sydney Cockle *Andara trapezia*, Sydney whelk *Pyrazus ebenius*, and small whelk *Velacumantus australis.* Stone artefacts located at the site include flakes and cores, unflaked pebbles with evidence of use as hammerstones or anvils, modified sandstone, ochre fragments (Donlon & Sefton 1988). Material type included fine-grained siliceous, quartz, silcrete, sandstone, igneous, and orche.

Navin (1989) conducted an archaeological investigation for the Windang Holiday Park extension and upgrade, located project approximately 5 kilometres east of the study area. The project originally began in 1988 where earthworks located and disturbed an Aboriginal burial site, and as a result NPWS advised Wollongong City Council to undertake archaeological monitoring while completing future earthworks. The earthworks involved removal of material to depths of 2 metres in a revegetated foredune. At 50 centimetres multiple artefacts were located, including several stone artefacts and two small areas of discrete shell (Navin 1989). The disturbed area was inspected and recorded, and the scaped material was investigated for artefacts and replaced back into the area. The investigation revealed a total of seven stone waste flakes and rejuvenation flakes, and a midden site comprising of Sydney cockle *Anadara trapezia,* Hercules club mud whelk *Pyrazus ebeninus,* and the large mud oyster *Ostrea angasi,* which is a rare species at Lake Illawarra (Navin 1989). At the end of the investigation, the whole area was covered with imported fill.

Navin Officer (1994) was commissioned by Camp Scott and Furphy to undertake an archaeological survey of the proposed Illawarra water quality project installation at Kembla Grange, approximately 10 kilometres north west of the study area. The survey was a targeted survey of creek banks and flats, areas of exposure around an existing dam, and flat ground on the southern part of their study area. These areas had higher degree of ground surface visibility and were considered as being favoured by Aboriginal people for occupation activities. Footslopes, creek banks, creek flats and plains were all aggrading landforms due to colluvial deposition and mass soil movement and deposition of sediments by water. The steep slopes on the spurs and in the north were sampled (Navin Officer 1994, pp. 7). During this survey there were no new Aboriginal sites identified. It was argued that archaeological potential in the proposed works area was low due to the results of previous testing in the similar landforms.

Navin Officer(2000) generated a site prediction model for the Shellharbour City Council area. Sites were considered likely to occur in varying densities across a broad range of topographical zones. Areas of relatively level ground without significant amounts of surface rock, situated within close proximity to fresh watercourses, and well drained slightly elevated areas (spurs, crests and ridgelines) were deemed archaeologically sensitive. Areas where different plant communities would meet were also considered to be

areas where sites would be potentially present. The most common site types to occur within the Shellharbour City Council area were isolated finds, artefacts scatters or potential archaeological deposits

AMBS (2006) conducted an archaeological survey in the West Dapto Area, which includes the Marshall Mount suburb and the current study area. Based on this work, they created a predictive model for broad site distribution in their "Landscape Model of Archaeological Sensitivity" of the region (Table 1).

Table 1 Summarised "Landscape Model of Archaeological Sensitivity" for the West Dapto region (AMBS 2006)

Archaeological Sensitivity, West Dapto
Areas of Low Archaeological Sensitivity
• Urban centres, areas of infrastructure and cemeteries.
Areas of Moderate Archaeological Sensitivity:
• Streams of upper creek catchments of West Dapto and the spur crests dividing these creek systems.
Areas of Moderate to High Archaeological Sensitivity:
• Sections of Dapto Creek, Sheaffes Creek, Forest Creek, Robins Creek, Mullet Creek and Duck Creek. • This includes stream banks, alluvial flats and undulating hillslopes.

AMBS subsequently undertook archaeological test excavations as part of a landform sampling strategy. These excavations resulted in the following:

- Recovery of 425 artefacts from 75 of the 136 excavated test pits.
- Dominant lithic materials consisted of chert and quartz with lesser amounts of silicified wood, quartzite, silcrete, silicified tuff and fine grained siliceous material.
- These artefacts were recovered from a variety of landforms including hillslopes, alluvial flats, stream banks, and spur crests.
- More specifically, this model was successful as it identified the Marshall Mount upper creek banks and the spur crests between the Duck Creek and Marshall Mount Creek systems as areas of moderate to high archaeological sensitivity.

As part of the assessment, AMBS also commissioned Philip Hughes to undertake geomorphic testing prior to the commencement of the larger sub-surface investigation program. The geomorphic testing revealed that while all landforms had the potential to contain artefact-bearing deposits, archaeological evidence for Aboriginal occupation and use of the Pleistocene terraces would be restricted to the Holocene period (AMBS 2006, pp. 176). Artefact bearing deposits across all landforms comprise soft to firm soils and sediment. The depth of deposits varies across landforms, with the shallowest sediments occurring on ridges and hill slopes, and the deepest sediments occurring on Holocene terraces. 'Richer' archaeological deposits could be expected within Holocene terraces, but they would be disturbed by floods and perhaps buried in deeper alluvium (AMBS 2006, pp. 177).

AMBS (2010) conducted a further preliminary Aboriginal and historical heritage report for the West Dapto Urban Release Area (WDURA), which included the study area. This followed on from previous testing conducted in the Dapto area in 2006. AMBS undertook a wide scale desktop assessment of the WDURA focusing on landforms and previously identified sites to produce predictive modelling for the area. Areas of high archaeological sensitivity included watercourses, ridges and coastal landforms within the area. Coastal areas in particular were identified to provide evidence for the nature of coastal occupations and are

commonly associated with middens. These areas were also identified to have high archaeological research potential. Areas of moderate archaeological sensitivity were associated with ephemeral and semi-permanent water courses, sloping landforms and some ridges. Artefact scatters were identified to likely be the most common site type within these landforms. Low archaeologically sensitive landforms were categorised as disturbed land within the WDURA.

Mapping of this predictive modelling includes the study area, which is located within an area of moderate archaeological sensitivity (Photo 11), marked as yellow. High archaeological sensitivity are marked in red.

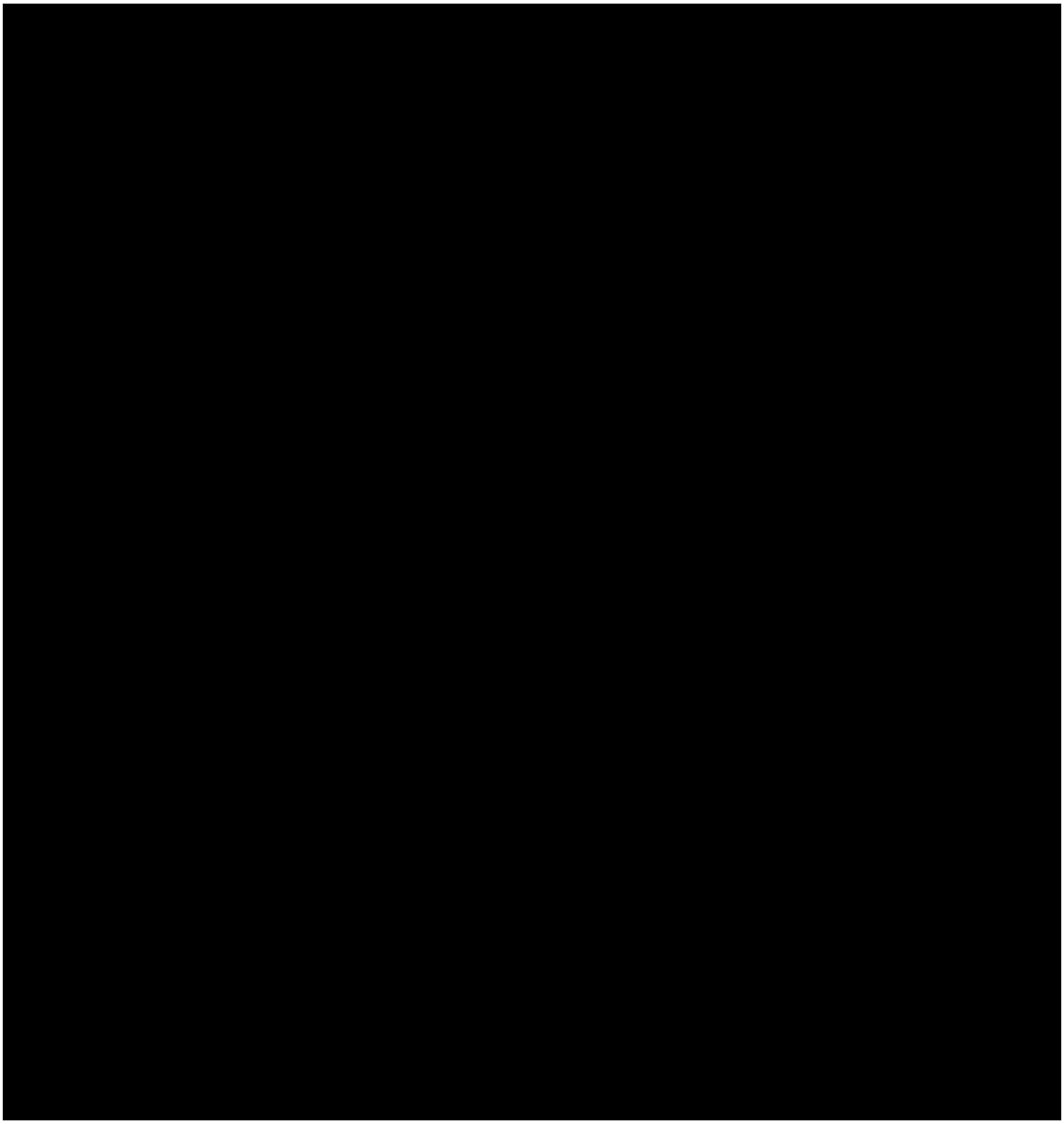


Photo 11 Predictive modelling of archaeological sensitivity in the WDURA (current study area marked by a red arrow) (AMBS 2010, p 87)

Biosis (2011b) conducted test excavations for proposed landscaping of Judbooley Park, located approximately 5.1 kilometres north-east of the study area. The test excavations were conducted within the sand dune above the Lake Illawarra foreshore. As a known Aboriginal site (AHIMS 52-5-0239) was located within the proposed works area, auger holes were excavated in a 10 by 10 metre grid to determine the extent of the known site.

