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Preliminary Aboriginal Cultural Heritage Assessment Report

Parramatta Light Rail Stage 2
Environmental Impact Statement

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GLOSSARY AND ABBREVIATIONS

Term/Acronym	Definition
Aboriginal artefact/object	Means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AMBS	Australian Museum Business Services
BP	Before Present
Burra Charter	The Australia ICOMOS Charter for Places of Cultural Significance, The Burra Charter, 2013
DCP	Development Control Plan
DECCW	Former NSW Department of Environment, Climate Change and Water
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2021
GPOP	Greater Parramatta and the Olympic Peninsula
GPS	Global Positioning System
Grinding grooves	Usually oval-shaped indentations in sandstone outcrops. These grooves were made when Aboriginal people shaped and sharpened stone axes by grinding them against the sandstone. As a fine-grained material, rubbing stone axes against sandstone provided a sharp edge that could be used for cutting.
Heritage Act	NSW *Heritage Act 1977*
HNSW	Heritage New South Wales
ICOMOS	International Council on Monuments and Sites
IHO	Interim Heritage Order
KNC	Kelleher Nightingale Consulting
Knapping	(or lithic/stone reduction) Knapping is shaping of a suitable stone material (hard, homogenous, elastic, brittle, isotropic raw materials) into a stone tool by removing piece or pieces. The reduction of the stone can be done striking or applying pressure via other stones or bone/antler as hammers.
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
Material culture	Physical objects made or modified by a human
NHL	National Heritage List
NNTT	National Native Title Tribunal
NPW Act	NSW *National Parks and Wildlife Act 1974*
NSW	New South Wales
NTA	Commonwealth *Native Title Act 1993*
OEH	Former NSW Office of Environment and Heritage
PACHCI	*Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (Roads and

Term/Acronym	Definition
	Maritime Services, 2012)
PAD	Potential Archaeological Deposit is an area identified with potential for artefacts to occur below the ground surface. PADs occur over time, as artefacts are covered by sediment such as dirt/sand or are moved by erosion to new areas which may then be covered by sediment. These artefacts remain under the ground surface and when excavated provide important spatial and temporal information about Aboriginal land use. As PADs are located below the ground, artefacts can only be recovered through archaeological excavation in consultation with the local Aboriginal community.
PHALMS	Parramatta Historical Archaeological Landscape Management Study
PLR2	Parramatta Light Rail Stage 2 – acronym used for labelling project PADs
project	The project (for which Transport for NSW is seeking approval) is the construction and operation of Stage 2 of Parramatta Light Rail.
project site	Refers to the area that would be directly disturbed by construction of the project (for example, as a result of ground disturbance and the construction of foundations for structures). It includes the location of construction activities, compounds and work sites, and the location of permanent infrastructure (Figure 1.3).
RAPs	Registered Aboriginals Parties
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
Shell middens	Shell middens are accumulation of the debris of shellfish. Shell middens often also include other material such as the bones of birds and fish, stone artefacts, and charcoal from campfires. Shell middens are usually found on the coast, but can also be found in inland lakes, swamps and along riverbanks and inlets. They can range from thin scatters of shells to deep layered deposits that have built up over a longer period of time.
SHI	State Heritage Inventory
SHR	State Heritage Register
Study area	The study area includes the project alignment and earlier route options plus a 50 metre buffer either side.
SU	Survey Unit
Transport for NSW	Transport for NSW is the lead agency of the NSW Transport cluster.

EXECUTIVE SUMMARY

Parramatta Light Rail will deliver an integrated light rail service that supports the population and employment growth expected throughout the Greater Parramatta and the Olympic Peninsula area (GPOP). It will integrate with existing and future modes of transport, including buses, trains, ferries and active transport (pedestrian and cycle networks), as well as Sydney Metro West services and the existing road network.

Parramatta Light Rail will be delivered in stages to keep pace with development:

- Stage 1 will connect Westmead to Carlingford via the Parramatta central business district (CBD) and Camellia. The construction and operation of Parramatta Light Rail Stage 1 was approved by the NSW Minister for Planning in May 2018. Major construction is underway, with the track installation complete and light rail stop construction in progress. Stage 1 is expected to start operating in 2024. Further information on Stage 1 is provided at Parramatta Light Rail
- Transport for NSW is now proposing to construct and operate Stage 2 of Parramatta Light Rail ('the project'). Stage 2 would connect the Parramatta CBD and Stage 1 to Camellia, Rydalmere, Ermington, Melrose Park, Wentworth Point and Sydney Olympic Park.

Transport for NSW has engaged RPS to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) to inform the environmental impact statement (EIS) for Parramatta Light Rail Stage (the 'project'). This report is a Preliminary ACHAR and commences assessment in accordance with the Secretary's environmental assessment requirements (SEARs) relating to Aboriginal heritage for the project. It has been guided by the *Requirements and guidelines relating to the assessment of Aboriginal heritage in NSW* (DECCW, 2010).

The study area for the project is located across the City of Parramatta and City of Ryde Local Government Areas (LGAs) and the Deerubbin and Metropolitan Local Aboriginal Land Council (LALC) boundaries.

Background research included a review of previous studies and database searches on the Aboriginal archaeological and historical context of the study area and surrounds. The presence of the Parramatta Sand Body (a geological formation dating from the Pleistocene associated with significant Aboriginal archaeology) was also identified within the Parramatta CBD section of the project site.

Consultation with Aboriginal stakeholders has commenced in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010) and the requirements of Clause 60 of the National Parks and Wildlife Regulation 2019. It is noted that consultation with Registered Aboriginal Parties (RAPs) for the project is continuing. This Preliminary ACHAR would be refined and updated, and the Final ACHAR provided with the response to submissions report to the Department of Planning and Environment following completion of the public exhibition of the EIS.

