

Kogarah Golf Club Redevelopment – Concept & Early Works SSDA (SSD-84467726)

Archaeological Report

Final Report

Prepared for Stockland Development Pty Limited

25 March 2026

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- Olivia Williams (mapping)
- Anthea Vella (quality assurance)

Biosis acknowledges the Aboriginal and Torres Strait Islander peoples as Traditional Custodians of the land on which we live and work.

We pay our respects to the Traditional Custodians and Elders past and present and honour their connection to Country and ongoing contribution to society.

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Summary

This Archaeological Report (AR) has been prepared for Stockland Development Pty Limited (Stockland) to accompany a State Significant Development Application (SSDA) (SSD-84467726) for a Concept Masterplan and Early Works associated with the Kogarah Golf Club Redevelopment located on land identified as 13-19A Marsh Street, Arncliffe (Lot 31 DP 1231486, Lot 100 DP 1231954, Lot 60 DP 1301057, Lot 61 DP 1301057, Lot 62 DP 1301057, Lot 63 DP 1301057, Lot 1 DP 329283, Lot 12 DP 570900, Lot 102 DP 1231954, Lot 103 DP 1231954), New South Wales (NSW) (the site/study area).

This AR documents the findings of the archaeological investigations conducted as part of the ACHA. As required under Section 2.3 of *The Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b) (the Code), the AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

The study area is located approximately 8 kilometres south-west of the Sydney Central Business District (CBD). There are 104 Aboriginal archaeological sites registered with the Aboriginal Heritage Information Management System (AHIMS) register within a 6.25 by 6.25 kilometre search area, centred on the study area (search conducted 14 October 2025, Client service ID: 1054525). There are no Aboriginal cultural heritage sites within the study area.

The project is being assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The State Significant Development (SSD) application will help determine if the proposed development is likely to have a significant effect on the environment, including Aboriginal cultural heritage.

The study area is situated on the western margins of Botany Bay, bounded to the north and east by the Cooks River and to the south and west by urban settlement of Rockdale. The geological character of the area is described as the Estuarine tidal-delta flat which consists of Quaternary sand, peat and mud deposits, which overlies Hawkesbury Sandstone, present in the northern portion of the study area and common throughout the Sydney basin. The study area is considered disturbed terrain, being predominately comprised of reclaimed land (Figure 6). The Disturbed Terrain soil landscape is defined as areas where soils have been disturbed to at least a depth of 100 centimetres by human activity, including complete disturbance, removal, or burial of soil. Aerial photography and geotechnical investigations confirm these disturbances.

The survey was conducted on 8 December 2025 by two Biosis heritage consultants and two members of the Metropolitan Local Aboriginal Land Council (LALC). The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed low. This was attributed to vegetation cover restricting ground surface visibility (GSV) combined with no exposure.

No previously unrecorded Aboriginal cultural heritage sites were identified during the field investigation.

Surface shell inclusions and disturbances

During the archaeological survey bleached shell was identified across the study area eroding out of fill where GSV was high underneath trees, within the walls of sand bunkers, or where grass was otherwise not present. The shell was comprised of individuals varying highly in size, with most being small individuals that would not be considered edible. Species varied and included inedible and edible species such as *Anadara trapezia* Sydney cockle, and *Ostreidae* Oyster. There was a lack of stratigraphy evident, with no clear shell lenses (defined as a distinct, concentrated layer or pocket of shell material within a midden deposit) or intact soil layers present. No evidence of cooking (burn marks or charcoal) or other remains typically seen within middens (such as other edible animal species such as fish bones, or stone tools) were present. This suggests

that the shell may originate from either a redeposited shell midden or a natural deposit, such as one formed by fluvial processes.

Archaeological assessments previously undertaken within the study area (Biosis 2001, 2023; AECOM 2015) have investigated and confirmed extensive high-level disturbances to the natural soil profile. AECOM (2015) determined that these underlying deposits were likely also disturbed and that there was therefore no archaeological sensitivity for the area. Biosis (2023) also concluded that even if the natural soil deposits are present *in situ*, they would be located beneath the current groundwater level and have low potential to contain archaeological deposits.

Available borehole data for the project shows that the current soil profiles within the study area consist of imported fill to a depth of 0.5 to 1.8 metres, overlying interbedded sands and clays, which in turn overly sandstone bedrock at a depth of between 9 and 33 metres (Jeffery and Katauskas 2008, p. 5). If any intact archaeological material were to be present within the study area, it would be located within the interbedded clays and sands underlying the fill. The depositional sequences between the boreholes suggests that the interbedded sands and clays across the entire study area were created through extensive filling of a mixture of the Birrong and Warriewood soil landscapes. The groundwater depth and seepage also indicates the original area would have been low-lying and marshy (Jeffery and Katauskas 2008, p. 7).

Through observation of the shell material and disturbances within the study area, Biosis has therefore determined that the shell material does not represent intact cultural midden deposits and is unlikely to be cultural midden material. Although some of the shell may be representative of redeposited midden material, the shell material identified is from a highly disturbed context and the origins of the soil and shell material are unclear. While this analysis was not supportive of the recovered shell material being cultural in nature, this does not imply that land around the Cooks River did not once contain several complex Aboriginal shell middens.

Strategies have been developed based on the archaeological significance of cultural heritage relevant to the study area. The strategies also take into consideration:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practice, widely considered to include:
 - The ethos of the Australia — International Council on Monuments and Sites (ICOMOS) Burra Charter.
 - the Code.

The recommendations that resulted from the consultation process are provided below.

Management recommendations

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

Recommendation 1: Continued consultation with the Registered Aboriginal Parties

It is recommended that Stockland continue to inform the Registered Aboriginal Parties (RAPs) about the progress of the study area throughout the life of the project. This recommendation is in keeping with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* 2010 (DECCW 2010b) (consultation requirements).

Recommendation 2: No further archaeological works necessary

Due to the high disturbance prevalent throughout the recent history of the study area and geotechnical works identifying the presence of fill at depths up to 1.8 metres across the site, the study area has been identified as containing low potential for Aboriginal sites to be present. No further archaeological works are necessary.

Recommendation 3: Monitoring during earthworks

The majority if not all of the evidence of past Aboriginal occupation/ Aboriginal history on the site has since been removed, heavily disturbed or buried under deep landfill. While testing was recommended by the members of Metro LALC who attended the field investigation, the depth of the fill across the site indicates that test excavations would not be effective in this instance. Therefore, in keeping with recommendations from previous assessment Biosis (2023) and consultation it is recommended that monitoring be undertaken by RAPs when excavation past fill layers occurs. This will ensure, that should any Aboriginal archaeology be present it would be identified and properly cared for. This was supported by RAPs during Stage 4 consultation.

Recommendation 4: Heritage induction and Construction Environmental Management Plan

While it has been concluded that the study area has been highly disturbed and contains low archaeological potential, the study area is in a location where middens were likely present. Therefore, a heritage induction should be included in the site induction for all personnel. This will inform as to when works should cease and a manager be contacted for further instruction should any potential Aboriginal sites be identified during groundworks. This includes the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

This should be included in the Construction Environmental Management Plan (CEMP) for the project, which would also outline the methodology for RAP monitoring (Recommendation 3).

Recommendation 5: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the NSW *National Parks and Wildlife Act 1947* (NPW Act). It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by Heritage NSW, Department of Climate Change, Energy, the Environment and Water (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 Heritage NSW and Aboriginal stakeholders. This can also be incorporated into the CEMP.

Recommendation 6: Discovery of human remains

If any suspected human remains are discovered during any activity works, all activity in the vicinity must cease immediately. The remains must be left in place and protected from harm or damage. The following

contingency plan describes the immediate actions that must be taken in instances where human remains or suspected human remains are discovered. Any such discovery at the study area must follow these steps:

1. **Discovery:** If suspected human remains are discovered all activity in the vicinity must stop to ensure minimal damage is caused to the remains; and the remains must be left in place and protected from harm or damage.
2. **Notification:** Once suspected human skeletal remains have been found, the Coroner's Office and the NSW Police must be notified immediately. Following this, the find will be reported to the Aboriginal parties and Heritage NSW.

This can also be incorporated into the CEMP.

Definitions

ACHAR	Aboriginal Cultural Heritage Assessment Report
ADDA	Aboriginal Due Diligence Assessment
AHO	Aboriginal Heritage Office
AHIMS	Aboriginal Heritage Information Management System
AR	Archaeological Report
Biosis	Biosis Pty Ltd
CBD	Central Business District
CEMP	Construction Environmental Management Plan
Consultation requirements	<i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i>
Cth DCCEEW	<i>Australian Commonwealth Department of Climate Change, Energy, the Environment and Water</i>
DP	Deposited Plan
EFCP	Electrical Friction Cone Penetration
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
ESD	Ecologically Sustainable Development
GFA	Gross Floor Area
GPS	Global Positioning System
GSV	Ground Surface Visibility
Heritage NSW	Heritage NSW, NSW Department of Climate Change, Energy, the Environment and Water
ICOMOS	International Council on Monuments and Sites
JMCHM	Jo McDonald Cultural Heritage Management
KGC	Kogarah Golf Course
LALC	Local Aboriginal Land Council
LGA	Local Government Area
Metro LALC	Metropolitan Local Aboriginal Land Council
MOC	Motorway Operations Centre
NHL	National Heritage List
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
NTSCORP	Native Title Services Corporation
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party

SSDA	State Significant Development Application
Stockland Development	Stockland Development Pty Limited
Study area	13-19A Marsh Street, Arncliffe (Lot 31 D P1231486, Lot 100 DP 1231954, Lot 60 DP 1301057, Lot 61 DP 1301057, Lot 62 DP 1301057, Lot 63 DP 1301057, Lot 1 DP 329283, Lot 12 DP 570900, Lot 102 DP 1231954, Lot 103 DP 1231954)
the Code	<i>Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i>

1 Introduction

1.1 Project background

Biosis was commissioned by Stockland to undertake an ACHAR for a Concept Masterplan and Early Works associated with the Kogarah Golf Club Redevelopment located on land identified as 13-19A Marsh Street, Arncliffe (the study area) (

Figure 1 and Figure 2). This AR documents the findings of the archaeological investigations conducted as part of the ACHAR. The AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHAR.

This investigation has been carried out under Part 6 of the NPW Act and in accordance with the Code. The Code has been developed to support the process of investigating and assessing Aboriginal cultural heritage by specifying the minimum standards for archaeological investigation undertaken in NSW under the NPW Act.

1.2 Study area

The study area is located approximately 8 kilometres south-west of the Sydney CBD (

Figure 1). It encompasses approximately 36.21 hectares of private land.

The study area is within the:

- Bayside Council LGA.
- Parish of St George.
- County of Cumberland.

The study area is bounded by Marsh Street to the north, the Cooks River to the east and the M5 East Freeway to the south-west (Figure 2).

1.3 Planning approvals

The proposed development will be assessed against Part 4 of the EP&A Act. Other relevant legislation and planning instruments that will inform this assessment include:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.
- NSW NPW Act.
- NSW *National Parks and Wildlife Amendment Act 2010*.
- *Bayside Local Environmental Plan 2021*.
- *Bayside Development Control Plan 2022*

1.4 Objectives of the investigation

The objectives of the investigation can be summarised as follows:

- To identify and consult with any registered Aboriginal stakeholders and the Metropolitan LALC.
- To conduct additional background research in order to recognise any identifiable trends in site distribution and location.
- To search statutory and non-statutory registers and planning instruments to identify listed Aboriginal cultural heritage sites within the study area.
- To highlight environmental information considered relevant to past Aboriginal occupation of the locality and associated land use and the identification and integrity/preservation of Aboriginal sites.
- To summarise past Aboriginal occupation in the locality of the study area using ethnohistory and the archaeological record.
- To formulate a model to broadly predict the type and character of Aboriginal sites likely to exist throughout the study area, their location, frequency and integrity.
- To conduct a field survey of the study area to locate unrecorded or previously recorded Aboriginal sites and to further assess the archaeological potential of the study area.
- To assess the significance of any known Aboriginal sites in consultation with the Aboriginal community.
- To identify the impacts of the proposed development on any known or potential Aboriginal sites within the study area.

- To recommend strategies for the management of Aboriginal cultural heritage within the context of the proposed development.

1.5 Investigators and contributors

The roles, previous experience and qualifications of the Biosis project team involved in the preparation of this archaeological report are described below in Table 1.

Table 1 Investigators and contributors

Name and qualifications	Experience summary	Project role
Anthea Vella Bachelor of Archaeology Master of Archaeology and Heritage Management	Anthea has over seven years of experience in the consulting industry, as well as extensive volunteering experience on archaeological research projects in Australia. Anthea has also managed and completed a range of Aboriginal cultural heritage and historical heritage projects across NSW. She also has geophysical skills in Ground Penetrating Radar data collection, processing and interpretation. Anthea has managed a range of different projects for a diverse client base including architectural firms, engineering firms, private developers and Government departments. These include projects which require Aboriginal Due Diligence Assessments (ADDAs), ACHARs, Historical Heritage Assessments, Statements of Heritage Impact, Constraints Assessments, Aboriginal and Non-Aboriginal Heritage Management Plans, and Heritage Impact Assessments and permits for Aboriginal archaeology. She has experience working on major State significance projects as well as locally significant sites.	• Quality assurance • Project Management
Maggie Butcher Bachelor of Arts (Honours) Bachelor of Science/Bachelor of Arts <i>*no longer at Biosis</i>	Maggie is a Senior Associate Heritage Consultant and Excavation Director with the Biosis Sydney office. Maggie has over ten years' experience as an archaeologist and has experience in conducting desktop assessments, archaeological survey and Aboriginal and historical excavation as well as consulting with Traditional Owners.	• Field investigation • Report writing • Project Management
Rhiannon Whitton Bachelor of Archaeology Bachelor of Philosophy	Rhiannon is a Heritage Consultant based in the Biosis Western Sydney office with two years of experience. Her prior experience in the heritage industry revolves around the preservation of artefacts via 3D digitisation, something which she is passionate about. Since joining Biosis she has gained experience working on both Aboriginal and historical projects. These have involved undertaking background research, Aboriginal community consultation, report writing, post fieldwork data entry, artefact analysis, test/salvage excavations, field surveys and heritage monitoring. She is eager to expand her skillset at Biosis.	• Aboriginal community consultation • Report writing
Megan Porter Bachelor of Arts (Honours)	Megan joined Biosis in 2025 as a Graduate Heritage Consultant based in the Western Sydney office, with one year of experience. Since joining Biosis, Megan has contributed to various projects throughout the Sydney, Albury and Illawarra regions, including conducting background research, field survey, and test excavations, as well as preparing consultation documentation.	• Report writing • Field investigation

Name and qualifications	Experience summary	Project role
Olivia Williams Bachelor of Environmental Science and Management	Olivia has been a member of the GIS team at Biosis since July 2024. In her time with us she has gained experience across a wide range of technical skills, including spatial modelling, spatial data management and digitisation, cartographic design and providing field data collection support whilst working on various ecology, heritage and environmental approvals projects. Since joining Biosis, Olivia has been committed to producing high quality maps and spatial analyses for clients on various projects across a wide range of sectors, including transport, utilities, renewable energy, residential subdivisions and tourism.	• Mapping