Two 1 by 1 metre test pits were also excavated to determine the nature of the shell midden deposit. The results of test excavations showed that the midden was located within a wider area than previously considered and extended from 15 to 45 centimetres below the ground surface. The midden deposit was characterised by bone, lithic and shellfish remains. The material was identified in a stratified context within the test locations and was concentrated on the centre of the study area across an elevated rise. The area was characterised as an estuarine landscape, located at the transition between the river and ocean environments. The shell assemblage from test excavations comprised mainly of estuarine species, *Anadara trapezia* and *Pyrazus* sp. They would have been found within the close proximity to the subject site and were abundant. Shellfish species from other habitats were considered to have been opportunistically gathered, such as mud flats, rocky shores and sandy intertidal species.

Biosis (2014) undertook the test excavation program recommended by OnSite Cultural Heritage Management (2013) within the eastern foreshores of Lake Illawarra in 2014, located approximately 5.9 kilometres north-east of the study area. This program of test excavations resulted in the identification of four new Aboriginal sites. Three sites, Primbee Artefact Scatter, Primbee South Isolated Artefact and Purry Burry Avenue Artefact Scatter were located within the tidal flats landform, while the site Primbee Midden 1 was within the elevated lake foreshore approximately 2 metres AHD above the lake water level.

Cultural material recovered from two sites located within the tidal flat landform (Purry Burry Avenue Artefact Scatter and Primbee South Isolated Artefact) came from an extensively disturbed context due to previous land use activities and their location within the landscape. Purry Burry Avenue Artefact Scatter site was within an area that had experienced previous extensive disturbance due to the construction of Purry Burry Avenue, Bundah Lane, and the existing services along the road reserve. Three artefacts were found within the fill layers, suggesting they were possibly introduced to the area or were the result of mixing of natural layers and introduced fill material. Artefact type and raw material indicate that these artefacts were likely to originate from the local vicinity. Primbee South Isolated Artefact was located within the flood layer consisting of dark peaty sandy clay organic matter. It is likely that that the artefact was displaced by flood waters.

Primbee Artefact Scatter was identified within the tidal flat landform which exhibited limited levels of previous disturbance. Three artefacts were found within natural sandy layers of up to 600 millimetres in depth. Artefact range and type conform to the general distribution of artefacts from other sites around the lake, and consist of chert and silcrete waste flakes. One geometric microlith was identified within the site. This tool type is associated with a technological innovation that took place in the late Holocene, 4,500 years ago. Artefacts recovered from this site confirm that the area was extensively used by Aboriginal people. Small density artefact scatters indicate that the area has not been used as a long-term occupation place but rather represent isolated events indicative of people moving across the tidal flats. Since these movements were very frequent across the landscape, artefacts can represent deliberate discard or loss of artefacts during an extensive period of time.

Primbee Midden 1 was located within the elevated lake foreshore some 2 metres above the lake water level. During the testing a dense shell deposit was revealed which included artefacts. The analysis of the shell material from four tested shovel probes and test pits was carried out using the criteria set out by Attenbrow (1992) in order to confirm the shell was part of the culturally deposited material. Results of the analysis indicated that the shell deposit was of Aboriginal origin. The site had very limited levels of previous disturbance and as such was not a very common occurrence within the lake foreshore area. Results of the analysis of stone artefacts recovered from the site as well as the location of the site within the landscape (lake foreshore) indicated that the site dated to the last 4,500 years.

GML (2015) were commissioned by Stockland to complete a review on the heritage context of all Stockland-owned lands in the Dapto area, approximately 7 kilometres north west of the study area. This assessment included extensive background review, Aboriginal consultation, and some field survey to characterise the

area. This assessment led to the revision of previous predictive models and the formulation of a number of predictive statements relating to the local area. These statements have been summarised below):

- The area contains a number of alluvial terraces bordering the main creeks in the area. Suitable soil landscapes in these areas have high potential to contain subsurface archaeological deposits.
- The foothills landforms cantina numerous palaeochannels showing a long history of the landscape being reworked. Predictive modelling should not rely on current creek location, but should consider the location of these palaeochannels.
- Sites identified in the middle reaches of Robins and Duck creeks show a link to the extent of flood levels and Lake Illawarra water rises, showing that middens may occur up to 2.5 kilometres from the lake.
- The foot hills of the escarpment are the closest landforms with appropriate areas suitable for intensive Aboriginal activities. Alluvial terraces in this area with slopes of less than 3% are likely to have moderate to high potential.
- Sites on alluvial soils which have been excavated appear to contain stratified deposits, and such sites should be test excavated by stratigraphy to recover spatial data.
- Gravel beds are likely to have been used as sources for the extraction of raw stone materials. Future Investigations should aim to identify the sources of gravel beds and stone material.
- Archaeological sites may be connected with specific landscape locations, such as the upper outer bends of larger creeks, and may only extend 10 metres away from the bend in creeks. Conversely, archaeological sites may be found on sheltered alluvial landforms on flat terraces nestled between the creek bends.
- Archaeological evidence recovered from excavations on the coastal plain has been mainly limited to stone artefacts. Survey and excavation methodologies should allow for the identification or of the site types, including hearths. Based on the sandstone bedrock of the region, creek beds may show evidence of grinding.
- Those landforms associated with Aboriginal walking tracks may contain the greatest variety of archaeological evidence, with the potential for material brought up from the coast and down from the plateau.

3.3 Local context

Dallas and Navin (1987) conducted an archaeological survey along the southern foreshore of Lake Illawarra and on Bevans, Picnic, Berageree and Werrang islands approximately 3.8 kilometres north-east of the study area. The survey identified five new shell midden sites and one previously recorded midden site (AHIMS 52-5-0119). In their discussion of the survey results Dallas and Navin suggested that the locations of the middens on the islands was not necessarily indicative of preferential use. Rather, they suggest it was more likely that the lack of disturbances on the islands compared to the more heavily disturbed Illawarra Lake foreshore has resulted in the destruction of foreshore middens and the preservation of island middens.

Navin (1987) conducted an archaeological investigation into the settlement and exploration of Lake Illawarra's resources and landscape to develop a comprehensive reference base of the Illawarra region (encompassing the study area). The fieldwork for the project was conducted along the foreshore and backshore of Lake Illawarra. The study area is described to be located within low lands below the 10 metre contour. Land immediately next to the lake is noted to slope gently for about 1 kilometre inland. Much of the vegetation has

been cleared for grazing and agriculture and residential development, parks, carparks and yacht clubs extend along 50% of the lakefront.

A survey of the area identified 33 sites, with 70% of them being middens. Half of these middens were located in estuarine environments. Other sites included artefact scatters, isolated finds and grinding grooves. Of the middens, only 5 are located in the foreshore and within 20 metres of the lake.

Artefact scatters were noted to occur mainly along river terraces and minor creeks. Scarred trees in remnant vegetation, and grinding groves 6 kilometres south of the lake. Mogurah Point, which includes the study area, is noted to be disturbed as a landscaped area for recreational purposes (Navin 1987).

Koettig (1992) conducted an assessment of Aboriginal sites for the electrification of the Dapto to Kiama railway line, approximately 2 kilometres west of the study area. Landforms surveyed included the low lying coastal plain and foothills. Due to the levels of previous disturbance during the construction of the railway it was considered that any possible archaeological sites would have been destroyed. No sites were located during the survey. Since the railway crosses areas that are deemed as having high archaeological sensitivity, such as dunes, old terraces, areas close to water sources that have not been affected by the recent development, archaeological material could still remain. Any new development outside the boundary of the railway easement was assessed as having archaeological sensitivity.

Dominic Steele (2000) was commissioned by SMEC Australia Pty Ltd to undertake an archaeological survey and assessment of the proposed upgrade to the Albion Park water supply system. Three survey units were assessed in order to efficiently cover the scope of the works. No Aboriginal sites or objects were identified during the survey effort. This may have been due to the poor level of visibility across the study area, and the fact that approximately 50% of the proposed pipeline route was located in heavily built-up urban residential areas. It was recommended that monitoring of earthworks be undertaken by the Illawarra Local Aboriginal Land Council, particularly in areas nearby Frazer's Creek, and at the Albion Park High Level Reservoir.

Navin Officer (2004) completed a cultural heritage assessment for Shellharbour Urban Fringe area that included the Dunmore area, and western portion of Albion Park including the current study area. The initial assessment in this report identified level ground on hill crests close to water as having moderate potential for artefact occurrences, particularly given the likely use of watershed crests as access routes for the rangelands and coastal plain. Grinding grooves were assessed as having a moderate potential to occur, if sandstone outcrops were present, and the same was said of scarred trees, if mature growth trees were present. The general assessment of the area stated that ' Areas of archaeological potential within this zone are generally level ground on ridge and spurline crests and benches, especially locally elevated landforms adjacent to freshwater' (Navin Officer 2004, pp. 19). The survey identified seven Potential Archaeological Deposits (PADs) in total, with two of these PADS being within 1 kilometre of the study area. The nearest (SUFA1) being approximately 400 metres to the south of the current study area. This PAD was identified on the gentle lower slopes of a steep mini spur and associate valley flats, and was to the west of Hazelton Creek. This site has not been recorded in AHIMS. It appears that the survey obtained extensive coverage in the corner of the site occupied by the current study area (Navin Officer 2004, pp. 28). It was noted that the ridgeline that the study area is located along would ordinarily have a moderate to high potential for sites to be present, however the level of disturbance, combined with the total lack of any artefacts being identified and the shallowness of the topsoil led to the conclusion that there was extremely limited potential for subsurface deposits (Navin Officer 2004, pp. 23). No Aboriginal sites were identified during the survey, and the report concluded that it was impossible to accurately assess the areas of PAD without further investigation.