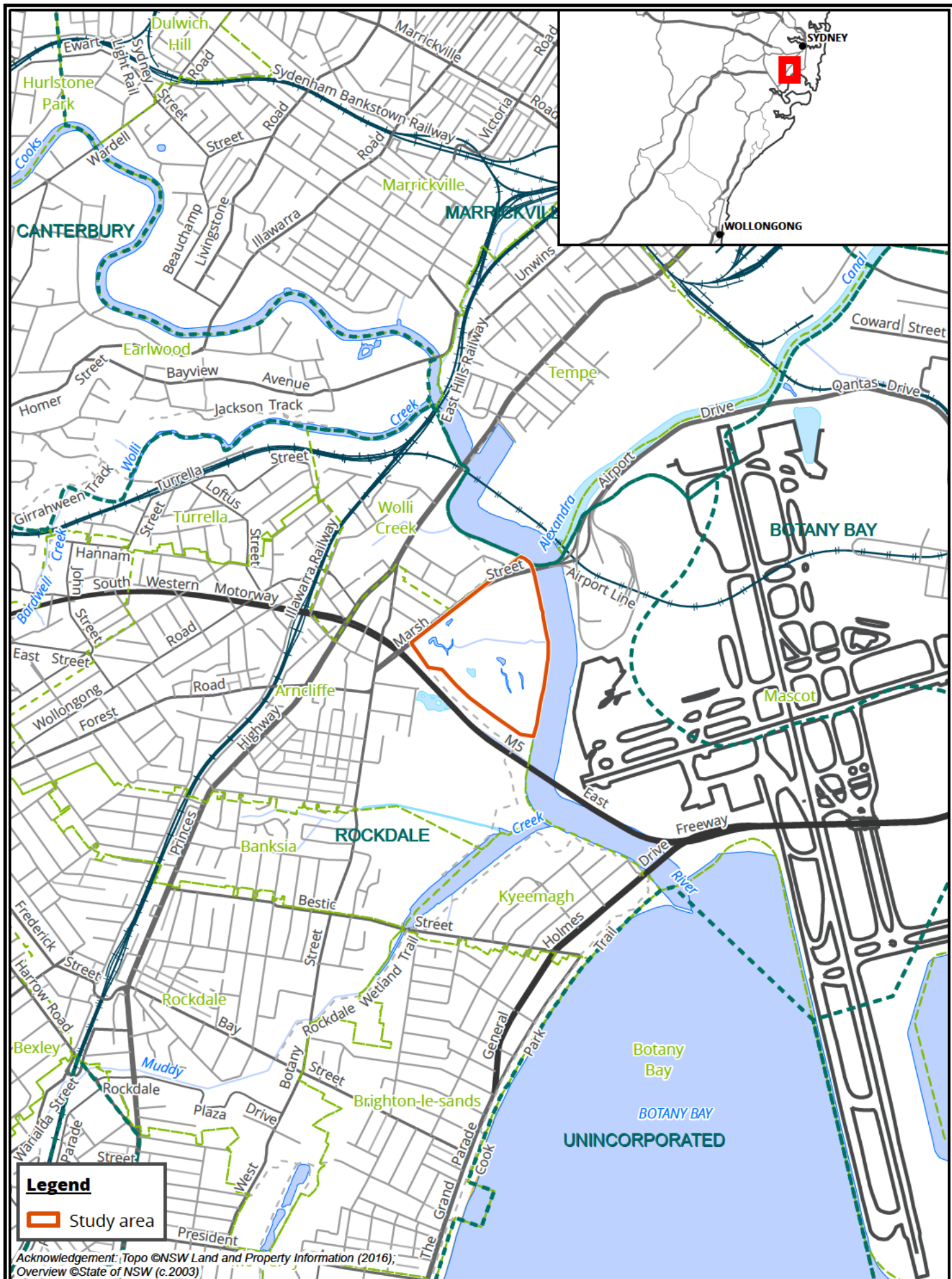
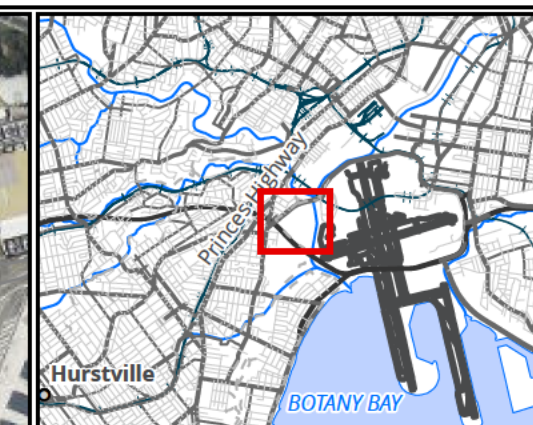


Figure 1 Location of the study area

Matter: 43695, Date: 24 October 2025,
Prepared for: RW, Prepared by: OW, Last edited by: owilliams
Location: P:\43600s\43695\Mapping\43695_Kogarah_GC_ACHA
Layout: 43695_ACHA_F1_Locality



Legend

- Study area
- Lot

Figure 2 Study area detail

0 50 100 150 200 N

Metres
Scale: 1:4,000@ A3
Coordinate System:
GDA2020 MGA Zone 56

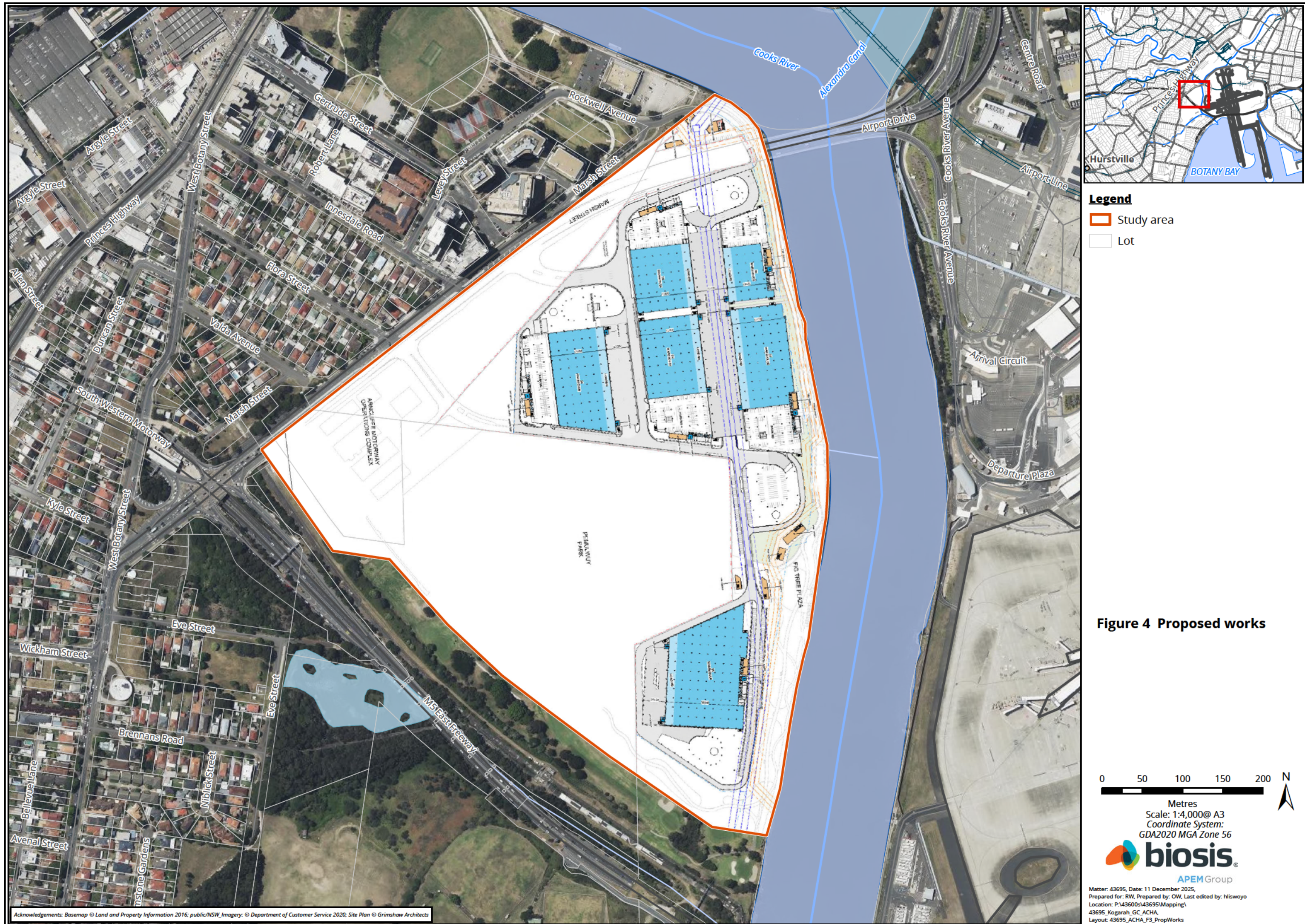
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Layout: 43695_ACHA_F2_StudyArea

2 Proposed development

The Concept & Early Works SSDA seeks consent for the following:

- Concept Masterplan to support the staged delivery of the Kogarah Golf Club Redevelopment, including:
 - Maximum building envelopes, including maximum building heights and minimum building setbacks.
 - Maximum Gross Floor Area (GFA) up to 343,250m², comprising:
 - 3,250m² of GFA (FSR of 1.25:1) on Lot 31 DP1231486.
 - 340,000m² of GFA on Lot 100 DP1231954.
 - Conceptual primary land uses, including:
 - Block 1 – Mixed-use and advertising structures.
 - Block 2 – Logistics and mixed-use.
 - Block 3A – Logistics.
 - Block 3B – Logistics.
 - Block 3C – Logistics and data centres.
 - Urban Design Guidelines to guide future development of the built form and public domain.
 - Strategies and mitigation measures to manage potential environmental impacts.
- Early Works to support the future delivery of built form and publicly accessible open space, including:
 - Site preparation works, comprising:
 - Demolition of existing structures.
 - Clearing of existing vegetation.
 - Remediation works.
 - Bulk earthworks, including ground improvement and flood mitigation works.
 - Site servicing and infrastructure works, including:
 - Construction of the Flora Street East extension consistent with Item 3 of the executed Voluntary Planning Agreement with Bayside Council.
 - Construction of stormwater infrastructure.
 - Construction and augmentation of service and utility infrastructure as necessary.

For a detailed description, refer to the Environmental Impact Statement prepared by Colliers Urban Planning and Figure 3.



3 Desktop assessment

The desktop assessment involves researching and reviewing existing archaeological studies and reports relevant to the study area and Bayside region. This information is combined to develop an Aboriginal site prediction model for the study area, and to 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.

3.1 Landscape context

It is important to consider the local environment of the study area any heritage assessment. The local environmental characteristics can influence human occupation and associated land use and consequently the distribution and character of cultural material. Environmental characteristics and geomorphological processes can affect the preservation of cultural heritage materials to varying degrees or even destroy them completely. Lastly, landscape features can contribute to the cultural significance that places can have for people.

3.1.1 Geology, topography and hydrology

Geologically, the site is situated on the western margins of Botany Bay, bounded to the north and east by the Cooks River and to the south and west by urban settlement of Rockdale. The study area is contained within the Botany Lowlands physiographic region (Chapman et al. 1989, Hazelton & Tille 1990). The geological character of the area is described as the Estuarine tidal-delta flat which consists of Quaternary sand, peat and mud deposits, which overlies Hawkesbury Sandstone, present in the northern portion of the study area and common throughout the Sydney basin (Figure 4). Quartz and marine sand with varying amounts of shell fragments dominate the coastal and estuarine margins. Local relief of the undulating flood plain of the Cooks River is typically up to five metres with broad concave valleys and valley flats, although extensive remodelling of the landscape has removed all natural landform features in this area. A small portion of the study area in the north contains Hawkesbury Sandstone without the Estuarine tidal-delta flat where certain site types are more likely to occur, such as grinding grooves.

The majority of the land in and around the study area was (and in some locations still is) wetland, characterised by level to gently undulating swales, depressions and infilled lagoons on Quaternary sands.

The study area contains a number of landforms but is predominately comprised of flats and gentle slopes. Given the degree of disturbance which exists throughout the site because of historical and recent uses, particularly land reclamation and the landscaping associated with its use as a golf course, an analysis of modern landforms is of limited use in this context (Figure 5).

Stream order is recognised as a factor which helps the development of predictive modelling in Aboriginal archaeology in NSW. Predictive models which have been developed for the region have a tendency to favour permanent water courses 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 1. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

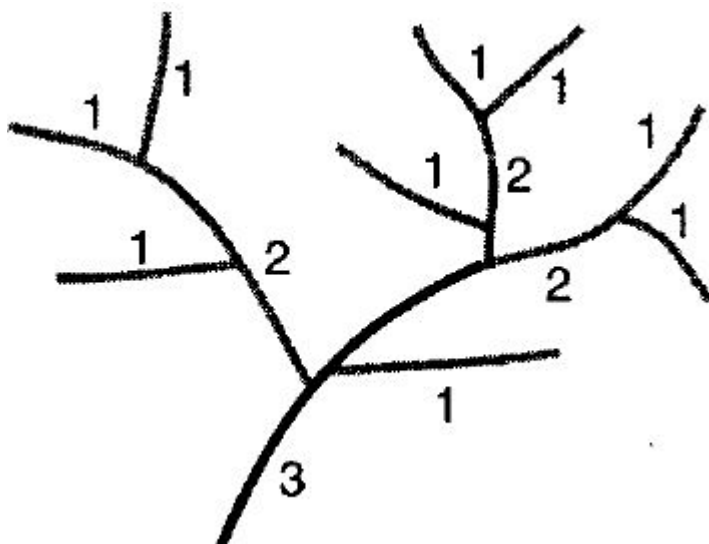


Photo 1 Diagram showing Strahler stream order (Source: (Ritter et al. 1995, p. 151))

The study area is located adjacent to the Cooks River, a fourth order perennial source of water (Figure 5). There is also one ephemeral drainage channel located within the study area and several man made water bodies within the golf course.

The study area has been subject to extensive disturbance, and the Cooks River has been diverted on a number of occasions in the local area due to land reclamation and the construction of Sydney Airport. As such, the hydrology of the area has been modified significantly, and it is difficult to make firm assessments about the exact location of watercourses prior to European colonisation impacts. It can be stated that the Cooks River would have been in close proximity to the study area and likely flowed through the southern part of it.

3.1.2 Soil landscapes

The study area is considered disturbed terrain, being predominately comprised of reclaimed land (Figure 6). The Disturbed Terrain soil landscape is defined as areas where soils have been disturbed to at least a depth of 100 centimetres by human activity, including complete disturbance, removal, or burial of soil. A small portion of the north-eastern most extent of the study area is also contained within the Birrong soil landscape. The Birrong soil landscape is typically present over the floodplains and watercourses draining the Wianamatta Group shales, including along the Cooks River. These soils are typically identified in association with level to gently undulating alluvial floodplains. They tend to be deep (over 250 centimetres), and consist of clay loam layers overlying silty clay, which in turn overlies a mottled clay subsoil (Chapman et al. 1989, pp. 82–84).

An understanding of soil landscapes is useful as it assists in creating a model of site potential within the area. An understanding of the depth and composition of soils impacts on the likelihood for subsurface deposits to be present, with deeper deposits having a higher potential to contain archaeological deposits than comparatively shallow ones. In this instance, the extensive disturbance of the terrain suggests intact subsurface deposits are unlikely (Biosis Research 2001). In order to gain a clearer understanding of any soil profiles which may potentially underlie this disturbance, both geotechnical assessments of the terrain and soil landscapes adjacent to the study area have been examined.

Birrong soils

The Birrong soil landscape is typically present over the floodplains and watercourses draining the Wianamatta Group shales, including along the Cooks River. These soils are typically identified in association with level to gently undulating alluvial floodplains. In floodplains and drainage lines, generally 10-40 centimetre of dark brown pedal silty clay loam (bg1) overlies up to 35 centimetre of bleached hardsetting clay loam (bg2) and >100 centimetre of orange, mottled silty clay (bg3) and brown mottled clay (bg4). There is a gradual change to light grey mottled salty heavy clay (bg5) which often overlies bedrock. Total soil depth is >200 centimetre. The boundaries between the soil materials are clear except for the gradual bg4-bg5 boundary (Yellow Solodic Soils [Dy3.42], Yellow Solonetzic Soils [Dy3.43]) (Chapman et al. 1989, pp. 82–84). The Birrong soil landscape characteristics can be found in Table 2.

Table 2 Birrong soil landscape characteristics ((Chapman et al. 1989))

Soil landscape	Description
Bg1: Dark brown pedal silty clay loam	This is a dark brown silt loam or silty clay loam with moderately pedal structure and rough ped fabric. It generally occurs as topsoil (A1 horizon). Texture can range from loam to silty clay loam with fine sand and silt often being present. Peds are blocky and large (100-200 mm). These large peds readily break down to small (<2-10 mm) crumb and polyhedral shaped peds. Colour is commonly dark brown (10YR 3/3), brown (7.5YR 4/4) or brownish black (10YR 2/2). The pH is usually slightly acid (pH 6.0). Roots are common to abundant, but stones and charcoal fragments are absent.
Bg2: Bleached hardsetting clay loam	This is a bleached, clay loam to fine sandy clay loam with weakly pedal to apedal massive structure that is hardsetting when dry. This material occurs as an A2 horizon. This material contains large amounts of silt and fine sand. Peds when present are rough faced, angular blocky and range in size from 100-200 mm. Otherwise an earthy, apedal massive structure is present. Colour ranges from dull yellowish-brown (10YR 5/3) to greyish yellow-brown (10YR 6/2) when moist to bleached, light grey (10YR 7/1) when dry. Pores and faunal casts are common. The pH varies from moderately acid (pH5.5) to slightly acid (pH6.5). A few small rounded, ironstone nodules are present. There are few roots and charcoal fragments are absent
Bg3: Orange mottled silty clay	This is an orange mottled fine sandy clay loam to silty clay with moderately pedal structure and smooth-faced dense ped fabric. It occurs as subsoil (B horizon). Fine sand is commonly present in large amounts. Peds are smooth-faced, prismatic, angular blocky and range in size from 50-100 mm. Colour is orange (7.5YR 6/6) with dark orange mottles. This material is hard and brittle when dry and very sticky when wet. The pH varies from moderately acid (pH 5.5) to slightly acid (pH 6.5). Stones, roots and charcoal fragments are absent.
Bg4: Brown mottled clay	This is commonly brown, mottled medium clay with strongly pedal structure and dense, rough-faced ped fabric. It occurs as deep subsoil (B horizon). Texture can range from light to heavy clay. Peds are large (20-100 mm) and prismatic or angular blocky and readily break down to smaller (10-20 mm) polyhedral peds. Peds are mostly dense and smooth-faced with occasional cutans. Colour varies from brown (7.5YR 4/4, 10YR 4/6) to greyish brown (7.5YR 6/2). Orange, red or grey mottles are often present. The pH varies from strongly acid (pH 4.5) to slightly acid (pH 5.5). Stones, charcoal and roots are rare.
Bg5: Light grey mottled saline clay	This is light grey, mottled, light medium clay to heavy clay with moderately to strongly pedal structure and dense smooth ped fabric. It is saline and occurs as deep subsoil (C or D horizon) overlying bedrock. Peds are dense, smooth-faced, range in size from 50-100

Soil landscape	Description
	mm and are sub-angular blocky. Colour is predominantly light grey (10YR 7/1) and ranges from bright yellowish-brown (10YR 6/6) to light grey (10YR 8/2). Prominent dark red mottles are common. These occupy up to 40% of the material and form reticulated patterns. The red mottles often contain iron concretions that harden on exposure. The pH ranges from strongly acid (pH 4.5) to slightly acid (pH 6.0). Stones and roots are usually absent.

Warriewood soils

In addition to the Birrong soil landscape, Biosis has considered the Warriewood soil landscape which is within 140 metres of the study area and may have originally been in the location of the Disturbed Terrain. The Warriewood soil landscape is typically present over swales, depressions, and infilled lagoons on Quaternary sands. These soils are typically identified in association with level to gently undulating plains. They tend to be deep (>150 centimetres) and consist of sand and loamy sand topsoils and subsoils.

Geotechnical assessments

Biosis (2001, 2023) previously undertook archaeological assessments for the Cooks Cove Northern Precinct within the Disturbed Terrain soil profile, which includes additional land to the south of Marsh Street. It was understood that a surface survey would not be sufficient to adequately map the archaeological potential of the project area. As such, Biosis referred to geotechnical and contamination works undertaken over the past 10 years at the site, in order to gain a better understanding of existing soil profiles across the study area and attempt to identify the depth at which intact soil profiles are present.

The geotechnical investigations consisted of the drilling of four boreholes to a depth of between 15.91 and 28.82 metres below the existing ground level, and ten Electrical Friction Cone Penetration (EFCP) tests, which ranged in depth from 4.3 to 32.2 metres. The assessment stated that

“subsurface conditions within the boreholes and EFCPs varied substantially and in general terms consisted of shallow to moderately deep sandy fill overlying a deep sequence of interbedded clays and sands above sandstone and shale bedrock. The depth to bedrock appears to increase substantially near the southern extremity of the site and may indicate a buried valley or watercourse in this area” (Jeffery and Katauskas 2008, p. 8).

A summary of the soil profiles as presented in the report is provided in Table 3.

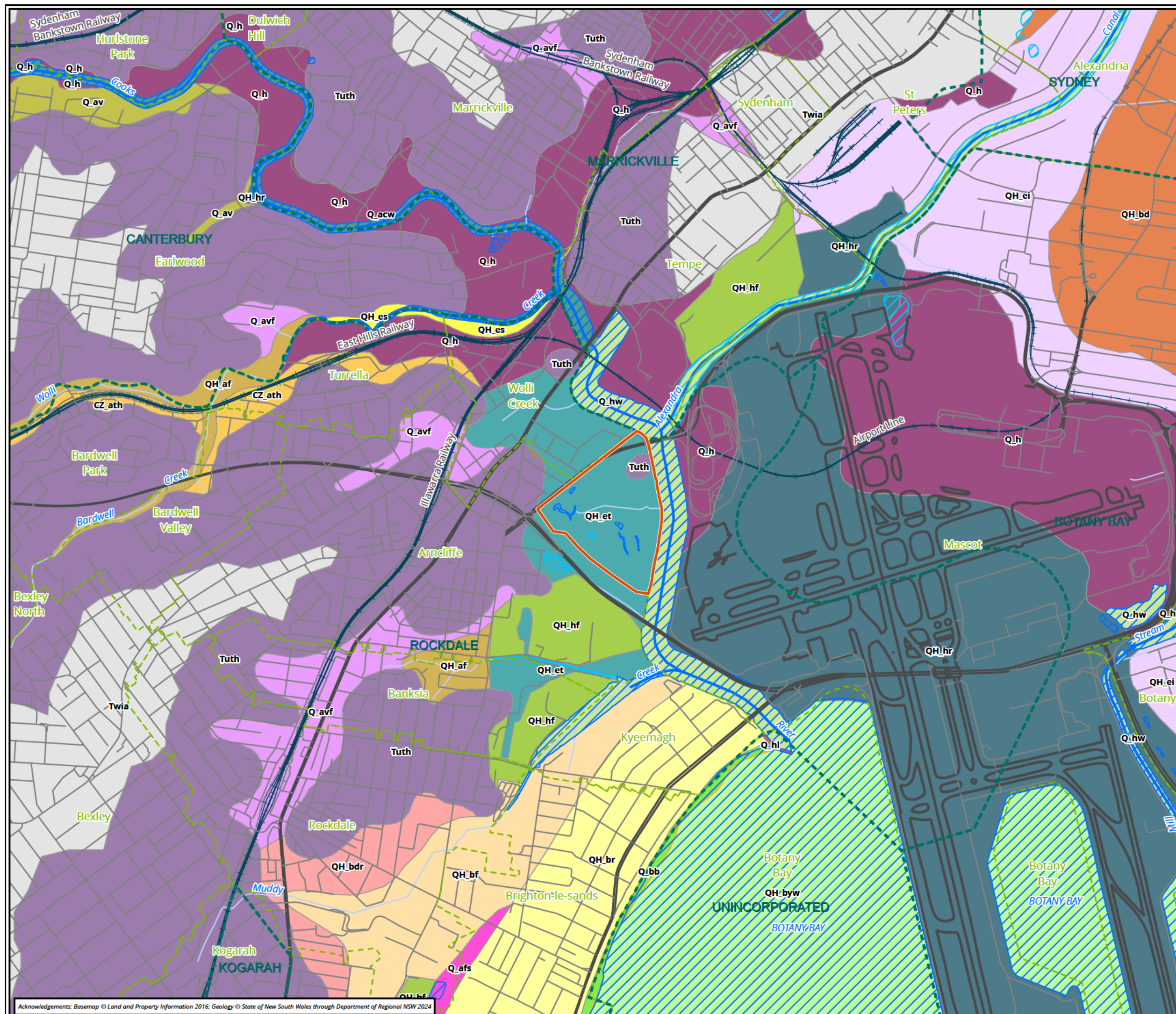
Table 3 Geotechnical results for the study area (Source: (Jeffery and Katauskas 2008, pp. 5–7)

Layer	Description
Fill	Fill containing a mixture of silt, sand, and clay, encountered at depths of 0.5m to 1.8m. Fill typically poorly to moderately compact.
Interbedded clays and sands	Intersected below fill layer. Upper profiles relatively loose and weak, but increased in density with depth, although this varied between the boreholes and EFCPs. Clays contained varying amounts of sand, shell, and organic matter. Underlying sands and clays improved in strength, with the sands ranging from medium dense to very dense, and the clays from stiff to very stiff.
Sandstone and shale bedrock	Bedrock belonging to the Hawkesbury Sandstone formation. Encountered at a depth of 10.82m in BH101, 9.97m in BH106, 29.4m in BH109, and 33.65m in BH113.

The results also indicated that groundwater seepage occurred within the boreholes at depths from 1.0 to 2.1 metres below existing levels in the boreholes and inferred to be at 0.8 to 1.5 metres within the EFCPs. The

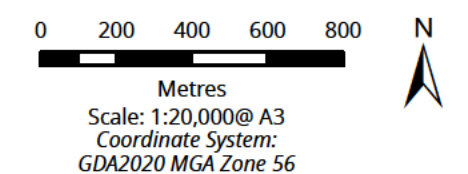
report raised a number of issues with the soil profiles on site, including weak and variable subsoil layers, shallow groundwater level, and the softness of the sand subsoils.

The results of geotechnical investigations provide an indication of how the study area has developed over time. For instance, the two boreholes situated further south were found to be considerably deeper and confirm historic land reclamation patterns. The results also reveal intersecting layers of sand and clay underlying the fill layers across the project area. This assessment was consistent throughout, including areas of reclaimed land, and suggests that whatever underlying soil profiles were present consist of redeposited or disturbed soil landscapes, or potentially that the study area was at the interface of these two soil landscapes.

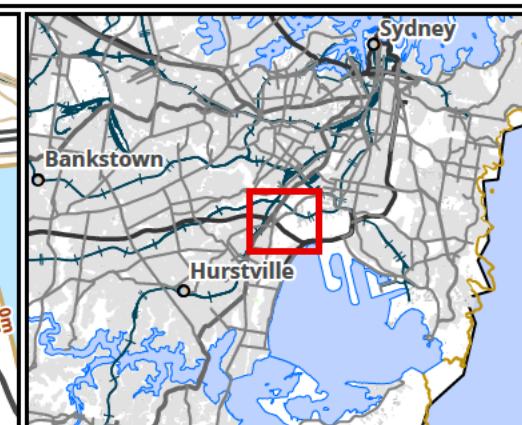
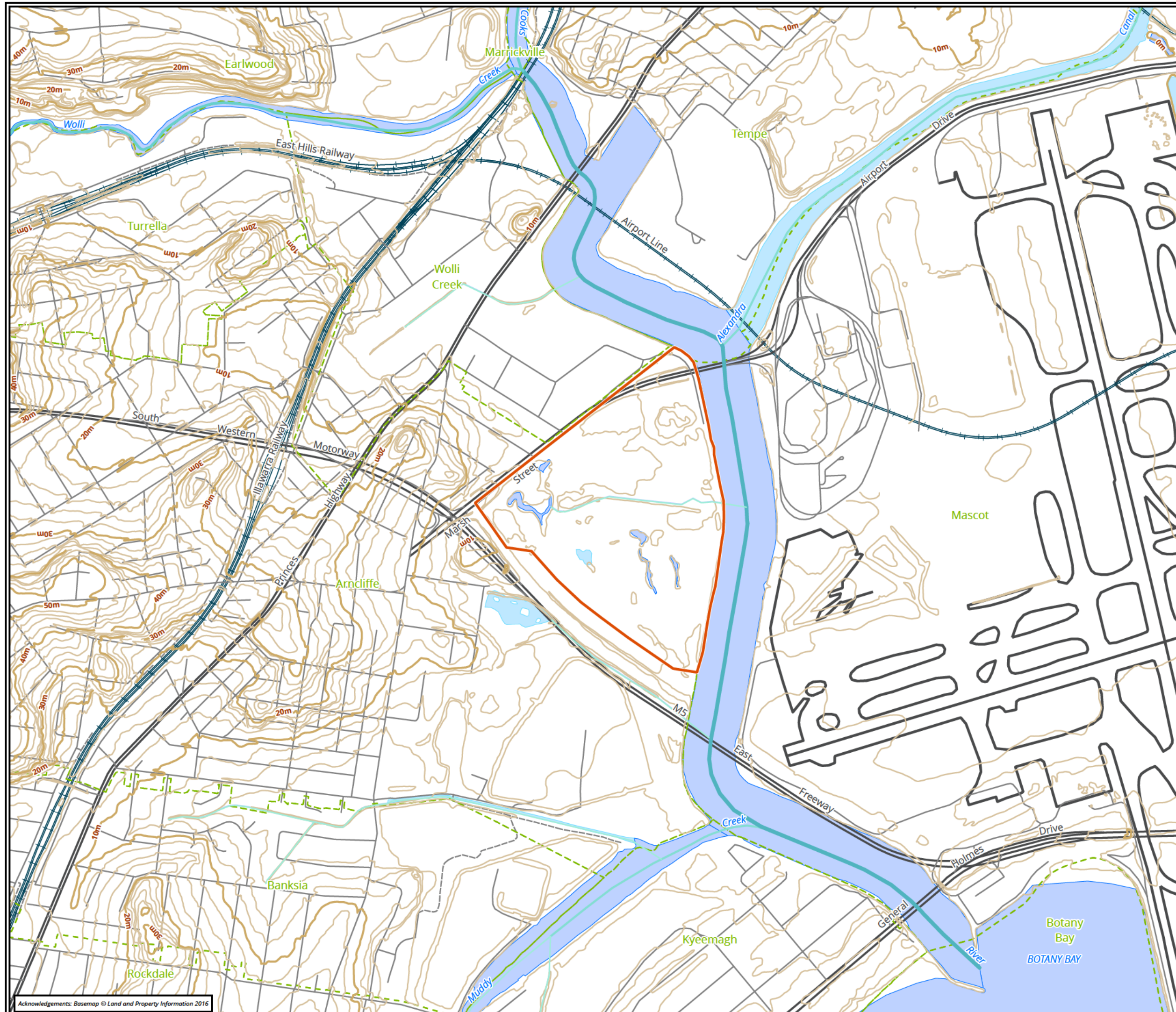


- Legend**
- Study area
- Geological units**
- CZ_ath - Alluvial terrace deposits - high-stand facies
 - QH_af - Alluvial floodplain deposits
 - QH_bd - Coastal deposits - dune facies
 - QH_bdr - Coastal deposits - bedrock-mantling dune facies
 - QH_bf - Coastal deposits - backbarrier flat facies
 - QH_br - Coastal deposits - beach ridge
 - QH_byw - Coastal deposits - bay sand sheet (subaqueous)
 - QH_ei - Estuarine interbarrier creek deposits
 - QH_es - Estuarine swamp
 - QH_et - Estuarine tidal-delta flat
 - QH_hf - Anthropogenic deposits - fill on Quaternary deposits
 - QH_hr - Anthropogenic deposits - reclaimed estuarine areas
 - Q_acw - Alluvial channel deposits - subaqueous
 - Q_afs - Alluvial floodplain deposits - swamp facies
 - Q_av - Alluvial valley deposits
 - Q_avf - Alluvial fan deposits
 - Q_bb - Coastal deposits - beach facies
 - Q_h - Anthropogenic deposits
 - Q_hl - Anthropogenic breakwaters, embankments and artificial levees
 - Q_hw - Anthropogenic stored water, pondage, reservoirs, canals
 - Tuth - Hawkesbury Sandstone
 - Twia - Ashfield Shale

Figure 4 Geological units in the vicinity of the study area



Matter: 43695, Date: 24 October 2025,
Prepared for: RW, Prepared by: OW, Last edited by: owilliams
Location: P:\43600s\43695\Mapping\
43695_Kogarah_GC_ACHA,
Layout: 43695_AR_F4_Geology



Legend

- Study area
- Contour (2m)