Navin Officer (2005) completed an Aboriginal archaeological assessment for the Tullimbar Village Development in 2002 located approximately 1.5 kilometres south west of the study area. During the survey, two sites and four areas of potential archaeological deposits were identified. Subsequent mechanical test excavations were carried out at Tullimbar Village PAD 3 (AHIMS 52-5-0431). A total of 11 artefacts were

excavated from 5 of the 14 test pits. A majority of the artefacts recovered were chert, though other raw materials included silcrete, tuff and volcanic rock. One volcanic flake was also recovered from the surface. Considering the low density of artefacts, the presence of a diverse range of raw materials, and the level of bioturbation and earthworks disturbance, it was concluded that the site is a background artefact scatter representing a low intensity occupation site or transient camp of low archaeological significance. No further archaeological excavations were recommended for the northern section of PAD3.

Kayandel (2008) conducted subsurface archaeological test excavations at PAD sites Tullimbar Village PAD 1 (52-5-0434), Tullimbar Village PAD 2 (52-5-0439) and Tullimbar Village PAD 4 (52-5-0440), located 1.5 kilometres south west. This assessment covered a portion of the current study area and the areas located immediately to the west, and to the north of the current study area. A total of 26 tests pits were excavated over the extent of the 3 sites. A total of 33 artefacts were recovered from 12 of the 26 test pits excavated via mechanical means (backhoe). Of these artefacts 14 came from PAD 1, 16 from PAD 2 and three from PAD 4. A majority of the artefacts salvaged were of fine-grained siliceous, or tuff raw materials that are common within the landscape context of the study area. Other raw materials included chert, quartz, jasper, volcanic, jasper, silcrete and petrified wood. The results of the test excavations were consistent with Navin's excavations at PAD3. PAD1, PAD2, and PAD4 were assessed to be background artefact scatters of low significance. Kayandel recommended that no further archaeological investigations were required at PADs 1, 2, and 4. It was also recommended that a valid heritage impact permit (s.87 and s.90 permit), would be required prior to the commencement of works.

Comber Consultants Pty Ltd (Comber) (2010) undertook an Aboriginal archaeological assessment for the proposed bike and pedestrian path around Lake Illawarra, approximately 2.4 kilometres north-west of the study area. As part of this assessment Comber undertook basic predictive modelling and developed predictive statements for various site types. These statements indicated that there was a possibility for middens, burials, open camp sites, axe grinding grooves and isolated finds to be present in the study area. Following background research, Comber conducted a survey of their study area. No Aboriginal archaeological sites were recorded during this survey, but Area 2 and Area 4 of their study area were identified as having a high potential to contain sub surface archaeological deposits. Considering a high number of previously recorded Aboriginal archaeological sites (13) within the vicinity of the study area and the landform they were in (Lake Illawarra foreshore), it was recommended that archaeological sub-surface testing be undertaken in Areas 2 and 4 in order to determine the existence, nature and extent of any such deposits.

Biosis (2010) conducted an Aboriginal archaeological assessment of the Tallawarra lands for TRUenergy, located approximately 3 kilometres north of the study area. Biosis was commissioned to conduct sub-surface testing for a number of areas assessed by Kelleher and Nightingale (2006) as having moderate and high archaeological sensitivity. A total of 10 areas were excavated across five landform types. These landforms included foreshore, spur line, drainage line, hill slope, and creek line landforms. The excavations identified 24 stone artefacts and one piece of ochre across the 10 excavation areas; the highest number of artefacts were uncovered in the creek line landform (n=13) followed by the drainage line landform (n=10) (Biosis Research 2010, pp. 134–135). The foreshore and hill slope landforms each contained one artefact and the spur line did not contain any (Biosis Research 2010, pp. 134–135). The artefact assemblage consisted of a range of raw materials including chert, quartzite, silcrete, basalt, chalcedony and siltstone.

An analysis of the soil profiles within various landform units in the study area indicated that depth of deposit increased with proximity to water (specifically Duck Creek). Disturbances to the soil stratigraphy were found to be limited to the upper (top soil) layer, with lower stratigraphic units showing very low to no evidence of previous disturbance. The soil profiles within TLPD AFT-7 (AHIMS 52-5-0613), TLPD AFT-8 (AHIMS 52-5-0614), TLPD AFT-9 (AHIMS 52-5-0615), were all noted to have three distinct stratigraphic units displaying no evidence of previous disturbance. Testing was not conducted at Tallawara Pipeline PAD3 (AHIMS 52-5-0523). Biosis concluded that the low number of artefacts indicated that Aboriginal people were using the Tallawarra Lands,

with occupation focusing on Duck Creek, but it was likely sporadic or low density (Biosis Research 2010, pp. 147).

Biosis (2011b) were commissioned by the Lake Illawarra Authority to undertake archaeological assessment and test excavations of the Tallawarra recreational shareway based on the recommendations of Comber (2010). The Tallawarra Lands development encompasses parts of the area assessed by Biosis (2011b), located approximately 3 kilometres north of the study area. As part of this assessment Biosis undertook background research to construct several predictive statements for the study area. These statements indicated that (Biosis 2011b, pp. 36–39):

- Midden shell and lithic material have been known to occur on sand bodies such as coastal beach dune systems, elevated ground adjacent to wetlands such as low gradient basal colluvial slopes, terminal spur line crests and alluvial terraces along valley floor drainage corridors.
- Artefact scatters may be identified anywhere within the study area but they are more likely to be identified near water-related landforms and on gently inclined slopes within 100 metres of water. Stone artefacts are more likely to consist of sandstone, quartz or volcanics.
- Shelters, grinding grooves and raw materials suitable for stone tool manufacture will not occur within the study area due to a lack of suitable geology.
- Scarred trees may occur anywhere within the study area where mature trees remain.
- A burial was recorded on the shores of Lake Illawarra. Due to alluvial deposits within the study area and previously recorded burial, there is a possibility that unrecorded burials may be located in the area.

The test excavations undertaken as part of the assessment included 157 auger holes along the foreshore. The excavations identified one new artefact scatter Tallawarra Point 1 and extended the pre-existing site Tallawarra Power Station Midden (AHIMS 52-5-0070). Two artefacts consisting of a quartz flake fragment and a silcrete geometric microlith were identified at Tallawarra Point 1. It was suggested that this site was likely representative of transient occupation. Six stone artefacts were also excavated in a tidal creek landform directly south of Tallawarra Power Station Midden (AHIMS 52-5-0070). The artefacts consisted of four chert flakes, 1 quartz flake and one silcrete flake. This scatter was identified as part of the Tallawarra Power Station Midden. Biosis suggested that the Tallwara Power Station Midden was representative of camping activities or frequent travel through the area (Biosis 2011b, pp. 61–62). No midden material was encountered during the test excavations.

Artefact Heritage (2015) was commissioned by Hyder Cardno Joint Venture to prepare an ACHA for the Albion Park Bypass project, located west of the M1 Princes Highway, located approximately 3 kilometres west of the study area. Following an archaeological survey in 2013, which identified two previously recorded Aboriginal sites and one new area of PAD, test excavations were undertaken in 2014. One Aboriginal site (AHIMS 52-5-0512) and six areas of PADs were excavated. Four PADs contained low density subsurface artefact deposits while the other two PADs had moderate density subsurface artefact deposits. A total of 99 artefacts were recovered with a variety of raw materials; however, silcrete and quartz were the most abundant raw material types. From this assessment, a predictive model was developed. It stated that all levels of the Western foothills zone and the Coastal Plain within 100 metres of a creek situated on quaternary deposits (floodplains), Budgong Sandstone, and Berry Siltstone, are archaeologically sensitive.

Biosis (2015) provided Aboriginal due diligence advice for 225 Crest Road in Albion Park, approximately 1 kilometre south west of the current study are. The assessment concluded that ridgelines with associated upper slopes and spur lines would possess high archaeological potential, and were likely to have been used by Aboriginal people as a transient corridor between the hinterland and the coast. The most likely site types to occur were predicted to be low to moderate density artefact scatters and isolated artefacts. These sites

would be the remnants of short-term camping places or would represent lost or discarded material along the transient corridor. The assessment also identified a small area within the eastern end of the area on the upper gentle slopes associated with the ridgeline and the small easternmost part of the entire as having moderate archaeological potential. Those areas are located within flat areas on spur lines in the vicinity of the watercourses. Areas of low archaeological potential were attributed to steep slopes that would not be suitable for occupation or movement across the landscape. Further assessment was recommended for the areas of high and moderate potential.

Biosis (2017) were commissioned by Planit Consulting to provide Aboriginal due diligence advice for a proposed sewer and water pipeline to be installed at Pleasant View Close, Albion Park, NSW, approximately 1.5 kilometres south of the current study area. A site inspection was undertaken and the area was assessed to be of moderate to high archaeological potential. Site types most likely to occur within the area were assessed to be low to moderate density artefact scatters and isolated finds, which would most likely be present within the well-drained flat areas within the landscape located within close proximity to watercourses, upon the boundaries between different ecological zones, and upon ridgelines utilised as movement corridor from hinterland to coast. It was recommended that further investigations be undertaken due to the natural context of the area.