Strahler Order

- 1
- 2
- 3
- 4

Figure 5 Hydrology and topography in the vicinity of the study area

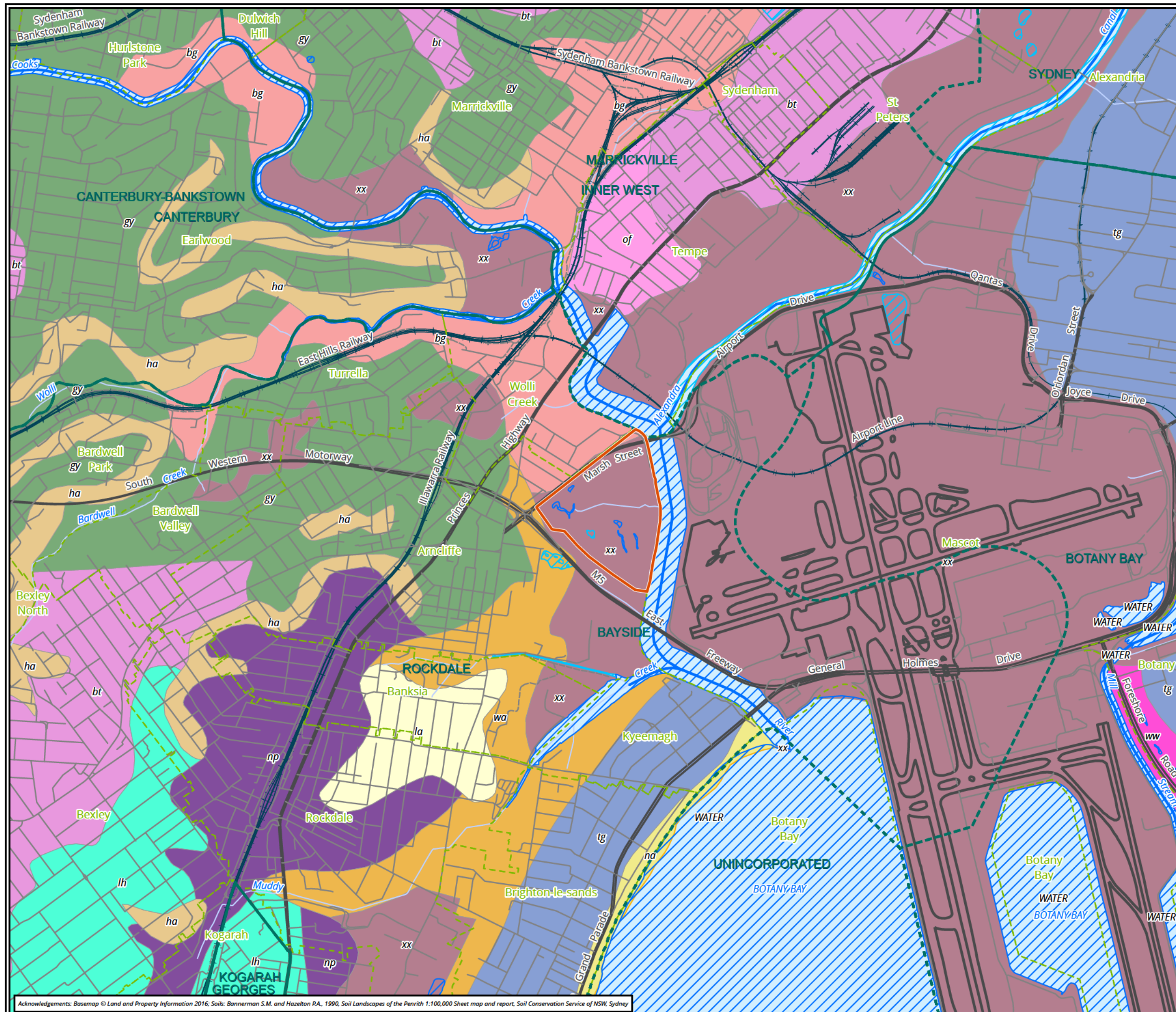
0 100 200 300 400

Metres

Scale: 1:10,000@ A3
Coordinate System:
GDA2020 MGA Zone 56



Matter: 43695, Date: 24 October 2025,
Prepared for: RW, Prepared by: OW, Last edited by: owilliams
Location: P:\43600s\43695\Mapping\
43695_Kogarah_GC_ACHA,
Layout: 43695_AR_F5_Hydrology



Legend

Study area

Soil landscape units

- bg - BIRRONG
- bt - BLACKTOWN
- gy - GYMEA
- ha - HAWKESBURY
- la - LAMBERT
- lh - LUCAS HEIGHTS
- na - NARRABEEN
- np - NEWPORT
- of - OXFORD FALLS
- tg - TUGGERAH
- wa - WARRIEWOOD
- WATER - WATER
- ww - WOY WOY
- xx - DISTURBED TERRAIN

Figure 6 Soil landscapes in the vicinity of the study area

0 200 400 600 800

Metres

Scale: 1:20,000@ A3
Coordinate System:
GDA2020 MGA Zone 56

Matter: 43695, Date: 24 October 2025,
Prepared for: RW, Prepared by: OW, Last edited by: owilliams
Location: P:\43600s\43695\Mapping\
43695_Kogarah_GC_ACHA,
Layout: 43695_AR_F6_Soils

Acknowledgements: Basemap © Land and Property Information 2016; Soils: Bannerman S.M. and Hazelton P.A., 1990, Soil Landscapes of the Penrith 1:100,000 Sheet map and report, Soil Conservation Service of NSW, Sydney

3.1.3 Landscape resources

The study area comprises an urban landscape heavily impacted by residential development. As such, extensive vegetation clearance and landscape modification has occurred which has greatly altered the apparent available resources that would have been previously available.

Descriptions of the surrounding Lambert, Birong and Warriewood landscapes give an indication of the types of vegetation that may have been native to the study area (NSW DCCEW 2013). She-oak *Allocasuarina distyle*, Heath Banksia *Banksia ericifolia*, Spiky Hakea *Hakea teretifolia* occur predominantly and Spider Flowers *Grevillea spp.*, Billy Buttons *Kunzea spp.*, Large Leaf Bush Pea *Pultenaea spp.*, Teatree *Leptospermu*, Native Heath *Epacris spp.*, Coastal Teatree *Leptospermum laevigatum*, Spike Rushes *Eleocharis spp.*, and Tall Swamp Sedge *Gahnia sieberiana* have been observed as shrub species. Modern observations indicate woodland environments are likely to have contained Red Bloodwood *Eucalyptus gummifera*, Yellow-top Ash *E. luehmanniana*, Yellow Bloodwood *E. eximia*, Scribbly Gum *E. haemastoma* and Narrow-leaved Apple *Angophora bakeri*, Ironbark *Eucalyptus paniculata*, Turpentine *Syncarpia glomulifera*, Sydney Blue Gum *E. saligna*, Broad-leaved Paperbark *Melaleuca quinquenervia*, Coastal Banksia *Banksia integrifolia*, Swamp Oak *Casuarina glauca* and Swamp Mahogany *Eucalyptus robusta*.

Plant resources can be used in a variety of ways. Fibres can be twisted into string that have many purposes, including the weaving of nets, baskets and fishing lines, as well as personal adornment. Bark from eucalypts is useful in the provision of shelter, such as a large sheet of bark being propped against a stick to form a gunyah (Attenbrow 2002). Bark canoes are also considered the primary form of transportation along the river and its tributaries, and provided ways to access the marine life within the river (MDCA n.d.).

A wide variety of marine fauna are also available in the Bay and along the coast and present a significance resource for Aboriginal peoples living along the Cooks River, including fish species, stingray, and the occasional seal, dolphin and beached whale. In the inner parts of Botany Bay even up as far as Wolli Creek oysters would have been plentiful. Many other mollusc species can be eaten, some abundant in the estuaries, such as Whelks *Buccinidae*, Cockles *Cardiidae*, Periwinkles *Littorina littorea* and Snails *Gastropoda*, and others on the rock platforms fringing the headlands such as Rock Oysters *Saccostrea*, Tritons Trumpet *Charonia*, Turbans *Turbinidae*, Limpets *Cellana tramoserica* and Mussels *Mytilus*.

As well as being important food sources, terrestrial fauna is also utilised in tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to be used to make fastening cord, while 'bone points', which function as awls or piercers, are often a part of the archaeological record. Animals such as Brush-tailed Possums are highly prized for their fur, with possum skin cloaks worn fastened over one shoulder and under the other. Kangaroo teeth are incorporated into decorative items, such as head bands (Attenbrow 2002). Although archaeological and historical evidence around the Cooks River valley is limited, nearby Aboriginal hunters are known to have sought Kangaroo *Macropus giganteus*, Possums *Trichosurus vulpecula* and *Pseudocheirus peregrinus*, Gliders *Petaurus breviceps*, Bandicoots *Perameles nasuta*, Echidnas *Tachyglossus aculeatus*, Fruit Bats *Pteropus alecto* and *Pteropus scapulatus*, Blue tongue lizards *Tiliqua occipitalis*, and Long-necked Tortoise *Chelodina longicollis* (MDCA n.d.).

3.1.4 Land use history

Historical use of the study area is useful in determining what kind of disturbances would have impacted the potential archaeology of the site. A brief outline is presented below.

The broader area within which the study area is situated (area of the Cooks River and Wolli Creek) was described by Captain Cook as "a fine meadow". This was later rejected by Governor Phillip, who described the same area 18 years later as "marshes...not to be attempted by first settlement" (Geeves & Jervis 1986, p. 7).

This unflattering opinion of the area and the difficulties of travel in the early 1800s meant that the sand dunes and wetlands adjacent to the Cooks River and Botany Bay were primarily utilised for collecting timber and extracting shell to produce lime for mortar. For more than 60 years, the Aboriginal shell deposits were dredged from the bed of the Cooks River and special-built, wood-fire kilns along the shoreline were used to produce the quick-lime product for the building trades. Soda-ash was also sourced from the mangrove tree trunks for soap and glass products. Timber felled from the vast forests of she-oaks and casuarina were transported by horse-drawn vehicles to the Sydney colony metropolis as a source of fuel for heating and cooking (Gifford and Eileen Eardley 1966).

From the 1830s, the land now cleared of vegetation could be utilised for livestock grazing and dairying, while fertile areas were drained for orcharding and market gardening. Associated industries such as boiling-down works and tanneries were also conducted in the local area, supposedly affecting complaint from neighbours (Gifford and Eileen Eardley 1966). To service these properties, several watercourses were dammed, including the Cooks River (AECOM 2015, pp. 14–20).

The study area is contained within the original 110-acre land grant given to Alexander Brodie Spark in 1828. The location of the grant was described as:

“...on the south bank of Cooks River where the stream narrowed to pass between two opposing sandstone hillocks, before entering the wide expanse of estuarine mangrove covered mudflats, through which the tidal channels, in great meanders, flowed slowly to Botany Bay.” (Gifford and Eileen Eardley 1966)

The land within the study area remained undeveloped during multiple subdivisions throughout the 1800s until 1882 when the study area was reclaimed by the Commonwealth for Lands, Easements, and Waterways for the purpose of establishing a sewage farm (Photo 2). The original location of the Cooks River can also be seen to the north-east of the study area. Sewage was laid out in filtration drains constructed within the sandy soil so that effluent would be filtered as it travelled into the Cooks River (Photo 3 and Photo 4). The waste was initially transported to the filtration beds via a locomotive that crossed the Cooks River from a dumping point on the northern bank (MacLaren North 2013). These disturbances can be seen in the 1943 aerial, where the sewerage farm is evident along with evidence of agriculture in the western portion of the study area (Photo 4).



Photo 2 1903 Parish map of St George showing the study area in orange, contained within the land reclaimed by the Crown; the original alignment of the Cooks River can be seen to the north-east of the study area (Department of Lands Sydney NSW 1903)

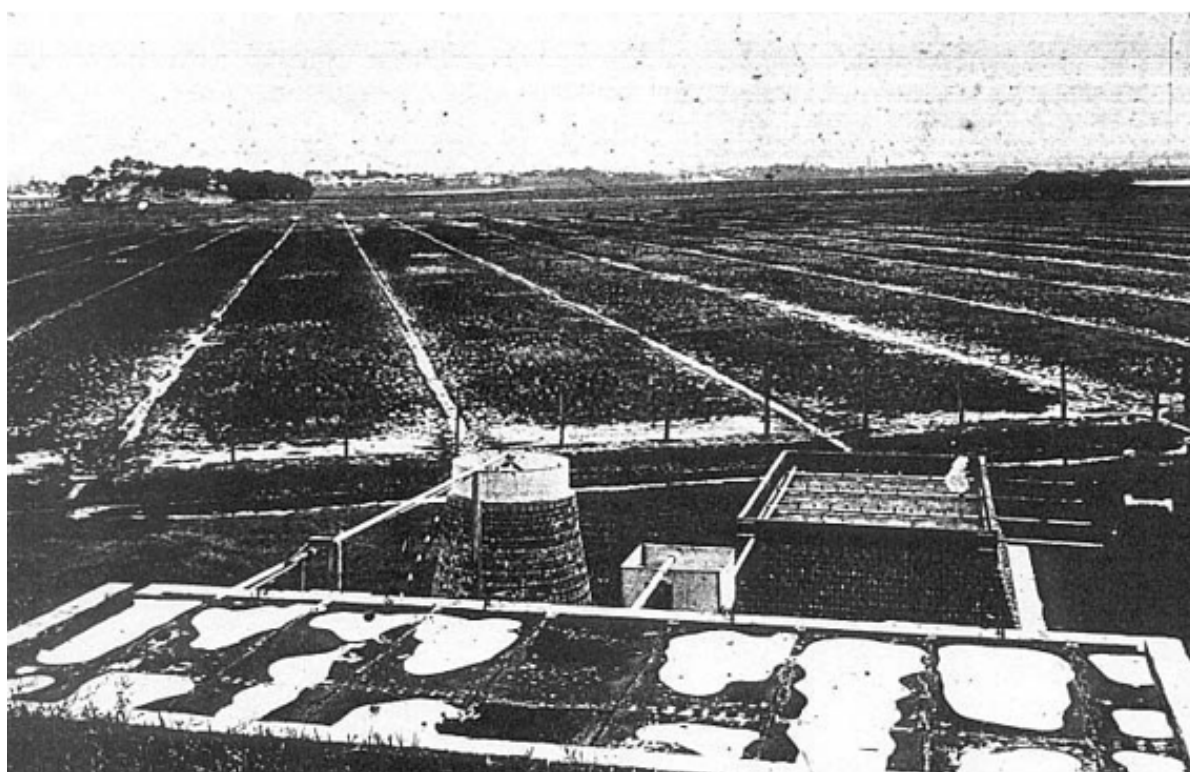


Photo 3 Arnccliffe Sewage Farm (Source: Rockdale Local History Collection)



Photo 4 1943 aerial imagery with the study area in orange (Source: NSW Spatial Services 2025)

The expansion of the airport after World War II meant that the Cooks River had to be completely diverted below the line of the dam, as shown in aerial imagery dating to 1955 (Photo 5). Between 1947 and 1956 the river was realigned to the west and south-west, which resulted in the destruction of large sections of the estuarine wetlands and original river shore.



Photo 5 1955 aerial imagery with the study area in orange (Source: NSW Spatial Services 2025)

Aerial imagery dated to 1971 show that the current Kogarah Golf Course has been constructed at this stage. The land has been modified entirely with the establishment of sandpits, small dams, and the golf course itself. Any remaining archaeological material in study area will have been greatly impacted by this development. (Photo 5).

The construction of the Motorway Operations Centre (MOC) for the M1 seen in the 2025 aerial (Photo 7) and its subsequent impacts (subsurface service installation, foundation establishment, landscape modification as some examples) would have severely impact archaeological material that was remaining in this area. Alterations continue to be made to the study area until it was acquired for the current project (Figure 2).



Photo 6 1971 aerial imagery with the study area in orange (Source: NSW Spatial Services 2025)



Photo 7 2025 aerial imagery with the study area in orange (Source: NSW Spatial Services 2025)

3.2 Previous archaeological work

A number of Aboriginal cultural heritage investigations have been conducted in the wider Sydney region. Models for predicting the location and type of Aboriginal sites with a general applicability to the inner Sydney 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.

3.2.1 Regional overview

Attenbrow (1990) undertook an investigation titled 'The Port Jackson Archaeological Project' for the Australian Museum (Photo 8), approximately 14 kilometres north-east of the study area. The purpose of this report was to improve upon the existing literature about Aboriginal life utilising the archaeological record. Fieldwork focused largely on existing recorded Aboriginal sites, and supplementary surveys were undertaken in areas which had the potential to hold further Aboriginal sites. The project investigated the roles played by marine and land animals in the diet of Aboriginal people within the Port Jackson area, as well as their use of stone, bone and shell in implements and weapons. The survey relocated and recorded 112 sites with middens and deposits. Attenbrow (1990) concluded that the distance from the harbour mouth influenced the range and predominance of particular shellfish species in middens. It appears that Aboriginal people were occupying areas of the foreshore and exploiting shellfish for at least 4,500 years, and that over time there was a change in the predominance of particular shellfish species.

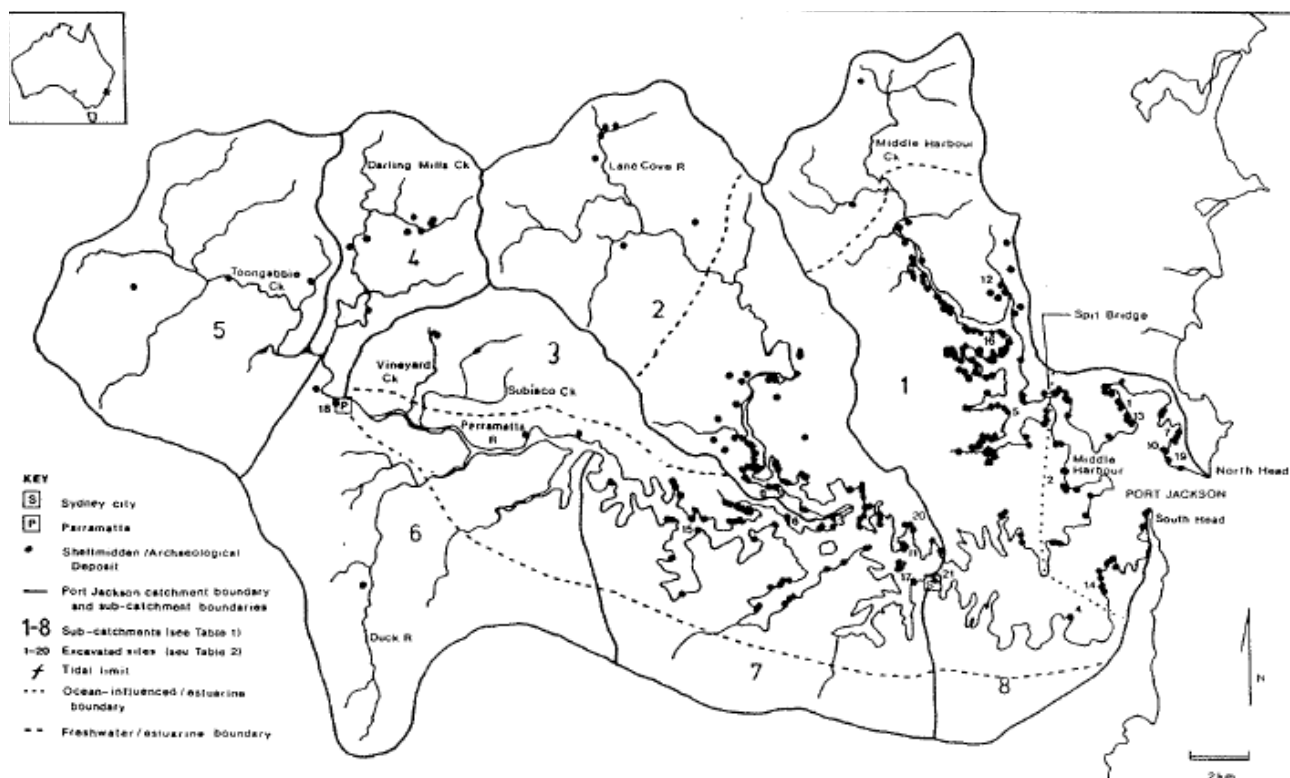


Photo 8 Port Jackson catchment area, subcatchment and aquatic zones, with registered shell midden and archaeological deposit sites as at 28 February 1990 and known excavated sites (Source: Attenbrow 1990)

Attenbrow (1990) reported on three weeks of excavations at two rock shelters with shell middens (AHIMS 45-6-560/Mt Trefle and AHIMS 45-6-1045/Hydrofoil Cave) located in Neilson Park, Vacluse, approximately 15 kilometres north-east of the study area, as part of Stage 2 of the Port Jackson Archaeological Project. At AHIMS 45-6-560/Mt Trefle, an excavation area was established within and outside of the rock shelter. Two

instances of human bone were identified within the shelter and were left in-situ with no further work undertaken. Excavations of the units outside of the shelter identified a 70 centimetres deep deposit with depth varying due to the presence of sloping bedrock and rock slab. Less stratified dark humic-rich soils than the deposit within the shelter were present and a hearth was recovered and excavated at a depth of 2-5 centimetres. In addition to Aboriginal objects and cultural material, European artefacts were also recovered, with the shelter having been used during the Great Depression in the 1930s. At AHIMS 45-6-1045/Hydrofoil Cave, an area within the overhang at the north-western end was excavated, reaching rock at 80 centimetres. A hearth was identified, and the soils consisted of a black to very dark brown sandy sediment. The presence of rusted metal pieces throughout the soil profile suggests that the deposit was significantly disturbed; no further excavations took place at AHIMS 45-6-1045/Hydrofoil Cave.

Conyers (1990) completed an assessment which consisted of background research and a survey carried out to record the 'Aboriginal carvings and areas' in the Lane Cove River State Recreation Area, located approximately 12.5 kilometers north of the study area (Conyers 1990, p. 1). The predictive modelling undertaken for this study identified the coastal margins of the area as the likely location of shell midden deposits, occurring in both open contexts and rock shelters. Areas where the underlying geology consists of shales were considered the locations where campsites, PADs, quarries and scarred trees would occur, with it being noted that due to extensive vegetation clearance scarred trees are unlikely to be identified. Areas overlying the Hawkesbury Sandstone were the likely locations of rock shelters, art sites, rock engravings, and grinding grooves (Conyers 1990, pp. 30–34). The survey relocated three previously recorded sites, identified seven new sites, and noted five potential habitation sites. The three relocated sites were all rock engravings. Two newly recorded sites were rock engravings, and five were middens. The five potential habitation sites were all rock shelters with PADs. It was recommended that all sites be managed appropriately, and in some cases be subject to further investigation

The Aboriginal Heritage Office (AHO) (2011) undertook a broad assessment of Aboriginal cultural heritage for the City of Ryde Council. The area included the foreshores of the Parramatta River, approximately 15 kilometres north-west of the current study area. The report contains a detailed discussion of Aboriginal socio-cultural history for the Ryde area, as well as information on landscape resources and current Aboriginal perspectives on cultural heritage. With regards to the Parramatta River foreshore area, AHO determined that middens were the most common site type, followed by rock shelters with middens. As AHO's report is a broad survey of a municipal area, its recommendations focus on high level legislative policy and guideline formulation, rather than recommendations for specific Aboriginal heritage sites.

Biosis (2018b) undertook an ADDA and ACHAR (2019) as part of the Stage 1 Concord Hospital redevelopment works to support a Review of Environmental Factors at Concord Repatriation General Hospital approximately 12.5 kilometres north-west of the study area. The investigation comprised a foot survey of the Stage 1 area of the project and a geotechnical survey undertaken by Coffey (2018). A total of 17 core samples were taken over the entire project area. The survey identified that the broader study area sat on geological deposits of Ashfield Shale, Hawkesbury Sandstone and Quaternary Alluvium, with a layer of Mittagong Formation between the former layers. The underlying soil profiles were largely disturbed fill, overlaying a clay base at approximately 0.5 to 1.4 metres. The results of this study strongly suggested that the chance of subsurface cultural deposits being located within the assessment area was low. The archaeological assessment found that the site had been highly modified by previous construction and hospital use. No Aboriginal cultural heritage objects were located, and the area was assessed as having low archaeological potential.

Artefact Heritage (2021) completed an ACHA to support an Environmental Impact Statement for a project which involved the creation of a ferry link between wharves at La Perouse and Kurnell in Botany Bay. The La Perouse portion of this project is approximately 8 kilometres south-east of the current study area. Ground surface visibility within the project area was generally low, covered by dense vegetation, grass, road pavement

or commercial buildings. The survey resulted in the identification of AHIMS 45-6-3865/La Perouse Midden 19-01 consisting of a shell midden located directly above a rock shelter overlooking Kamay Botany Bay, at approximately 13 metres above sea level. The shell material was eroding out of the humic layer of sediment and had dispersed across the top of the cliff collecting in natural grooves. The area was also determined to have a high likelihood of containing subsurface deposits and therefore was determined to be an extended area of PAD. The survey also attempted to identify eight previously recorded AHIMS sites. Two engravings (AHIMS 45-6-0648/Site 1 La Perouse and AHIMS 45-6-0649/Site 2 La Perouse) were re-identified and found to have been the subject of heavy erosion, compromising the legitimacy of the engravings. The remaining six sites were not identified.

Biosis (2023b) was commissioned by ESR Developments Australia to undertake an ACHA of a proposed light industrial development at 270-286 Horsley Road, Milperra, located approximately 15 kilometres west from the study area. An archaeological survey conducted by Biosis in 2023 and was attended by members of the Gandangara Local Aboriginal Land Council, Kamilaroi-Yankuntjatjara Working Group, and ESR Development to ascertain the overall potential for Aboriginal cultural material to be discovered on site. Much of the site was occupied by structures and sealed surfaces, and where exposures were present, the soils appeared to be comprised of imported material which contained building rubble and a variety of soils (sand, clay) not consistent with the Blacktown soil landscape or the Birrong soil landscape. No Aboriginal sites or objects were identified as part of the archaeological survey, and the site was determined to contain low archaeological potential. The high level of previous disturbance present and the environmental context of the area suggests that it was unlikely to have been an area of focused occupation.

Biosis (2024a) was commissioned by Selleys to undertake an ACHA at 1-15 Gow Street, located approximately 10.5 kilometres west of the current study area. The project area at Gow Street was located on disturbed terrain, similar to the current study area. An archaeological survey was completed on 9 July 2024 and it was noted by the surveyor that the area had been subject to significant levels of disturbance including historical vegetation clearance, ground disturbing works, construction of buildings and associated subsurface infrastructure, roads, footpaths, and landscaping. Due to these disturbances, it was determined that the area contained low archaeological potential and no further works were required.

Biosis (2024b) was engaged by Levy Planning to undertake an ADDA for the proposed remediation works of the timber piers at 1609 Anzac Parade, La Perouse, NSW, located approximately 8 kilometres south-east of the current study area. Whilst a search of the AHIMS database identified 165 AHIMS sites within a 5 by 5 kilometre search area centred on the site, research suggested that Aboriginal occupation of the peninsula was unlikely due to the lack of available fresh water in the area. It was also determined that the likelihood of undisturbed Aboriginal archaeological evidence being present in the site was low. It was acknowledged that whilst nearby AHIMS sites and the pre-development landscape of the area suggested that Aboriginal cultural heritage could exist in undisturbed soils, the highly erosional underlying soils reduces the likelihood that those materials have been preserved. As well as this, both natural and artificial disturbances were extensive throughout the study area. The archaeological potential of the area was determined to be low, and no further archaeological work was required.

3.2.2 Local overview

A number of Aboriginal cultural heritage investigations have been conducted within the region (within approximately 5 kilometres of the study area). Most of these investigations were undertaken as part of development applications and included surface and sub-surface investigations. These investigations are summarised below.

AMBS (2003) undertook an excavation at an Aboriginal shell midden site in Kendrick Park, Tempe, located approximately 900 metres east of the study area on the eastern bank of the Cooks River. The assessment identified six stone artefacts, as well as locally available estuarine shell and three animal bone fragments. Radiocarbon dates from an intact layer of the midden dated the midden to around 4,000 years BP.

Jo McDonald Cultural Heritage Management (JMCHM) (2005) undertook a salvage excavation at Discovery Point, approximately 800 metres north-east of the study area and comprising 40 salvage pits. The assessment was hampered by historical disturbance, however a total of 389 stone artefacts were recovered from a number of knapping floors within a sand body, as well as one hearth. Silcrete was the dominant raw material, with artefact densities generally low. Radiocarbon dating from the site returned a date of $9,376 \pm 61$ years BP.

JMCHM (2006) undertook a salvage excavation within two excavation areas in the vicinity of Tempe House, located approximately 900 metres north-west of the study area and nearby to Discovery Point. The assessment identified densities of stone artefacts and shell midden material, with carbon dating placing the site between 3,600- and 4,900-years BP. There was no animal bone identified at the site, and it was concluded that the evidence likely represented a series of short-term camping events.

AECOM (2015) undertook Aboriginal and historical assessments for the New M5 component of the Westconnex project which included a portion of the study area along its Northern boundary. The background assessment undertaken by AECOM stated that areas within the corridor that were contained within the Disturbed Terrain soil landscape had a low archaeological potential within the fill itself, and that underlying soil profiles may have been disturbed by fill activities (AECOM 2015, p. 23). On the basis of the background review undertaken by AECOM, the following predictions were made in relation to Aboriginal heritage:

- *Surface evidence of past Aboriginal occupation within the project corridor and construction footprint is likely to comprise rock shelter sites, shell middens, scarred trees and stone artefact sites in surface and subsurface contexts.*
- *Rock shelter sites will be located in areas of significant sandstone outcrops such as the Wolli Creek Valley, and may include archaeological features such as art, stone artefacts, midden and archaeological deposit.*
- *Aboriginal shell midden sites will occur in tidal estuarine foreshore zones (that is, within 10 metres of high water level) associated with the Cooks River, Wolli Creek, around Botany Bay and the original alignment of Sheas Creek in areas not subject to significant landscape modification. The location of shell midden sites may be considerable distances from existing foreshore areas and may represent past foreshore environments.*
- *Scarred trees may occur in areas of remnant bushland such as the Wolli Creek Valley, Stotts Reserve and the Bardwell Creek Valley.*
- *Stone artefact sites, comprising flaked stone assemblages most likely of silcrete and tuff, where identified, will be located in areas of remnant landscape such as Wolli Creek Valley, Stotts Reserve and the Bardwell Creek Valley. Stone artefact sites may occur in surface or sub-surface contexts.*
- *Aboriginal archaeological sites are highly unlikely to occur in areas previously subjected to significant levels of landscape modification as a result of urban development (AECOM 2015, p. 33).*

Within the works that overlaps with the study area, the results of the archaeological survey stated that overall visibility was poor, and that the ground integrity was low. The assessment stated that there was extensive landscape modification from land reclamation and the construction of the golf course, with no original landscape being retained, and concluded that there was no archaeological sensitivity as a result of this disturbance (AECOM 2015, p. 35).

Biosis (2018a) was commissioned by Cook Cove Inlet Pty Ltd to undertake an Aboriginal archaeological assessment for the proposed Cooks Cove Southern Precinct at Arncliffe and Banksia, NSW, approximately 66 metres south-west of the current study area. A survey was conducted on 13 June 2018 with low ground surface visibility, vegetation cover and extensive surface disturbance impeding the overall effectiveness of the survey. The survey did not identify any Aboriginal sites or objects, and it was determined that it would be unlikely that any intact archaeological deposits were present within the area. Background research revealed that the area had been subject to heavy disturbance including the widening of nearby waterways, land reclamation, the removal of soil, landscaping, revegetation and the introduction of fill. The area was determined to be of low archaeological potential, and no further archaeological assessment was required.