Biosis (2020) were engaged by Cardno to undertake an ACHA for the Tallawarra Northern Precinct. The ACHA included background research, a field investigation, Aboriginal community consultation and test excavations. There are 10 AHIMS sites located within the Northern Precinct, and no previously unrecorded Aboriginal cultural heritage sites were identified during the field investigation. One area of moderate archaeological sensitivity was identified. Test excavations were conducted between 2 and 18 March 2020. A total of 141 test pits were excavated within areas of moderate potential and within the vicinity of Boomberry Point 1 (AHIMS 52-5-0223), Elizabeth Point (AHIMS 52-5-0225), Gilba Road 2 Fill 1 (AHIMS 52-5-0643) and Gilba Road 1 (AHIMS 52-5-0642). A total of 17 artefacts were identified during the test excavations and a further seven Aboriginal sites identified, which includes Tallawarra PAD 1 (AHIMS 52-5-0956), Tallawarra PAD 2 (AHIMS 52-5-0955), Gilba Road 3 (AHIMS 52-5-0957), Gilba Road 4 (AHIMS 52-5-0958), Gilba Road 5 (AHIMS 52-5-0959), Gilba Road 6 (AHIMS 52-5-0960) and Tallawarra IOS 1 (AHIMS 52-5-0954). Recommendations included the development of Aboriginal Cultural Heritage Management Plan and to apply for an AHIP.

Biosis (2021) conducted an ACHA for the Tallawarra Central Precinct. Background research identified four AHIMS sites located within the study area. A survey of the site did not identify any previously unrecorded sites, however visibility was low. A drainage line located within the study area was assessed to contain high archaeological potential. A ridgeline within the study area was also assessed to contain moderate archaeological potential. Test excavations were undertaken across the areas of potential and eight new sites were recorded as a result. A previously recorded PAD site (AHIMS 52-5-0523) was also determined to not be valid as no sub-surface deposits were found. All sites were low density and sporadically placed. A total of 7% of test pits contained artefacts, which were located on crest, simple slope and lower slope landforms. Artefacts consisted primarily of chert or silcrete, in addition to lower numbers of chalcedony, mudstone and quartz. Flakes, angular fragments, and tools made up the assemblage. Overall it was determined that Lake Illawarra foreshore and surrounding alluvial plains would have provided a variety of resources utilised by Aboriginal people and was likely used as a resource gathering zone or travel route.

3.3.1 Identified Aboriginal archaeological sites

An extensive search of the AHIMS database was conducted on 21 June 2022 (Client service ID: 693957). The search identified 118 Aboriginal archaeological sites within a 2.45 kilometre search area, centred on the proposed study area (Table 2). None of these registered sites are located within the study area, however two are located within 50 metres of the eastern boundary, detailed below (Figure 6). The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from

Aboriginal heritage reports where available. These descriptions and maps were relied where notable discrepancies occurred.

It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area. Some recorded sites consist of more than one element, for example artefacts and a modified tree, however for the purposes of this breakdown and the predictive modelling, all individual site types will be studied and compared. This explains why there are 134 results presented here, compared to the 118 sites identified in AHIMS.

Table 2 AHIMS sites within the study area

Site type	Occurrences	Frequency (%)
Artefact	102	76.12
Shell	20	14.93
PAD	7	5.22
Modified Tree	4	2.98
Stone Arrangement	1	0.75
Total	**134**	**100**

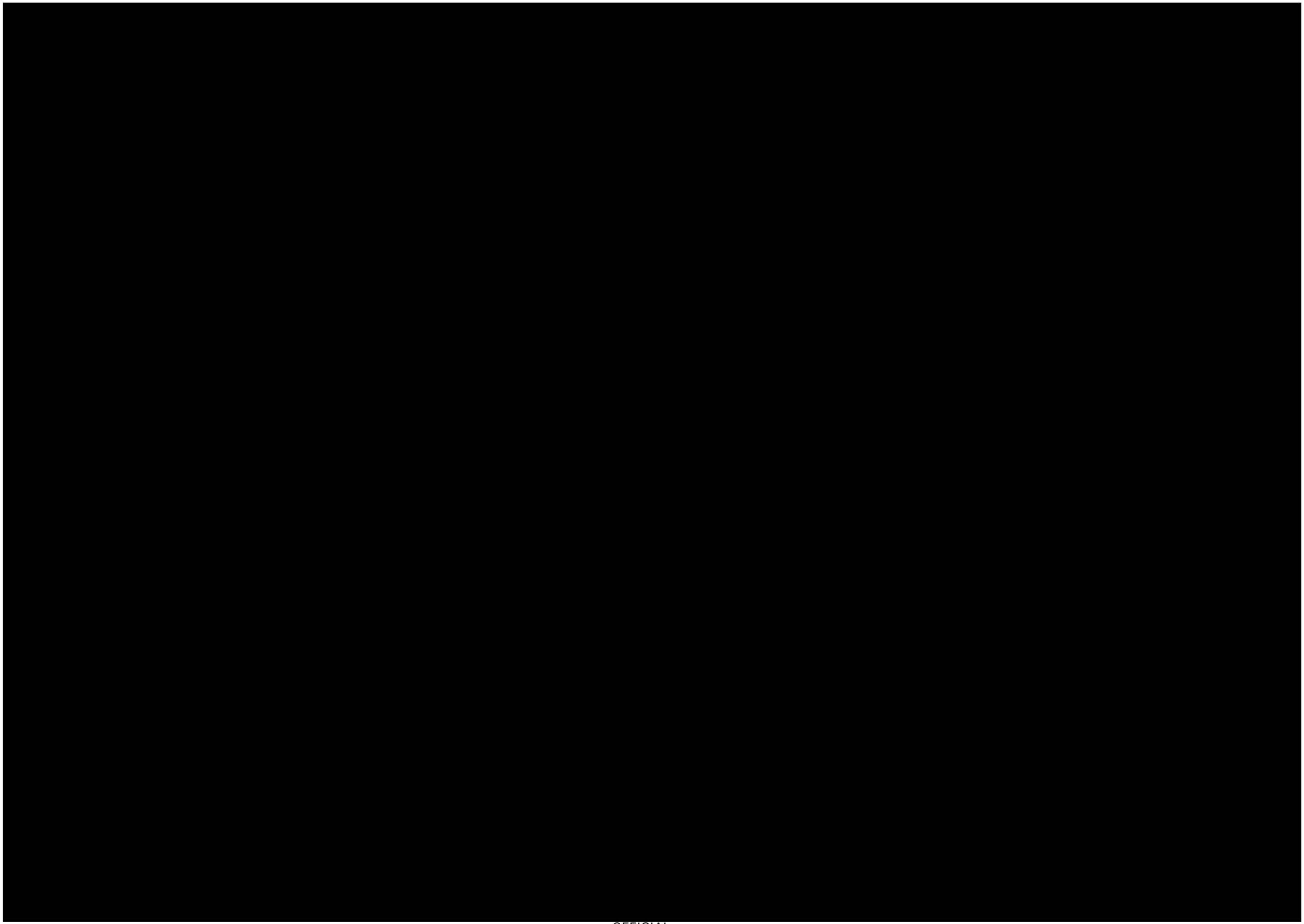
A simple analysis of the Aboriginal cultural heritage sites registered within 1km of the study area indicates that the dominant site type is artefact, representing 76.12% (n=102), followed by shell of 14.93% (n=20). PAD and modified tree sites were represented by 5.22& and 2.98% respectively (n=7 and n=4). Stone arrangement sites are the least frequently occurring site types recorded, representing 0.75% (n=1).

3.3.2 AHIMS sites within vicinity of the study area

There are two recorded AHIMS sites located within close proximity to the eastern boundary of the study area. These are AHIMS 52-2-1802/ Wollingurry Creek 3, an isolated find, and AHIMS 52-5-0230/ Macquarie Rivulet 4, an artefact scatter site. No artefact photographs were provided.

AHIMS 52-2-1802/ Wollingurry Creek 3

AHIMS 52-5-0230/ Macquarie Rivulet 4



3.3.3 Predictive statements

A series of statements been formulated to broadly predict the type and character of Aboriginal cultural heritage sites likely to exist throughout the study area and where they are more likely to be located.

This model is based on:

- Local and regional site distribution in relation to landform features identified within the study area.
- Consideration of site type, raw material types and site densities likely to be present within the study area.
- Findings of the ethnohistorical research on the potential for material traces to present within the study area.
- Potential Aboriginal use of natural resources present or once present within the study area.
- Consideration of the temporal and spatial relationships of sites within the study area and surrounding region.

Based on this information, a predictive model has been developed, indicating the site types most likely to be encountered across the identified landforms which are in close proximity to marine and freshwater (Table 3). The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 3 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	Moderate: Stone artefact sites have been previously recorded in the region on level, well-drained topographies in close proximity to reliable sources of fresh water. Due to the distance from permanent fresh water resources, despite disturbances associated with the railway the potential for artefacts to be present within the study area is assessed as moderate.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Moderate: Shell midden sites have been recorded within the vicinity of the study area. There is a moderate potential for shell middens to be located in the study area in areas in proximity to waterlines.
Potential Archaeological Deposits (PADs)	Potential sub surface deposits of cultural material.	Moderate: PADs have been previously recorded in the region across a wide range of landforms. PADs are likely to be present within areas adjacent to water courses or on high points in undisturbed landforms.
Modified trees	Trees with cultural modifications	Low: Scarred trees have been recorded within the vicinity of the study area. Due to extensive vegetation clearance only a small number of mature native trees have survived within the study area.