3.2.3 Previous studies undertaken within the study area

Biosis Research (2001) undertook a Cultural Heritage Issues and Constraints assessment for the Cooks Cove Master Plan, a wider precinct that encompasses the study area. The assessment noted that ethnographic and archaeological evidence available at the time for the Botany Bay region indicated that the area would have been subject to intensive occupation by Aboriginal people, and that this would result in a number of site types being present in the local area, including open campsites, shell middens and burials. The site inspection identified that the area was heavily disturbed, and no archaeological sites or areas of potential were identified. The results stated that “the majority if not all of the evidence of past Aboriginal occupation/ Aboriginal history on the site has since been removed, heavily disturbed or buried under deep landfill” (Biosis Research 2001, p. 18). It was concluded that “excluding the areas of reclaimed land there is a small possibility of Pleistocene or early Holocene archaeological material existing in the river gravels and saltwater swamp deposits lying under the derived material. The depth of these deposits (below the surface) and their integrity is unknown and would need to be assessed by geomorphological investigation” (Biosis Research 2001, p. 18). Biosis stated that there was a low potential for any Aboriginal sites to be identified and recommended that no further assessment was required prior to development.

Biosis (2023) undertook an archaeological re-assessment of the area within the previous Cooks Cove Masterplan (Biosis 2001), then known as the Cooks Cove Northern Precinct. This project area encompassed the current study area and included some extra land to the south. A survey was first conducted in 2017. The overall effectiveness of the survey for examining the ground for Aboriginal sites was low due to low GSV predominantly due to vegetation cover and a low number of exposures. The survey did not identify any Aboriginal sites or objects within the project area, owing to extensive surface disturbance as a result of historical land use practices. The supplementary survey completed in 2023 confirmed these results. Based on the geotechnical data gathered to date, the report determined that appears that the fill which forms the current ground surface overlies either disturbed or imported sand and clay soil layers. It was concluded that if *in situ* soil deposits are present, they are located beneath the current groundwater level and have a low potential to contain archaeological deposits.

3.2.4 AHIMS site analysis

An extensive search of the AHIMS database was conducted on 14 October 2025 (Client service ID: 1054525). The search identified 104 Aboriginal archaeological sites within a 6.25 by 6.25 kilometre search area, centred on the study area (Table 4 and Appendix 1). None of these registered sites are located within the study area (Figure 7). The closest site is AHIMS 45-6-2737/Tempe House 1, an artefact and PAD site located approximately 683 metres north of the study area. 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 upon 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 shell midden, 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 **154** results presented here, compared to the **104** sites identified in AHIMS.

Table 4 AHIMS site type frequency

Site type	Number of occurrences	Frequency (%)
Artefact	70	45.46
Shell	41	26.62
PAD	24	15.58
Art (Pigment or Engraved)	11	7.14
Burial	3	1.95
Aboriginal Resource and Gathering	2	1.30
Hearth	1	0.65
Non-Human Bone and Organic Material	1	0.65
Modified Tree (Carved or Scarred)	1	0.65
Total:	154	100.00

A simple analysis of the Aboriginal cultural heritage sites registered within the 6.25 by 6.25-kilometre buffer of the study area indicates that artefact sites, shell middens and PAD sites are the most represented site types, accounting for 87.65% of total sites recorded (n=70, n=41, n=24, respectively). The remaining site types account for only 12.34% of sites recorded altogether.

3.3 Discussion

The study area is bound to the north and east by the Cooks River and is underlain by the Hawkesbury Sandstone geological formation. The proximity of Cooks River, a fourth-order perennial watercourse, would generally suggest a high likelihood that Aboriginal sites and archaeological deposits would be present within the study area. This is due to the abundance of resources that the watercourse would have provided. It should be noted however, that the original alignment of the Cooks River is to the north-east instead of directly adjacent of the study area. The underlying Hawkesbury Sandstone could also indicate potential for grinding groove sites to be present.

The background research has identified that the study area has been modified extensively throughout its history. The study area is comprised of soils classified as disturbed terrain which are unlikely to retain Aboriginal sites. This area is classified as disturbed terrain due to land reclamation associated with the diversion of Cooks River and the original marshy nature of the study area, combined with more recent use of the study area as a golf course which required extensive landscaping works. Geotechnical analysis has revealed that the current soil profiles within the study area consist of imported fill to a depth of 0.5 to 1.8 metres, overlying interbedded sands and clays, which in turn overly sandstone bedrock at a depth of between 9 and 33 metres (Jeffery and Katauskas 2008).

Previous assessments have also detailed the extent of this disturbance. Predictive modelling developed by AECOM (2015) for the Westconnex project, overlapping the northern portion of the study area, identified trends that can be applied to the current study area:

- *Aboriginal shell midden sites will occur in tidal estuarine foreshore zones (that is, within 10 metres of high-water level) associated with the Cooks River, Wolli Creek, around Botany Bay and the original alignment of Sheas Creek in areas not subject to significant landscape modification. The location of shell midden sites may be considerable distances from existing foreshore areas and may represent past foreshore environments.*
- *Aboriginal archaeological sites are highly unlikely to occur in areas previously subjected to significant levels of landscape modification as a result of urban development (AECOM 2015, p. 33).*

The assessment indicated that areas within the AECOM study area, underlain by disturbed terrain soils, had low archaeological potential within the fill itself, and that underlying soil profiles may have been disturbed by fill activities (AECOM 2015, p. 23). Biosis previously carried out an assessment associated with the Cooks Cove Master Plan that overlapped the extent of the current study area. The site inspection identified that the area was heavily disturbed, and no archaeological sites or areas of potential were identified. The results stated that 'the majority if not all of the evidence of past Aboriginal occupation/ Aboriginal history on the site has since been removed, heavily disturbed or buried under deep landfill' (Biosis Research 2001, p. 18).

The results of the desktop assessment indicate that any Aboriginal archaeology present in the study area would take the form of subsurface deposits. Due to the extent of previous landscape modification, there is also a likelihood that any surviving deposits have been heavily disturbed.

3.3.1 Predictive statements

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

These statements are based on:

- Site distribution in relation to landscape descriptions 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.

Table 5 indicates the site types most likely to be encountered across the present study area. The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 5 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.	Low: Owing to heavy disturbances and landscaping within the study area, as well as the large part of it which is built on reclaimed land, there is a low potential for this site type to be identified in the study area. If artefacts are identified, they will almost certainly be located in a disturbed context.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Low: Shell middens are a common site type in the local area. Owing to heavy disturbances and landscaping within the study area, as well as the large part of it which is built on reclaimed land, there is a low potential for this site type to be identified in the study area. In addition to this the course of the Cooks River has been changed on a number of occasions, is likely to have impacted on any middens located on the shoreline.
PADs	Potential sub surface deposits of cultural material.	Low: Previous reports have indicated the potential for archaeological deposits to be present beneath fill layers within the study area. This potential is extremely limited within the study area, given the impact of past land use activities, the level of fill present, and the level of the water table. This is reflected in the results of the geotechnical assessment.
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.
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.

Site type	Site description	Potential
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.
Quarries	Raw stone material procurement sites.	None: There is no record of any quarries being within or surrounding the study area.
Modified trees	Trees with cultural modifications	None: There are no mature growth trees within the study area, and this is an uncommon site type in the local area.
Axe grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	None: The geology of the study area lacks suitable horizontal sandstone rock outcrops for axe-grinding grooves. Therefore, there is low potential for axe grinding grooves to occur in 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.	None: The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist, which are not present in the study area.

4 Archaeological survey

A field survey of the study area was undertaken on 8 December 2025 by Megan Porter (Graduate Heritage Consultant, Biosis), Maggie Butcher (Team Leader NSW Heritage, Biosis), Jordan Marr (Cultural Sites Officer, Metro LALC), and Josh Marr (Cultural Sites Officer, Metro LALC). The field survey sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological survey objectives

The objectives of the survey were to:

- Provide RAPs an opportunity to view the study area and to discuss previously identified Aboriginal object(s) and/or place(s) in or within close proximity to the study area.
- 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 PADs.
- Identify and record an area of shell deposit previously observed during Connecting with Country consultation between Aunty Barb and Stockland.

4.2 Archaeological survey methodology

The survey methods were intended to assess and understand the landforms and to determine whether any archaeological material from Aboriginal occupation or land use exists within the study area.

4.2.1 Sampling strategy

With the aim of full coverage, a total of four meandering transects initially followed the design of the fairway beginning in the northern portion of the study area and travelled in a general north-east to south-west direction (Figure 8). The four surveyors walked a minimum of 2 metres apart as per the methodology set out in Burke & Smith (2004, p. 65), which states that a single person can only effectively visually survey an area of two linear metres. However, noting that there was low (<10%) GSV across large parts of the study area due to the well-maintained nature of the golf green, these meandering transects were altered to target areas of higher GSV (>80%) under tree lines, along water edges, and within garden beds in the southern half of the study area.

The representatives from Metro LALC specifically targeted landforms and topographic features that they thought would traditionally hold greater potential were it not for the historical disturbances within the site, such as the edge of the Cooks River and along current sources of water. These transects were not GPS mapped but were confirmed and discussed during the survey debrief.

4.2.2 Survey methods

The archaeological survey was conducted on foot with a field team of four members. 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 been exploited by Aboriginal people.
- Landform.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.

Where possible, 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 handheld Global Positioning System (GPS) and the Map Grid of Australia (2020) 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 factors that contributed most to the effectiveness of the survey include development that has impacted the study area, low visibility associated with grass coverage, paving, and garden beds, as well as a lack of accessibility in the southern portion of the study area contained within the MOC (Photo 9). Exposure was 0% across the entire study area due to mass disturbances and the resultant lack of the original landform or soils.



Photo 9 No access beyond the boundary of the MOC, facing west

4.4 Archaeological survey results

The results from the field survey have been summarised in Table 6 and Table 7 below and full transect details are provided in Figure 8.

Table 6 Survey coverage

Survey unit	Landform	Survey unit area (m ²)	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage (%)
1	Disturbed landform	528,194	10	0	0	0.00

Table 7 Landform summary

Landform	Landform area (m ²)	Area effectively surveyed (m ²)	Landform effectively surveyed (%)	No. of Aboriginal sites	No. of artefacts or features
Disturbed landform	528,194	0	0.00	0	0

4.4.1 Landform

In this context, an analysis of landforms cannot provide any indicative data as the study area has been subject to extensive landscape modification since the arrival of Europeans into the area. The entire study area is constructed on reclaimed land, with the north-western and central portions of the study area seeing historical disturbances associated with the sewage farm and market gardening, while western edge has been impacted by the redirection of the Cooks River and all associated modifications, including irrigation channels and bunding. More recently the north-western and central portions of the study area have been significantly impacted by the construction of the MOC and the entire study area has been modified to suit the activities of the Kogarah Golf Club. Geotechnical works suggest that there is a minimum of 0.5 metres of fill over all areas of site, up to 1.8 metres in some areas (Jeffery and Katauskas 2008, p. 5). Therefore, although landscape analysis is typically used to assist in determining areas of archaeological potential, given the extensive disturbance that the study area has been subject to, this determination will need to be made on the basis of the geotechnical work undertaken to date.

4.4.2 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 2010a). Across the majority of the study area, there was no visibility (0%) due to the well-maintained nature of the golfing green (Photo 10), as well as unmaintained areas of vegetation (Photo 11) and paving for vehicle and pedestrian access (Photo 12). Small areas adjacent to tree lines (Photo 13) and subsurface utilities services (Photo 14) represent a minor amount (<10%) of surface area with high GSV (80%+) where grass was absent.



Photo 10 An example of no GSV (0%) that was present across the majority of the site due to grass coverage, facing east



Photo 11 An example of no GSV (0%) due to unmaintained grass coverage in the western portion of the study area, facing north-west



Photo 12 An example of no GSV (0%) owing to introduced gravel paving, facing north-west



Photo 13 An example of high GSV (80%+) underneath tree lines, facing east



Photo 14 An example of high GSV (80%+) adjacent to subsurface utilities services, facing north

4.4.3 Exposure

Exposure differs from visibility in that it is a percentage estimate of the amount of ground surface in which buried artefacts or deposits may be identified rather than a simple observation of the amount of ground surface that is visible (Burke & Smith 2004, DECCW 2010a).

Overall, the study area displayed no areas of exposure pertaining to the original Birrong or Warriewood soil profiles. Any areas of exposure are instead related to the substantial alterations made to the original landforms within the study area as part of the construction and maintenance of the golf course, such as sand bunkers (Photo 15), as well as works associated with Marsh Street and the Cooks River Bridge (Photo 16).



Photo 15 An example of exposure within an artificial sand bunker associated with the golf fairway, facing west



Photo 16 An example of exposure associated with the development of Marsh Street and the Cooks River Bridge, facing north

4.4.4 Disturbances

Disturbances can be associated with both natural (e.g. burrowing and scratching in soil by animals) and human agents (residential and commercial development). The level to which the disturbances that were identified during a comprehensive inspection of ground surface, landform, and aerial imagery have impacted the study area are categorised according to the following criteria:

- High disturbance—the landform has been heavily disturbed and all natural soil horizons have been displaced or removed, these areas are unlikely to contain Aboriginal cultural material.
- Moderate disturbance—the landform has undergone disturbances to a certain degree, but the extent and nature of these disturbances cannot be fully quantified. Aboriginal cultural material may be present within these locations but is unlikely to be *in situ*.
- Low disturbance—the landform has not been significantly disturbed and is highly likely to contain intact soil horizons. Aboriginal cultural material if present is likely to be *in situ*.

High levels of disturbances associated with recent human action are prevalent across the study area and cover large sections of the land surface. These agents are primarily associated with historical disturbances and golf course infrastructure, including the club house and gardens (Photo 17), footpaths (Photo 12), paved car parking (Photo 18), artificial water ways (Photo 19) and sand bunkers (Photo 15). Associated disturbances also include subsurface utilities, such as storm water drains (Photo 14 and Photo 20) and other services (Photo 21).



Photo 17 The Kogarah Golf Club house and gardens, facing south-east



Photo 18 The Kogarah Golf Club house parking, facing south-west



Photo 19 An example of an artificial water way that has been constructed and modified since at least the 1940s, facing south



Photo 20 An example of one of an artificial water way that has been constructed and modified since at least the 1940s, facing south



Photo 21 Subsurface electricity utilities services, facing west

4.4.5 Surface shell inclusions

Evidence of bleached shell were present where GSV was high underneath trees (Photo 22), within the walls of sand bunkers (Photo 24, Photo 25 and Photo 26), or where grass was otherwise not present (Photo 23). The survey also identified a shell deposit that was previously observed during Connecting with Country consultation between Aunty Barb and Stockland (Photo 25 and Photo 26).

While it is relatively straightforward to discern between natural and cultural deposits when *in situ*, there can be difficulty in distinguishing between redeposited natural shell beds and cultural middens (Attenbrow 1992). Due to the highly disturbed nature of the study area, any shell within the site should be considered redeposited and not *in situ*.

When determining the cultural status of a redeposited shell deposit there are several factors that can be considered. This includes factors such as soil stratigraphy, the size, condition and quantities of the shell, species presence and dominance, and the presence of articulated shells and other materials including charcoal, artefacts, inedible species and materials. The shells eroding from the fill were characterised by a range of shell sizes and multiple species, including Hercules club mud whelk *cf. Pyrazus ebeninus*, Australian mud whelk *Batillaria australis*, Sydney cockle *Anadara trapezia*, and oyster *Ostreidae*. The shells were extremely sun bleached and there was no evidence of burning or quantities of charcoal present.

The size and size sorting and condition of the shell provides strong justification for the material not being cultural in nature. The shell could be considered poorly sorted in terms of size. That is, the shells are individuals varying highly in size, with most being small individuals that would not be considered edible. In an area as abundant and rich as the Cooks River when it was inhabited solely by Aboriginal people, it is difficult to suggest that the smaller shells are present due to resource depression.

Additionally, there was a lack of stratigraphy evident within the exposed fill, with no clear shell lenses (a distinct, concentrated layer or pocket of shell material within a midden deposit) or intact soil layers present. This suggests that the shell may originate from either a redeposited shell midden or a natural deposit, such as one formed by fluvial processes. Moreover, there is strong historical evidence that for more than 60 years, the Aboriginal shell deposits were dredged from the bed of the Cooks River and special-built, wood-fire kilns along the shoreline were used to produce the quick-lime product for the building trades (Gifford and Eileen Eardley 1966).