Site type	Site description	Potential
Aboriginal Ceremony and Dreaming sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	Low: There are currently no recorded mythological stories for the study area.
Post-contact sites	These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with post-contact Aboriginal use.	Low: There are no post-contact sites previously recorded in the study area and historical sources do not identify one.
Aboriginal places	Aboriginal places may not contain any 'archaeological' indicators of a site, but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings.	Low: There are currently no recorded Aboriginal historical associations for the study area.
Burials	Aboriginal burial sites.	Low: Aboriginal burial sites are generally situated within deep, soft sediments, caves or hollow trees. Areas of deep sandy deposits will have the potential for Aboriginal burials. The soil profiles associated with the study area are not commonly associated with burials.
Quarries	Raw stone material procurement sites.	Nil: There is no record of any quarries being within or surrounding the study area. Suitable quarry locations are not present within the study area.
Grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	Nil: Suitable horizontal sandstone rock outcrops do not occur within the study area.
Rock shelters with art and / or deposit	Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground characterised by cliff lines and escarpments. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	Nil: The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist, which are not present within the study area.

4 Archaeological investigation

An archaeological investigation of the study area was undertaken on 24 June 2022. The survey sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological survey aims

The principle aims of the survey were to:

- Undertake a systematic survey of the study area targeting areas with the potential for Aboriginal heritage.
- Identify and record Aboriginal archaeological sites visible on the ground surface.
- Identify and record areas of Aboriginal archaeological and cultural sensitivity.

4.2 Survey methods

The survey was conducted on foot. Recording during the survey followed the archaeological survey requirements of the code and industry best practice methodology. Information that recorded during the survey included:

- Aboriginal objects or sites present in the study area during the survey.
- Survey coverage.
- Any resources that may have potentially have been exploited by Aboriginal people.
- Landform elements, distinguishable areas of land approximately 40m across or with a 20m radius (CSIRO 2009).
- Photographs of the site indicating landform.
- Ground surface visibility (GSV) and areas of exposure.
- Observable past or present disturbances to the landscape from human or animal activities.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.

Where possible, the identification of natural soil deposits within the study area was undertaken. Photographs and recording techniques were incorporated into the survey including representative photographs of survey units, landform, vegetation coverage, GSV and the recording of soil information for each survey unit were possible. Any potential Aboriginal objects observed during the survey were documented and photographed. The location of Aboriginal cultural heritage and points marking the boundary of the landform elements were recorded using a hand-held Global Positioning System and the Map Grid of Australia (94) coordinate system.

4.3 Constraints to the survey

With any archaeological survey there are several factors that influence the effectiveness (the likelihood of finding sites) of the survey. The main factors which contributing the effectiveness of the survey was the targeted inspection with only those areas to be impacted by the proposed works and the immediate surrounds inspected, visibility of the natural ground surface also contributed.

4.4 Visibility

In most archaeological reports and guidelines visibility refers to GSV, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (DECCW 2010b). Overall, visibility at each of the locations inspected across the study area was low (10-20%) (Photo 12, Photo 13 and Photo 14). This was primarily due to the fact that the proposed works involve the earthing works in the areas of the existing poles and the expansion of other infrastructure (see Photo 15) (See Appendix 2 for the annotated study area inspections photos for each proposed works location).

Photo 12 **Example of the disturbances around the location of proposed earthing works to the existing poles and anchor pads south of the substation**

Photo 13 **Example of the disturbances around the location of proposed earthing works to the existing poles directly north of the substation**

Photo 14 **Example of the disturbances north of Macquarie Rivulet and adjacent to residential subdivision**

Photo 15 Example of the disturbances around the substation

4.5 Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed, and attempts to describe the relationship between those conditions and the likelihood the prevailing conditions provide for the exposure of (buried) archaeological materials. Whilst also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke & Smith 2004, pp. 79, DECCW 2010b).

Overall, the study area displayed areas of low exposure (5-10%) across all targeted areas inspected for the works with all proposed works to be undertaken in disturbed and partially disturbed locations with the existing rail corridor. Areas of exposure are increased around the substation with occasional isolated areas of exposure around a number of existing poles where earthing works will be undertaken (see Appendix 2 for all photos).

4.6 Disturbances

Disturbance in the study area is associated with natural and human agents. Natural agents generally affect small areas and include the burrowing and scratching in soil by animals, water run-off and 'pooling' and erosion. Disturbances associated with recent human action are prevalent in the study area and cover large sections of the land surface. The agents include the construction of the existing substation, the construction of dams/ponds, the construction of the existing rail corridor which includes banking and landform alterations and the isolated disturbances related to the existing infrastructure where earthing works are proposed and previous NDD excavations (see Appendix 2 for all photos).

4.7 Investigation results and discussion

The archaeological investigation consisted of two transects separated by Macquarie Rivulet. The inspection targeted those areas to be impacted by the earthing works for existing poles and substation area expansion and, vegetation clearance works.

No Aboriginal sites or PADs were identified within the study area during the survey. However, the lack of surface material does not indicate that there is an absence of archaeological deposits. This is instead likely attributable to the limited exposure and areas of disturbance seen during the survey, rather than an absence of Aboriginal occupation of the area.

Background research indicated that the study area is located in within alluvial floodplains and alluvial backswamps. The study area is comprised of alluvial floodplains and modified landforms which include bulk

earth work cuttings and bences. The study area also crosses the Macquarie Rivulet a perennial fifth order watercourse. The study area is primarily underlain by the Fairy Meadow Soil Landscape which is characterised as a gently undulating broad alluvial plain. This type of soil landscape typically produces fertile soil and due to the regular inundation is not an ideal soil landscape for the insitu retention of artefact deposits. The Albion Park soil landscape is present to the far north of the study area. It is characterised as short steep upper slopes grading into long gently footslopes on Berry Formation on the Coastal Plain. The soil are moderately deep and suffer the limitation of waterlogging.

A search of the AHIMS database and a review of relevant reports was also undertaken. The AHIMS search identified 118 Aboriginal sites within a 1 kilometre radius of the study area. The AHIMS search identified two previously recorded sites within proximity of the study area. AHIMS 52-2-1802/ Wollingurry Creek 3, an isolated find recorded in 1994 which was subject to a permit A Consent And Permit To Salvage (Consent Number 725), as such the site has been 'destroyed and the artefact is no longer at the site location. AHIMS 52-5-0230/ Macquarie Rivulet 4 is an artefact scatter recorded in 1988. The site is located east of the railway bridge in a paddock, within a small area that was cleared and ploughed. The site is located adjacent to the study area and was not identified during the current site inspection of the study area. No additional area of archaeological potential was identified associated with this site.

Predictive models which have been developed for the regional and local area have a tendency to favour permanent water courses as the locations of complex sites have been continuously occupied. This is due to these areas having stable sources of water and by extension other resources which would have been used by Aboriginal groups.

The survey was hampered by low GSV (10-20%) and the disturbances of existing infrastructure where the earthing works are proposed or disturbances relating to existing infrastructure like the substation. The location of the proposed works are in areas subject to broad infrastructure disturbances and isolated disturbances related to the infrastructure to be upgraded, expanded and or where vegetation is to be cleared and as such has been disturbed throughout by these various activities.

The background research identified that the broader area has moderate potential for Aboriginal archaeological objects. However, no Aboriginal objects, sites or areas of PAD were identified during the site inspection. The results of the background research and the site inspection have determined that the location of the proposed targeted works within the study area are in areas of low Aboriginal archaeological potential.

5 Conclusions and recommendations

5.1 Conclusions

This assessment has found that the proximity of the study area to Lake Illawarra and various creeks and backswamps would have resulted in easy freshwater access and an abundance of marine resources for the Dharawal living the area. However, broad rail infrastructure disturbances and the isolated disturbances related to the existing infrastructure to be upgraded and expanded including targeted vegetation clearance and previous NDD excavations have likely removed or caused the displacement of any archaeological deposits which may have been located within the areas of proposed works across the study area. No Aboriginal objects, sites or areas of PAD were identified during the site inspection. The results of this assessment indicated that there is low potential for Aboriginal archaeological objects in the locations of the proposed works (see Section 1.4 for the proposed works detail).

5.2 Recommendations

The following management recommendations have been developed relevant to the study area and influenced by:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practise, widely considered to include:
  - Ethos of the Australia ICOMOS Burra Charter (2013).
  - The code.

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential.