Through observation of the shell material within the study area, Biosis has therefore determined that the shell material does not represent intact cultural midden deposits and is unlikely to be cultural midden material. Although some of the shell may be representative of redeposited midden material, the shell material identified is from a highly disturbed context and the origins of the soil and shell material are unclear. While this analysis was not supportive of the recovered shell material being cultural in nature, this does not imply that land around the Cooks River did not once contain several complex Aboriginal shell middens.



Photo 22 Example of shell deposit located within the northern part of the study area, showing a range of shell sizes and species



Photo 23 Example of a more compact shell deposit located within the eastern part of the study area, showing a range of shell sizes and species



Photo 24 Example of shells sparsely contained within the walls of artificial sand bunkers, facing east



Photo 25 Previously observed example of shells sparsely contained within the walls of artificial sand bunkers, facing east



Photo 26 Close-up view of the previously observed example of shells sparsely contained within the walls of artificial sand bunkers, facing east

4.5 Discussion of archaeological survey results

The archaeological investigation consisted of four meandering transects that targeted areas of high GSV and landforms and topographic features that would traditionally hold greater potential were it not for the historical disturbances within the site (Figure 8). The surface survey of the study area did not identify any Aboriginal sites or areas of archaeological potential. It was noted by the representatives of the LALC on site that the propensity of the shell across the site was a strong indication of the high significance of the site, but acknowledged the heavy disturbances that have led to the spread the shell across the site.

Previous archaeological assessments (AMBS 2003; JMCHM 2005c, 2006) undertaken to the north of the study area within undisturbed areas have recovered stone artefacts, estuarine shell and animal bone fragments, middens, and hearths. However, archaeological assessments previously undertaken within the study area (Biosis 2001, 2023; AECOM 2015) have investigated and confirmed extensive high-level disturbances to the natural soil profile. AECOM (2015) determined that these underlying deposits were likely also disturbed and that there was therefore no archaeological sensitivity for the area. Biosis (2023) also concluded that even if

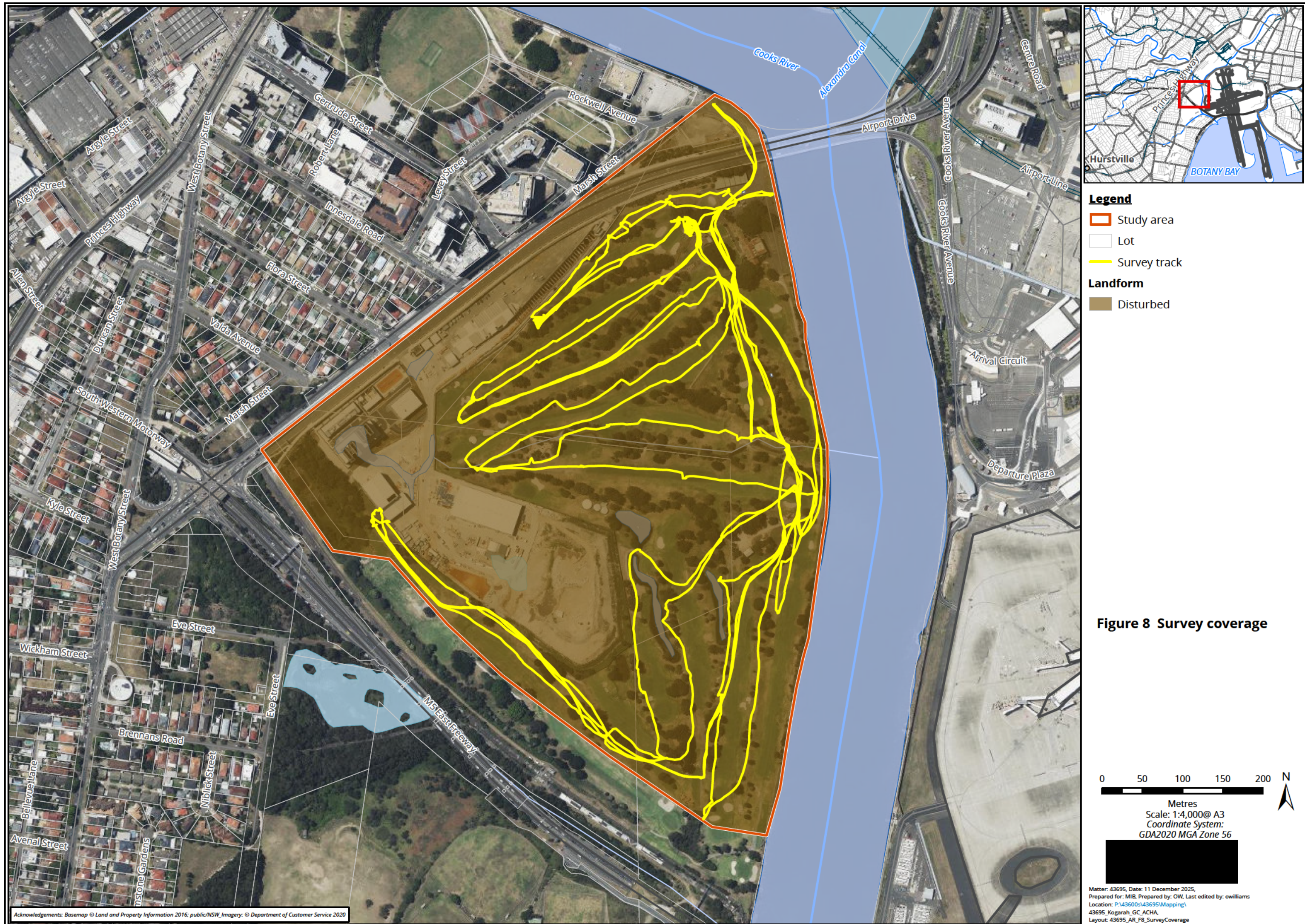
the natural soil deposits are present *in situ*, they would be located beneath the current groundwater level and have low potential to contain archaeological deposits.

As noted in Section 4.4, owing to the history of disturbance associated with fill activities and land reclamation within the study area, the current landscape context cannot necessarily provide us with a clear understanding of the subsurface archaeological potential within the study area. As such, available borehole data for the project is considered the most accurate available information relating to the subsurface condition of the study area. As outlined in Section 3.1.2, the current soil profiles within the study area consist of imported fill to a depth of 0.5 to 1.8 metres, overlying interbedded sands and clays, which in turn overly sandstone bedrock at a depth of between 9 and 33 metres.

If any intact archaeological material were to be present within the study area, it would be located within the interbedded clays and sands underlying the fill. A comparison was conducted between the four boreholes and adjacent soil landscapes in order to determine the likelihood of these sands and clays being intact, and whether or not they were imported. The depositional sequences between the boreholes appear to be relatively consistent, with the same materials (sand, clay, sandy clay, and silty clay), being deposited in random layers, with the sequence being more extensive in areas with deeper bedrock. This would suggest that there are similar depositional processes across the study area. Given that the southern portion of the study area, in which two of the boreholes were located, is built on reclaimed land, it is likely that the interbedded sands and clays in the northern portion of the study area were also created through extensive filling. Based on the descriptions available, the interbedded sands and clays appear to be a mixture of the Birrong and Warriewood soil landscapes located in closest proximity to the study area, suggesting that the soils have been sourced locally.

The current groundwater depth would also have a role in subsurface investigations within the study area. Groundwater seepage was encountered at varying depths during the geotechnical assessment, from 1.0 metres to 2.1 metres below existing levels in the boreholes and inferred to be at 0.8 metres to 1.5 metres within the EFCPs. Based on the available data, this would suggest that there is an average of less than 1 metre of interbedded clays and sands underlying the fill which is not subject to groundwater seepage. This would be consistent with historical descriptions of the area, which suggest it was low-lying and marshy.

The results of the field investigation have proven to be consistent with predictive statements made in Section 3.3.1. Fragments of shell that were identified on the surface were likely introduced during the construction of gardens, footpaths, and the golf course. Taking into account the extensive subsurface and surface landscape modifications associated with urban development, Biosis did not identify any areas with the potential to hold Aboriginal sites or objects (Figure 9).





5 Scientific values and significance assessment

The two main values addressed when assessing the significance of Aboriginal sites are cultural values to the Aboriginal community and archaeological (scientific) values. This report will assess scientific values while the ACHA report will detail the cultural values of Aboriginal sites in the study area.

5.1 Introduction to the assessment process

Heritage assessment criteria in NSW fall broadly within the significance values outlined in the Australia International Council on Monuments and Sites (ICOMOS) Burra Charter (Australia ICOMOS 2013). This approach to heritage has been adopted by cultural heritage managers and government agencies as the set of guidelines for best practice heritage management in Australia. These values are provided as background and include:

- **Historical significance** (evolution and association) refers to historic values and encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.
- **Aesthetic significance** (Scenic/architectural qualities, creative accomplishment) refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.
- **Social significance** (contemporary community esteem) refers to the spiritual, traditional, historical or contemporary associations and attachment that the place or area has for the present-day community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed. These aspects of heritage significance can only be determined through consultative processes with local communities.
- **Scientific significance** (Archaeological, industrial, educational, research potential and scientific significance values) refers to the importance of a landscape, area, place or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.

The cultural and archaeological significance of Aboriginal and historic sites and places is assessed on the basis of the significance values outlined above. As well as the ICOMOS Burra Charter significance values guidelines, various government agencies have developed formal criteria and guidelines that have application when assessing the significance of heritage places within NSW. Of primary interest are guidelines prepared by the Australian Commonwealth Department of Climate Change, Environment, Energy, and Water (Cth DCCEEW), Heritage NSW. The relevant sections of these guidelines are presented below.

These guidelines state that an area may contain evidence and associations which demonstrate one or any combination of the ICOMOS Burra Charter significance values outlined above in reference to Aboriginal heritage. Reference to each of the values should be made when evaluating archaeological and cultural significance for Aboriginal sites and places.

In addition to the previously outlined heritage values, the Heritage NSW Guidelines (Office of Environment and Heritage, Department of Premier and Cabinet 2011) also specify the importance of considering cultural landscapes when determining and assessing Aboriginal heritage values. The principle behind a cultural landscape is that ‘the significance of individual features is derived from their inter-relatedness within the cultural landscape’. This means that sites or places cannot be ‘assessed in isolation’ but must be considered as parts of the wider cultural landscape. Hence the site or place will possibly have values derived from its association with other sites and places. By investigating the associations between sites, places, and (for example) natural resources in the cultural landscape the stories behind the features can be told. The context of the cultural landscape can unlock ‘better understanding of the cultural meaning and importance’ of sites and places.

Although other values may be considered — such as educational or tourism values — the two principal values that are likely to be addressed in a consideration of Aboriginal sites and places are the cultural/social significance to Aboriginal people and their archaeological or scientific significance to archaeologists. The determinations of archaeological and cultural significance for sites and places should then be expressed as statements of significance that preface a concise discussion of the contributing factors to Aboriginal cultural heritage significance.

5.2 Archaeological (scientific significance) values

Archaeological significance (also called scientific significance, as per the ICOMOS Burra Charter) refers to the value of archaeological objects or sites as they relate to research questions that are of importance to the archaeological community, including indigenous communities, heritage managers and academic archaeologists. Generally the value of this type of significance is determined on the basis of the potential for sites and objects to provide information regarding the past life-ways of people (Burke & Smith 2004, p. 249, National Parks & Wildlife Service 1997, p. 26).

For this reason, the NPWS summarises the situation as ‘while various criteria for archaeological significance assessment have been advanced over the years, most of them fall under the heading of archaeological research potential’ (National Parks & Wildlife Service 1997, p. 26).

The NPWS criteria for archaeological significance assessment are based largely on the ICOMOS Burra Charter.

Research potential

Research potential is assessed by examining site content and site condition. Site content refers to all cultural materials and organic remains associated with human activity at a site. Site content also refers to the site structure – the size of the site, the patterning of cultural materials within the site, the presence of any stratified deposits and the rarity of particular artefact types. As the site contents criterion is not applicable to scarred trees, the assessment of scarred trees is outlined separately below. Site condition refers to the degree of disturbance to the contents of a site at the time it was recorded.

Table 8 and Table 9 outline the site content and site condition rating used for archaeological sites.

Table 8 Site contents ratings used for archaeological sites

Rating	Description
0	No cultural material remaining.
1	Site contains a small number (e.g. 0–10 artefacts) or limited range of cultural materials with no evident stratification.
2	Site contains a larger number, but limited range of cultural materials; and/or some intact stratified deposit remains; and/or are or unusual example(s) of a particular artefact type.
3	Site contains a large number and diverse range of cultural materials; and/or largely intact stratified deposit; and/or surface spatial patterning of cultural materials that still reflect the way in which the cultural materials were deposited.

Table 9 Site condition ratings used for archaeological sites

Rating	Description
0	Site destroyed.
1	Site in a deteriorated condition with a high degree of disturbance; lack of stratified deposits; some cultural materials remaining.
2	Site in a fair to good condition, but with some disturbance.
3	Site in an excellent condition with little or no disturbance. For surface artefact scatters this may mean that the spatial patterning of cultural materials still reflects the way in which the cultural materials were laid down.

Pearson & Sullivan (1995, p. 149) note that Aboriginal archaeological sites are generally of high research potential because ‘they are the major source of information about Aboriginal prehistory’. Indeed, the often great time depth of Aboriginal archaeological sites gives them research value from a global perspective, as they are an important record of humanity’s history. Research potential can also refer to specific local circumstances in space and time — a site may have particular characteristics (well preserved samples for absolute dating, or a series of refitting artefacts, for example) that mean it can provide information about certain aspects of Aboriginal life in the past that other less or alternatively valuable sites may not (Burke & Smith 2004, pp. 247–248). When determining research potential value particular emphasis has been placed on the potential for absolute dating of sites.

The following sections provide statements of significance for the Aboriginal archaeological sites recorded during the field investigation for the assessment. The significance of each site follows the assessment process outlined above. This includes a statement of significance based on the categories defined in the Burra Charter. These categories include social, historic, scientific, aesthetic and cultural (in this case archaeological) landscape values. Nomination of the level of value — high, moderate, low or not applicable — for each relevant category is also proposed. Where suitable the determination of cultural (archaeological) landscape value is applied to both individual sites and places (to explore their associations) and also, to the study area as a whole. The nomination levels for the archaeological significance of each site are summarised below.

Representativeness

Representativeness refers to the regional distribution of a particular site type. Representativeness is assessed by whether the site is common, occasional, or rare in a given region. Assessments of representativeness are subjectively biased by current knowledge of the distribution and number of archaeological sites in a region. This varies from place to place depending on the extent of archaeological research. Consequently, a site that is assigned low significance values for contents and condition, but a high significance value for

representativeness, can only be regarded as significant in terms of knowledge of the regional archaeology. Any such site should be subject to re-assessment as more archaeological research is undertaken.

Assessment of representativeness also considers the contents and condition of a site. For example, in any region there may only be a limited number of sites of any type that have suffered minimal disturbance. Such sites would therefore be given a high significance rating for representativeness, although they may occur commonly within the region.

Table 10 outlines the site representativeness ratings used for archaeological sites.

Table 10 Site representativeness ratings used for archaeological sites

Rating	Description
1	Common occurrence
2	Occasional occurrence
3	Rare occurrence

Overall scientific significance ratings for sites, based on a cumulative score for site contents, site integrity and representativeness are provided in Table 11.

Table 11 Scientific significance ratings used for archaeological sites

Rating	Description
1–3	Low scientific significance
4–6	Moderate scientific significance
7–9	High scientific significance

Each site is given a score on the basis of these criteria. The overall scientific significance is determined by the cumulative score. However as no Aboriginal sites were identified in the study area, this calculation has been omitted for this report, and instead the scientific statement of significance for the study area itself has been developed.

5.2.1 Statements of archaeological significance

The following archaeological significance assessment is based on Requirement 11 of the Code.

The study area, bounded to the north and east by Cooks River, has undergone extensive landscape modification associated with land reclamation through the diversion of Cooks River and land use as a sewage farm, agriculture and market gardening, and more recently as the KGC and MOC. Geotechnical works suggest that there is a minimum of 0.5 metres of fill over all areas of site, with up to 1.8 metres in some areas.