Recommendation 2: Discovery of Unanticipated Aboriginal Objects

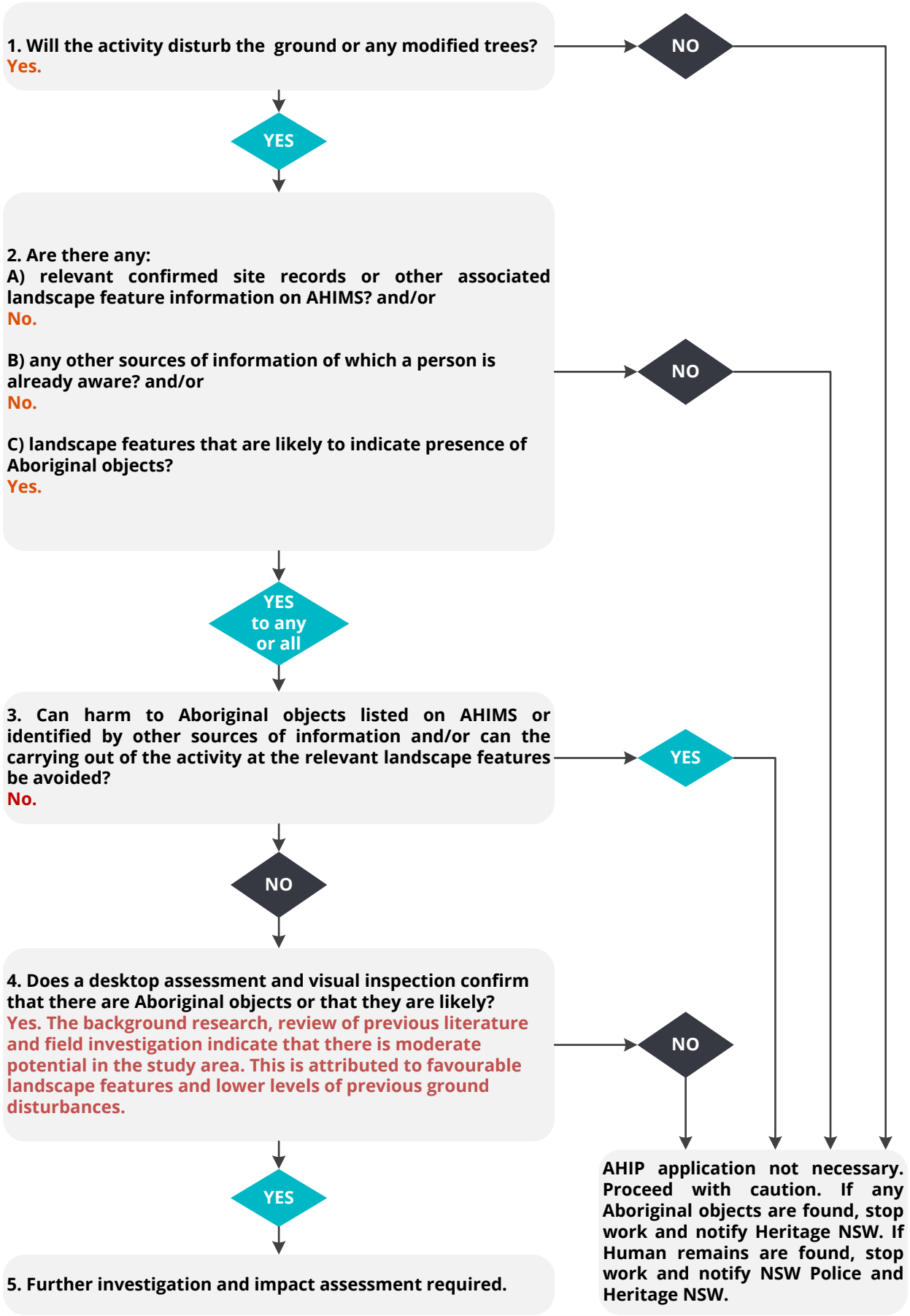
All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying the Heritage NSW and Aboriginal stakeholders.

Recommendation 3: Discovery of Aboriginal Ancestral Remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW' Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

Due Diligence Flow Chart



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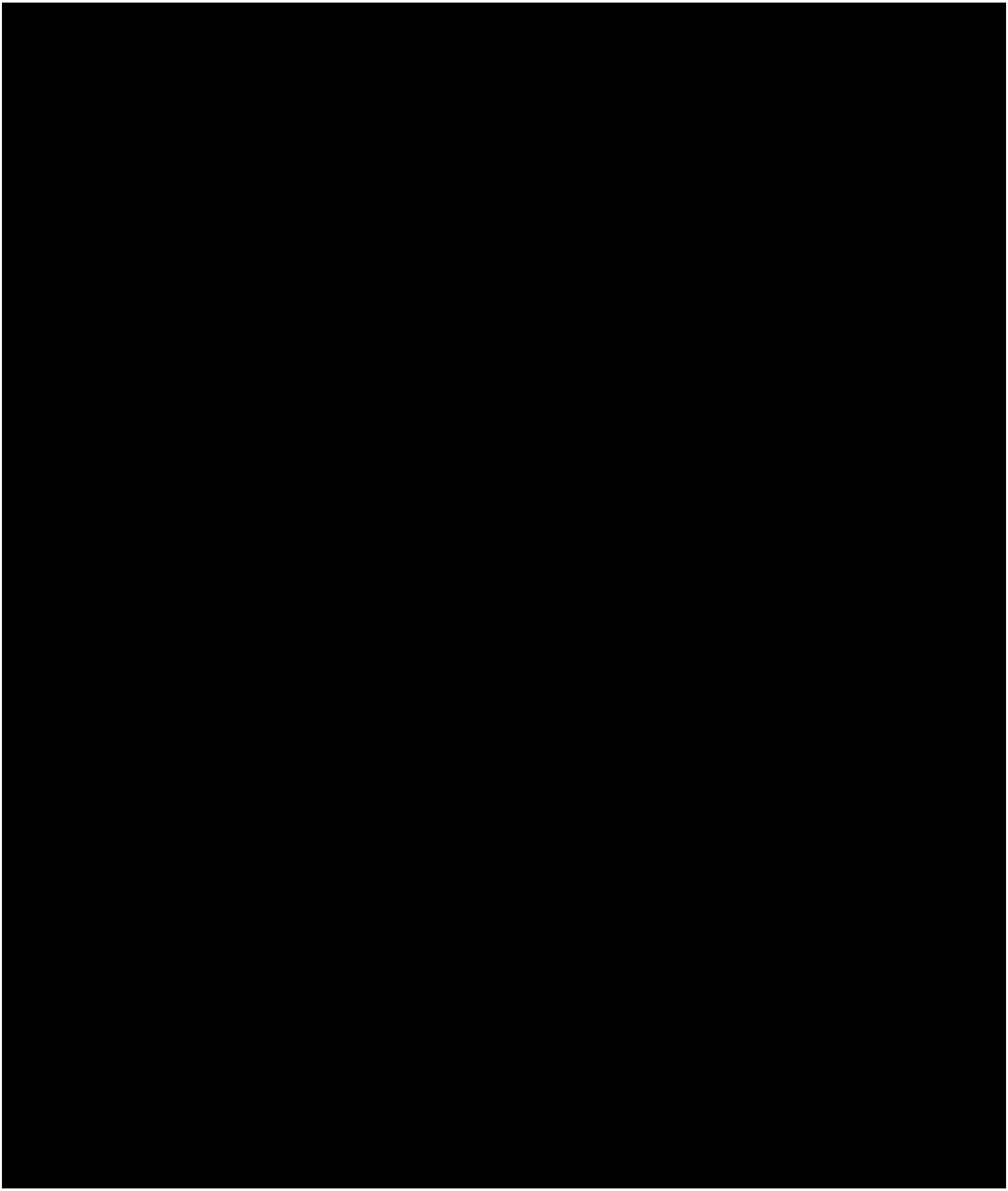
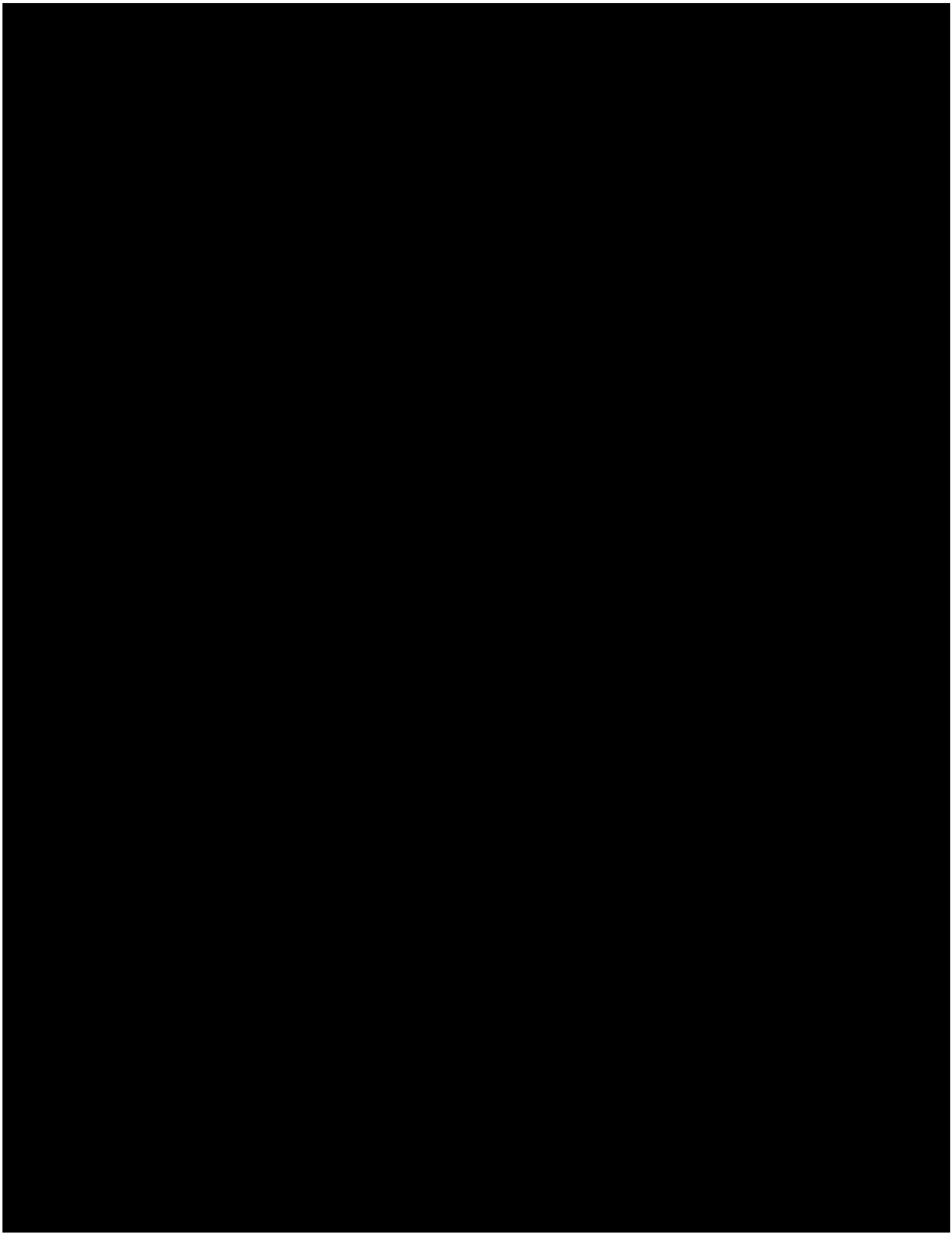
Appendices

Appendix 1 AHIMS search results

This Appendix is not to be made public.