As such, any archaeological deposits that may have once been present within the study area have likely been impacted or destroyed. No Aboriginal sites or objects, or favourable landforms were identified during the site survey. Shell deposits identified on the surface of the study area are considered redeposited shell deposits lacking in the stratigraphy characteristic of cultural middens, contain a variety of shell size and species including those not considered edible, and do not coincide with artefacts, charcoal, or other cultural material. They are therefore not considered traces of cultural middens.

Therefore, the study area has been assessed to hold low scientific significance.

6 Impact assessment

The Concept & Early Works SSDA seeks for the carrying out of Early Works to facilitate the initial site preparation and infrastructure works required to support future development and publicly accessible open space. This includes:

- Concept Masterplan to support the staged delivery of the Kogarah Golf Club Redevelopment, including:
 - Maximum building envelopes, including maximum building heights and minimum building setbacks;
 - Maximum GFA up to 343,250m², comprising:
 - 3,250m² of GFA (FSR of 1.25:1) on Lot 31 DP 1231486.
 - 340,000m² of GFA on Lot 100 DP 1231954.
 - Conceptual primary land uses, including:
 - Block 1 – Mixed-use (i.e. commercial, hotel, serviced apartments, artisan food and drink industry) and advertising structures.
 - Block 2 – Logistics and mixed-use (i.e. commercial, hotel, serviced apartments).
 - Block 3A – Logistics.
 - Block 3B – Logistics.
 - Block 3C – Logistics and Data centre.
 - Urban Design Guidelines to guide future development of the built form and public domain.
 - Strategies and mitigation measures to manage potential environmental impacts.
- Early Works to support the future delivery of built form and publicly accessible open space, including:
 - Site preparation works, comprising:
 - Demolition of existing structures.
 - Clearing of existing vegetation.
 - Remediation works.
 - Bulk earthworks, including ground improvement and flood mitigation works.
- Site servicing and infrastructure works, including:
 - Construction of the Flora Street East extension consistent with Item 3 of the executed Voluntary Planning Agreement with Bayside Council.
 - Construction of stormwater infrastructure.
- Construction and augmentation of service and utility infrastructure as necessary.

For a detailed description, refer to the Environmental Impact Statement prepared by Colliers Urban Planning.

6.1 Predicted physical impacts

Based on the available evidence, it is unlikely that any intact archaeological deposits are present within the study area. Based on the geotechnical data gathered to date, it appears that the fill which forms the current ground surface within the study area overlies either disturbed or imported sand and clay soil layers. If *in situ* soil deposits are present, they are located beneath the current groundwater level, and have a low potential to contain archaeological deposits.

There is a low potential for any Aboriginal sites to be encountered during works within the study area. As such the impacts of the proposed works upon Aboriginal cultural heritage values will be negligible (Figure 10).

6.2 Ecologically Sustainable Development

One of the primary aims of the NP&W Act is the ‘conservation of objects places and features ... of cultural value within the landscape, including ... places, objects and features of significance to Aboriginal people ...’ ((s.2A(1)(b)(i)). The *Operational Policy: Protecting Aboriginal Cultural Heritage (Version 2)* (DECC NSW 2011) provides guidance to proponents in term of 1.1 Ecologically Sustainable Development (ESD).

ESD has been defined in Part 3, 6. (2) Objective of the Authority of the *Protection of the Environment Administration Act 1991* (NSW). This outlines that the ESD requires the integration of economic and environmental considerations (including cultural heritage) in the decision-making process. In regard to Aboriginal cultural heritage, ESD can be achieved by applying the principle of intergenerational equity and the precautionary principle.

Intergenerational equity

The principle of intergenerational equity states that the present generation should make every effort to ensure the health, diversity and productivity of the environment – which includes cultural heritage – for the benefit of future generations.

In terms of Aboriginal cultural heritage, intergenerational equity can be considered in terms of the ‘cumulative impacts’ of any proposal to Aboriginal objects and places. For example, if few Aboriginal objects and places remain in a region (because of harm authorised under previous AHIPs), fewer opportunities remain for future generations of Aboriginal people to enjoy the cultural benefits of those Aboriginal objects and places.

Information about the significance of Aboriginal cultural heritage values associated with the Aboriginal objects and places proposed to be harmed will be relevant to the consideration of intergenerational equity and an understanding of the cumulative impacts of a proposal.

Where there is uncertainty, the precautionary principle should also be followed (see below).

The precautionary principle

The precautionary principle states that the lack of full scientific certainty about the threat of harm should not be used as a reason for not taking measures to prevent harm from occurring.

In applying the precautionary principle, decisions should be guided by:

- *a careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment (which includes cultural heritage)*

- *an assessment of the risk-weighted consequences of various options. The precautionary principle is relevant to OEH consideration of potential harm to Aboriginal cultural heritage where:*
- *the proposal involves a risk of serious or irreversible harm to Aboriginal objects or places or to the value of those objects or places, and*
- *there is a lot of uncertainty about the significance of Aboriginal cultural heritage values of the Aboriginal objects or places proposed to be harmed.*

Where this is the case, a precautionary approach should be taken and all cost-effective measures implemented to prevent or reduce harm to the Aboriginal objects/place.

6.3 Management and mitigation measures

Ideally, heritage management involves conservation of sites through the preservation and conservation of fabric and context within a framework of ‘doing as much as necessary, as little as possible’ (Marquis-Kyle & Walker 1994, p. 13). In cases where conservation is not practical, several options for management are available. For sites, management often involves the salvage of features or artefacts, retrieval of information through excavation or collection (especially where impact cannot be avoided) and interpretation.

As part of the management and mitigation measures for the proposed works, an ACHA including archaeological survey and consultation with the Aboriginal community was undertaken. This was done to determine the presence and nature of any potential Aboriginal sites so that appropriate management could be undertaken. The survey did not identify the presence of any Aboriginal sites and the study area was assessed with low potential due to high levels of disturbances present. The bleached shell that was identified across the study area eroding out of fill was observed to lack stratigraphy, was comprised of individuals that would not be considered edible), and included no evidence of cooking or other remains typically seen within middens present. This suggests that the shell may originate from either a redeposited shell midden or a natural deposit, such as one formed by fluvial processes.

Avoidance of impact to archaeological and cultural heritage sites through design of the development is the primary mitigation and management strategy, and should be implemented where practicable. Owing to the history of disturbance associated with fill activities and land reclamation within the study area, geotechnical data indicates that the extant soil profiles within the study area consist of imported fill to a depth of 0.5 to 1.8 metres. If any intact archaeological material were to be present within the study area, it would be located within the interbedded clays and sands underlying the fill. Any proposed works within the study area would therefore be undertaken within areas heavily disturbed by historical land-use and will avoid impacts to any known Aboriginal sites. As such, consultation undertaken has resulted in the following management strategies:

6.3.1 No further archaeological work required

Due to the high disturbance prevalent throughout the recent history of the study area and geotechnical works identifying the presence of fill at depths up to 1.8 metres across the site, the study area has been identified as containing low potential for Aboriginal sites to be present. No further archaeological works are necessary.

6.3.2 Continued consultation with the registered Aboriginal stakeholders

It is recommended that Stockland continue to inform the RAPs about the progress of the study area throughout the life of the project. This recommendation is in keeping with the consultation requirements.

6.3.3 Monitoring during earthworks

The majority if not all of the evidence of past Aboriginal occupation/ Aboriginal history on the site has since been removed, heavily disturbed or buried under deep landfill. While testing was recommended by the members of Metro LALC who attended the field investigation, the depth of the fill across the site indicates that test excavations would not be effective in this instance. Therefore, in keeping with recommendations from previous assessment Biosis (2023) and consultation it is recommended that monitoring be undertaken by RAPs when excavation past fill layers occurs. This will ensure, that should any Aboriginal archaeology be present it would be identified and properly cared for. This was supported by RAPs during Stage 4 consultation.

6.3.4 Heritage induction and Construction Environmental Management Plan

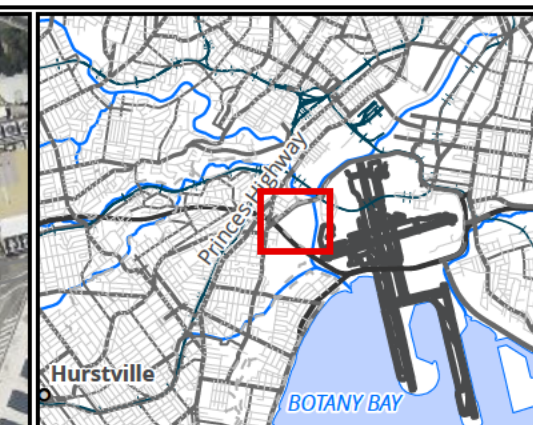
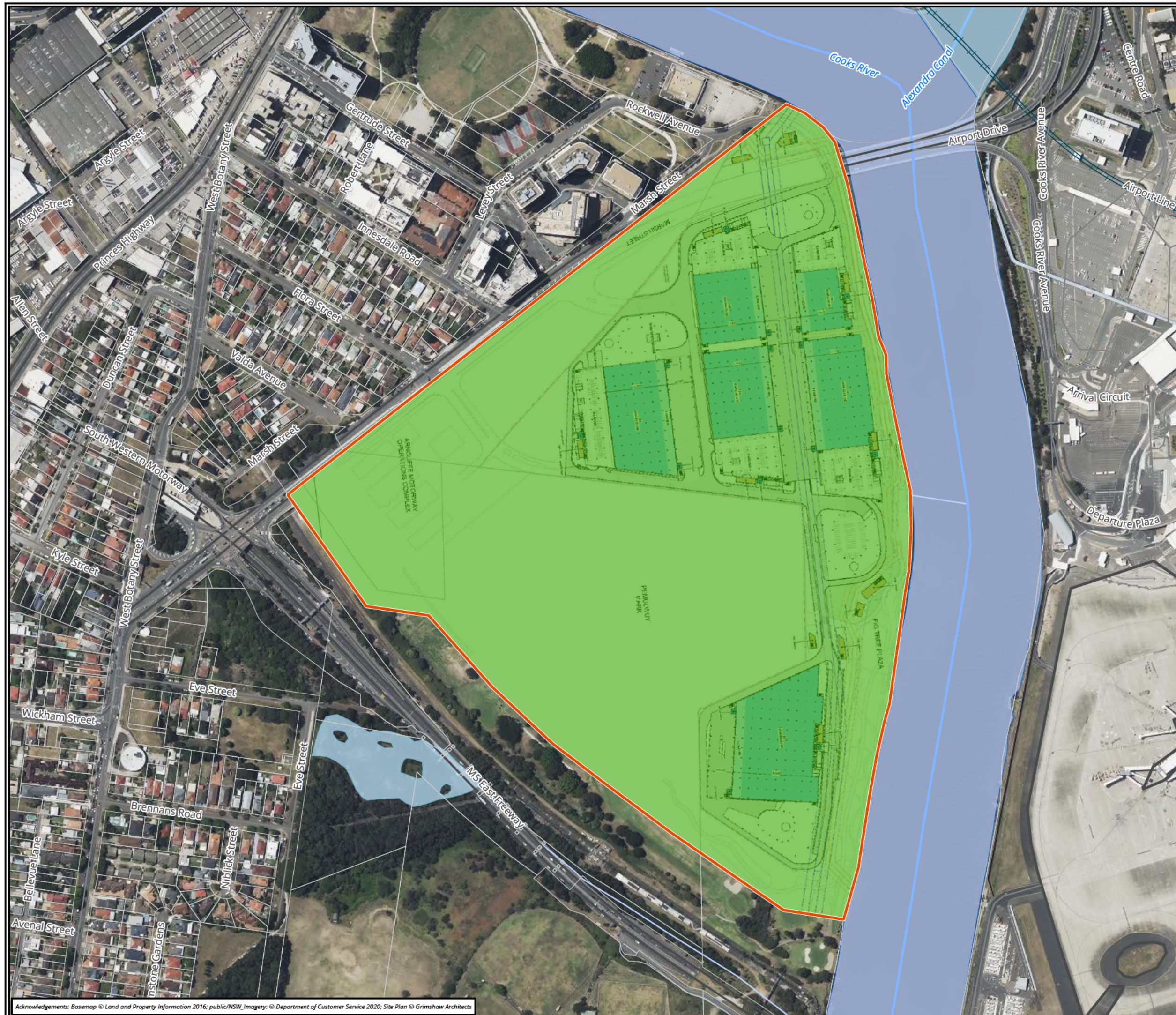
While it has been concluded that the study area has been highly disturbed and contains low archaeological potential, the study area is in a location where middens were likely present. Therefore, a heritage induction should be included in the site induction for all personnel. This will inform as to when works should cease and a manager be contacted for further instruction should any potential Aboriginal sites be identified during groundworks. This includes the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

This should be included in the CEMP for the project, which would also outline the methodology for RAP monitoring.

6.3.5 Discovery of unanticipated Aboriginal objects and human remains

An unexpected finds protocol should be developed so that if any Aboriginal objects or human remains are encountered, they are managed appropriately. This can also be incorporated into the CEMP.



Legend

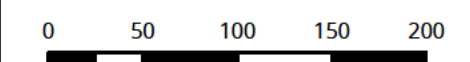
Study area

Lot

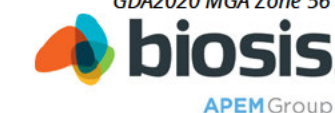
Archaeological potential

Low

Figure 10 Impact assessment



Metres
Scale: 1:4,000@ A3
Coordinate System:
GDA2020 MGA Zone 56



Matter: 43695, Date: 11 December 2025,
Prepared for: MIB, Prepared by: OW, Last edited by: hiswoyo
Location: P:\43600s\43695\Mapping\
43695_Kogarah_GC_ACHA
Layout: 43695_AR_F10_ImpactAssessment

7 Recommendations

Strategies have been developed based on the archaeological (significance) of cultural heritage 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.
 - The Code.

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

Recommendation 1: Continued consultation with the RAPs

It is recommended that Stockland continue to inform the RAPs about the progress of the study area throughout the life of the project. This recommendation is in keeping with the consultation requirements.

Recommendation 2: No further archaeological works necessary

Due to the high disturbance prevalent throughout the recent history of the study area and geotechnical works identifying the presence of fill at depths up to 1.8 metres across the site, the study area has been identified as containing low potential for Aboriginal sites to be present. No further archaeological works are necessary.

Recommendation 3: Monitoring during earthworks

The majority if not all of the evidence of past Aboriginal occupation/ Aboriginal history on the site has since been removed, heavily disturbed or buried under deep landfill. While testing was recommended by the members of Metro LALC who attended the field investigation, the depth of the fill across the site indicates that test excavations would not be effective in this instance. Therefore, in keeping with recommendations from previous assessment Biosis (2023) and consultation it is recommended that monitoring be undertaken by RAPs when excavation past fill layers occurs. This will ensure, that should any Aboriginal archaeology be present it would be identified and properly cared for. This was supported by RAPs during Stage 4 consultation.

Recommendation 4: Heritage induction and Construction Environmental Management Plan

While it has been concluded that the study area has been highly disturbed and contains low archaeological potential, the study area is in a location where middens were likely present. Therefore, a heritage induction should be included in the site induction for all personnel. This will inform as to when works should cease and a manager be contacted for further instruction should any potential Aboriginal sites be identified during groundworks. This includes the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts and human remains.

- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

This should be included in the CEMP for the project, which would also outline the methodology for RAP monitoring (Recommendation 3)

Recommendation 5: Discovery of Unanticipated Aboriginal Objects

All Aboriginal objects and Places are protected under the NSW NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by 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 Heritage NSW and Aboriginal stakeholders.

Recommendation 6: Discovery of human remains

If any suspected human remains are discovered during any activity works, all activity in the vicinity must cease immediately. The remains must be left in place and protected from harm or damage. The following contingency plan describes the immediate actions that must be taken in instances where human remains or suspected human remains are discovered. Any such discovery at the study area must follow these steps:

1. **Discovery:** If suspected human remains are discovered all activity in the vicinity must stop to ensure minimal damage is caused to the remains; and the remains must be left in place and protected from harm or damage.
2. **Notification:** Once suspected human skeletal remains have been found, the Coroner's Office and the NSW Police must be notified immediately. Following this, the find will be reported to the Aboriginal parties and Heritage NSW.

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Appendices

Appendix 1 AHIMS results

THE FOLLOWING APPENDIX IS NOT TO BE MADE PUBLIC.