Appendix 2 Site Inspection Photos

General photo looking south, south of the Substation and south of Albion Creek

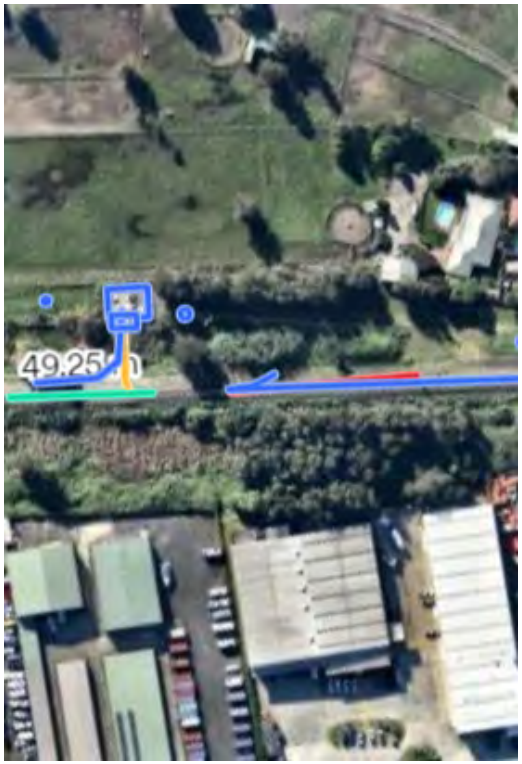
General photo looking north, south of the Substation and north of Albion Creek

General photo looking north, north of the Substation and south of Macquarie Rivulet

General photo looking north, north of the Substation and north of Macquarie Rivulet clearly showing the level of sub-surface disturbances and the landform modifications

General photo looking north, south of the Substation and north of Albion Creek showing the level of disturbances and sub-surface utilities

The below photos relate to the proposed works locations shown in the above image.



The below photos relate to the proposed works locations shown in the above image.

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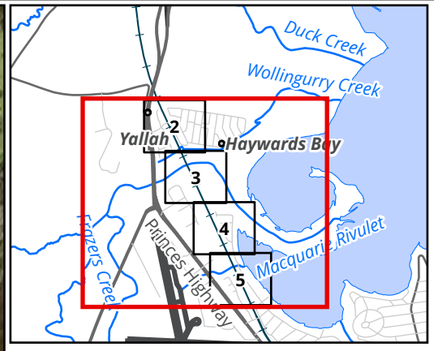
Appendix 3 Proposed works detail



Legend

Study area

Proposed works

Pole earthing works

Work area

Work area

Figure 3.1 Proposed works

0 60 120 180 240 300

Metres

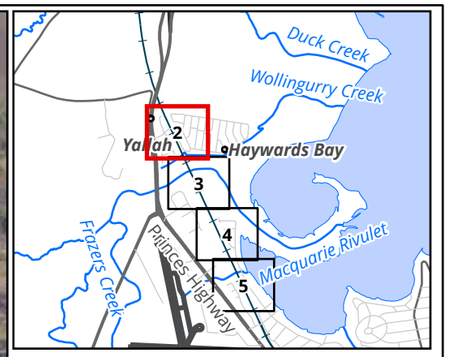
Scale: 1:8,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37610, Date: 11 July 2022,
Drawn by: MK, Checked by: JM, Last edited by: lharley
Location: P:\37600s\37610\Mapping\
37610_AlbionPark_ADDA, Layout: 37610_ADDA_F3_ProposedWorks



Legend

Study area

Proposed works

Pole earthing works

Figure 3.2 Proposed works

0 10 20 30 40 50

Metres

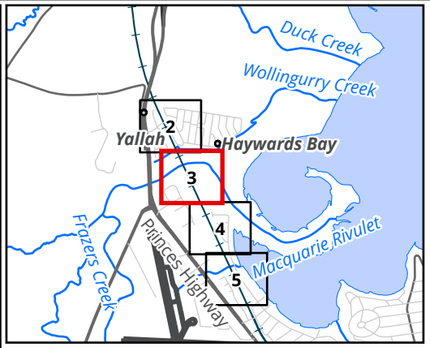
Scale: 1:2,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37610, Date: 11 July 2022,
Drawn by: MK, Checked by: JM, Last edited by: lharley
Location: P:\37600s\37610\Mapping\
37610_AlbionPark_ADDA, Layout: 37610_ADDA_F3_ProposedWorks



Legend

Study area

Proposed works

Pole earthing works

Work area

Work area

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © Nearmap 20## public/NSW_Imagery: © Department of Customer Service 2020

Figure 3.3 Proposed works

0 10 20 30 40 50

Metres

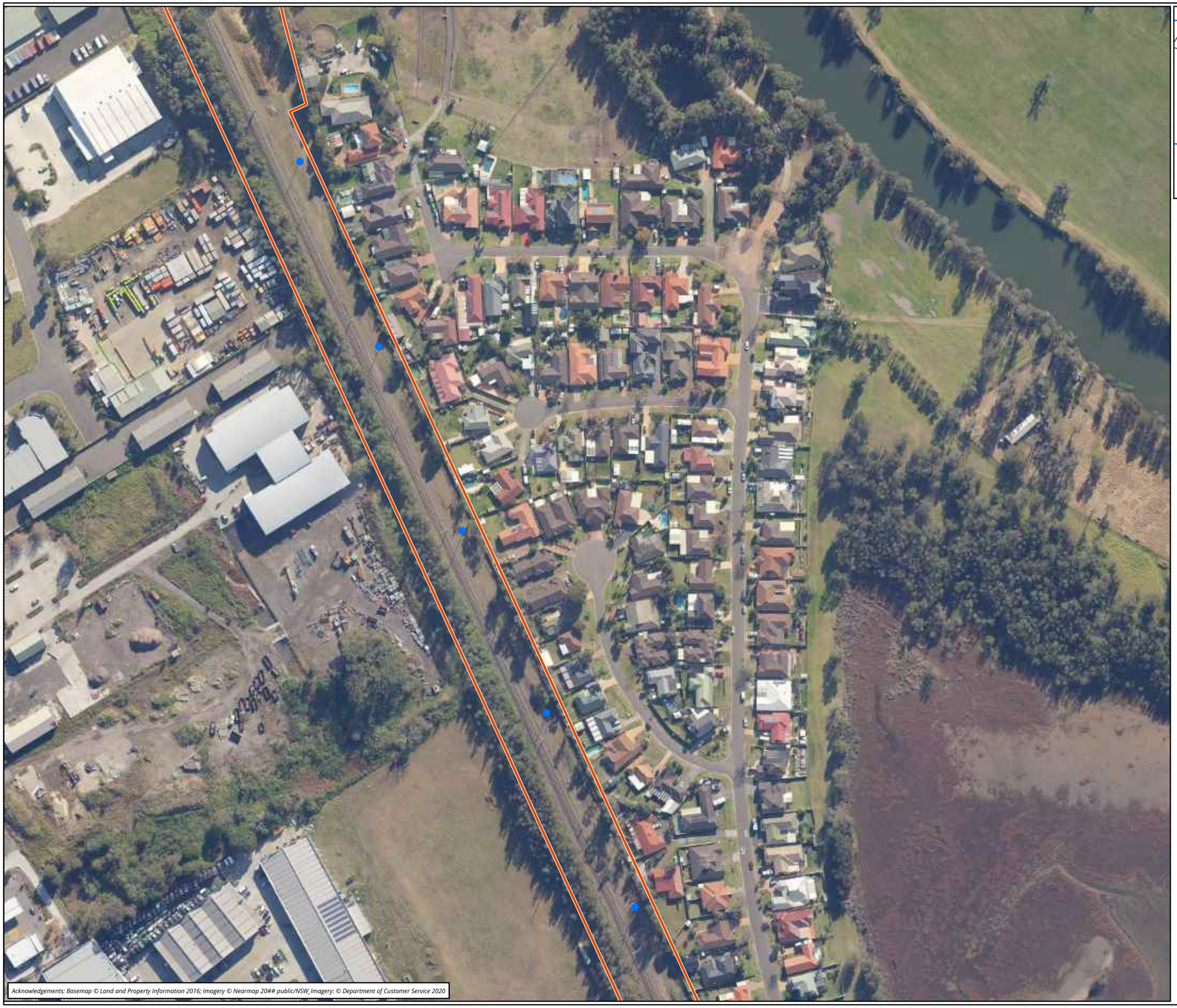
Scale: 1:2,000@ A3

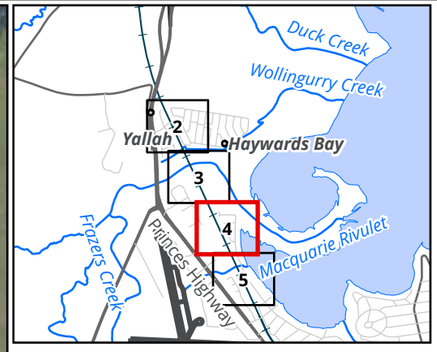
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37610, Date: 11 July 2022,
Drawn by: MK, Checked by: JM, Last edited by: lharley
Location: P:\37600s\37610\Mapping\
37610_AlbionPark_ADDA, Layout: 37610_ADDA_F3_ProposedWorks





Legend

Study area

Proposed works

Pole earthing works

Figure 3.4 Proposed works

0 10 20 30 40 50

Metres

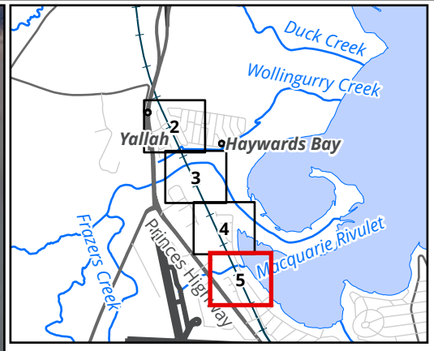
Scale: 1:2,000@ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 37610, Date: 11 July 2022,
Drawn by: MK, Checked by: JM, Last edited by: lharley
Location: P:\37600s\37610\Mapping\
37610_AlbionPark_ADDA, Layout: 37610_ADDA_F3_ProposedWorks



Legend

Study area

Proposed works

Pole earthing works

Work area

Figure 3.5 Proposed works

0 10 20 30 40 50

Metres

Scale: 1:2,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37610, Date: 11 July 2022,
Drawn by: MK, Checked by: JM, Last edited by: lharley
Location: P:\37600s\37610\Mapping\
37610_AlbionPark_ADDA, Layout: 37610_ADDA_F3_ProposedWorks

APPENDIX H – AHIMS Search

[redacted]

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : KGN

Client Service ID : [redacted]

[redacted]

Date: 09 June 2022

[redacted]

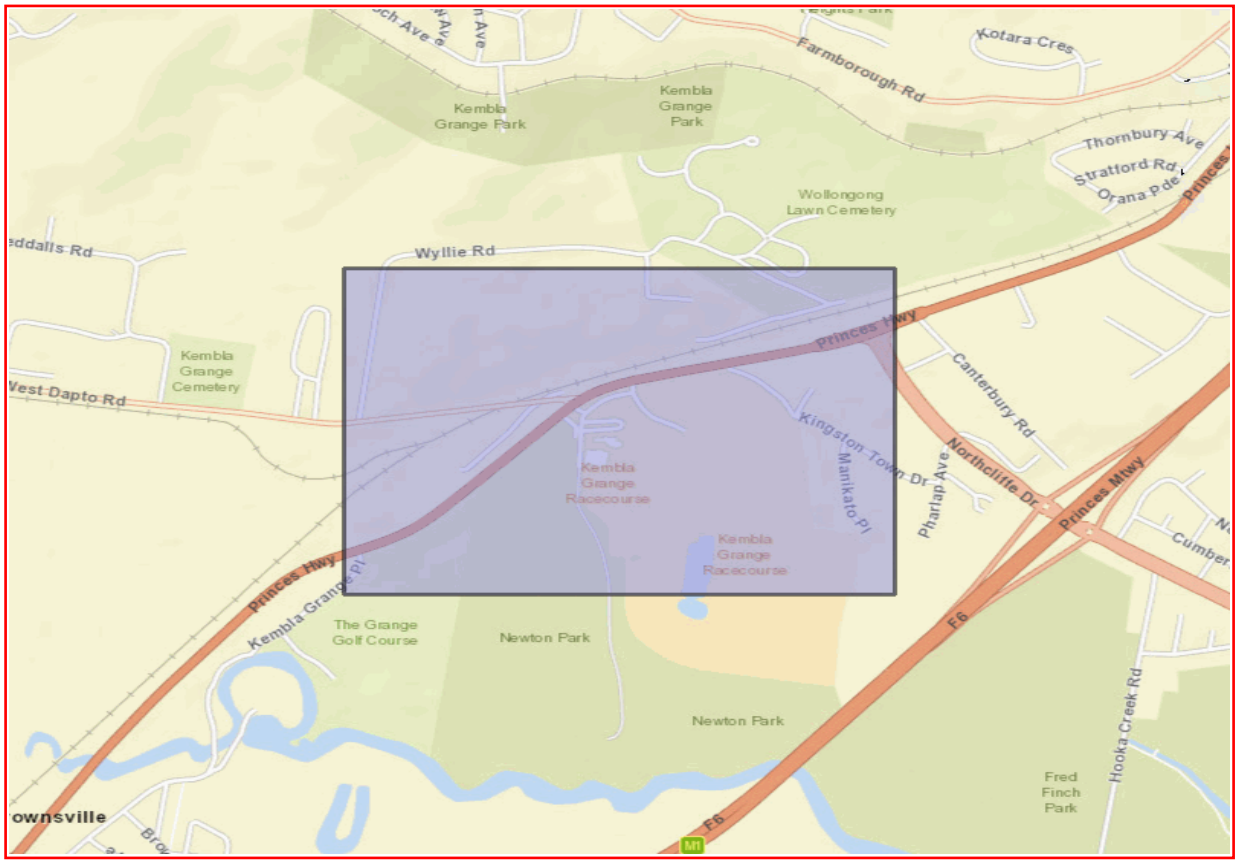
Attention: [redacted]

Email: [redacted]

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.4757, 150.8117 - Lat, Long To : -34.4668, 150.8272, conducted by Glen Isbester on 09 June 2022.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

[redacted]

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : KG

Client Service ID : [redacted]

[redacted]

Date: 09 June 2022

[redacted]

[redacted]

Attention: [redacted]

Email: [redacted]

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.4813, 150.8032 - Lat, Long To : -34.4724, 150.8186, conducted by Glen Isbester on 09 June 2022.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

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Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

[redacted]

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Croom

Client Service ID : [redacted]

[redacted]

Date: 09 June 2022

[redacted]

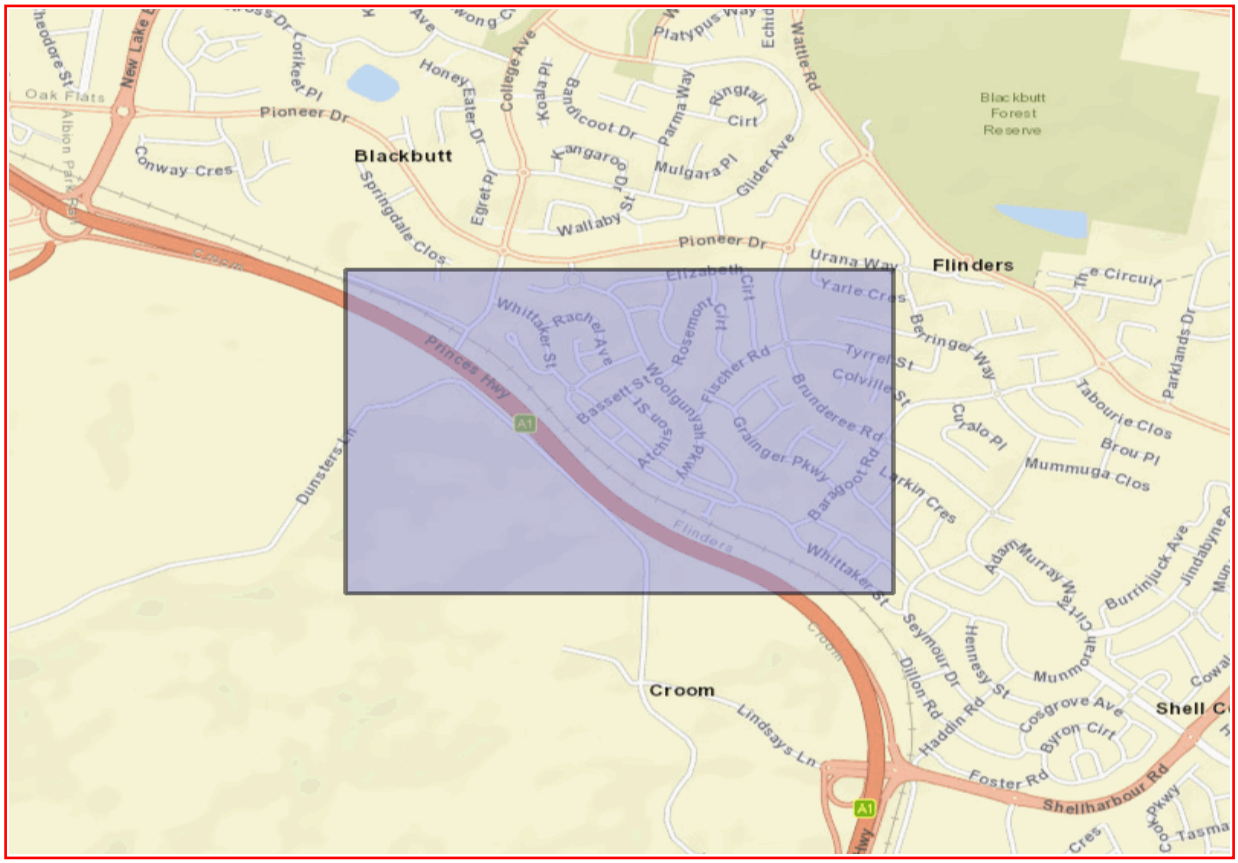
Attention: [redacted]

[redacted]

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.584, 150.8297 - Lat, Long To : -34.5752, 150.8451, conducted by Glen Isbester on 09 June 2022.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

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