This preliminary assessment has been informed by work undertaken in accordance with the *Procedure for Aboriginal cultural heritage consultation and investigation* (PACHCI) (Roads and Maritime Services, 2012). In accordance with PACHCI, an archaeological field survey was undertaken with representatives from the LALCs in January and February 2022 to further assess the archaeological potential of the study area based on landscape context, previously identified archaeology and the extent of prior disturbance.

Thirteen registered sites (AHIMS 45-6-2785, AHIMS 45-6-2786, AHIMS 45-6-2683, AHIMS 45-6-2559, AHIMS 45-6-3582, AHIMS 45-6-3767, AHIMS 45-6-3818, AHIMS 45-6-2686, AHIMS 45-6-1523, AHIMS 45-6-2978, AHIMS 45-6-2795, AHIMS 45-6-2679 and AHIMS 45-6-4097) and one PAD (PLR2 PAD2) are located within 200 metres of the project site. These sites would not be impacted by construction or operation of the project.

Two known Aboriginal heritage sites (AHIMS 45-6-2977 and AHIMS 45-6-4015) are located within the project site on Macquarie Street in the Parramatta CBD. In addition, seven potential archaeological deposits (PADs) with either high or moderate archaeological potential were identified in the project site in Ermington, Rydalmere, Melrose Park and Sydney Olympic Park. This included four areas of undisturbed parklands and nature strips. These are listed in Table 0.1, along with a preliminary significance assessment which has focussed on the intactness, representativeness and research potential of these sites within the landscape and determined that the sites displayed between moderate-high significance and a summary of potential impacts.

The Archaeological Survey Report (Appendix D) prepared in accordance with PACHCI 2 was provided to the RAPs for comment and review along with a draft Test Excavation Methodology (now updated and included in Appendix C). The first AFG meeting was held both in person, at the Transport for NSW Parramatta office and online on 22 July 2022. Sixteen RAPs were in attendance, including six in person and 10 online. Key points raised during the AFG were that the RAPs requested a reduced spacing between the test excavation pits and a site visit. Following the AFG, a site visit was conducted with RAPs on 8 August 2022, which was within the consultation period.

During the consultation period, comments received from RAPs in writing and during the site visit. Details on these comments and how they have been addressed are outlined in Section 8.3. This includes the changes made to the test excavation methodology following consultation and agreement with the RAPs. The Aboriginal archaeological test excavation program is planned to take place in around late 2022 to assess and inform the archaeological potential.

This preliminary assessment has determined that the two AHIMS and seven PAD sites may be at least partially impacted by construction of the project (PLR2 PAD2 (Melrose Park Public School Oval) is outside the project site and would not be impacted). Further assessment including archaeological test excavation and comprehensive cultural heritage assessment would be undertaken to fully assess the significance and extent of impact.

The confinement of large parts of the project site to existing road and rail transport infrastructure corridors would avoid impact to other surrounding sites and PADs and has lessened landscape disturbance required to construct the project to some degree. However, given the linear nature of the project and surrounding spatial constraints including topography/landscape and existing development, route selection is unlikely to be able to avoid all impacts to Aboriginal archaeological sites. Test excavation is proposed during the design phase which would inform where design modifications may be required. However, mitigative salvage excavation is likely to be required for all archaeological sites exhibiting high and moderate to low significance.

Table 0.1: Preliminary assessment of impacts

Suburb	PAD	Assessed significance	Extent of impact	Type of impact	Consequence of impact
Melrose Park	Ermington Boat Ramp PLR2 PAD1	High	Total (as all of the PAD is located in the project site)	Direct (ground disturbance, excavation and vegetation clearing resulting from bridge works and from vehicle and plant movements)	Partial or total loss of value
Rydalmere	Rydalmere Wharf PLR2 PAD3	High	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance, excavation and vegetation clearing resulting from bridge works and from vehicle and plant movements)	Partial or total loss of value
Sydney Olympic Park	Haslams Creek PLR2 PAD4	High	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance, excavation and vegetation clearing resulting from Holker Busway bridge strengthening works, and vehicle and plant movements)	Partial or total loss of value
Rydalmere	Broadoaks Park PLR 2 PAD5	Moderate	Total (as all of the PAD is located in the project site)	Direct (ground disturbance and vehicle and plant movements at the proposed compound site)	Partial or total loss of value
Ermington	Ken Newman Park PLR2 PAD6	Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance, excavation and vegetation clearing, and potential landscaping	Partial or total loss of value

Suburb	PAD	Assessed significance	Extent of impact	Type of impact	Consequence of impact
				works, and from vehicle and plant movements)	
Sydney Olympic Park	Hill Road West PLR2 PAD7	Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance and excavation resulting from vegetation clearing and installation of light rail, and from vehicle and plant movements)	Partial or total loss of value
Sydney Olympic Park	Brickpit - Australia Avenue PLR2 PAD8	Moderate	Partial (as not all of the PAD is located in the project site)	Direct	Partial or total loss of value
Parramatta CBD	AHIMS 45-6-2977 (Macquarie St PAD 3)	High/ Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance and excavation as a result of constructing the turnback facility)	Partial or total loss of value
	AHIMS 45-6-4015 (Church St PAD 1)	Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance and excavation as a result of constructing the turnback facility)	Partial or total loss of value

A Final Aboriginal Cultural Heritage Assessment Report (ACHAR) would be prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and in consultation with RAPs following the completion of test excavation program and cultural values assessment planned for around late 2022. This report would include the results of archaeological test excavation and comprehensive impact assessment based on identification of both archaeological evidence within the area and cultural heritage. The Final ACHAR would inform design refinement and construction planning to avoid or minimise the impact. Mitigation and management measures would be recommended where impacts cannot be avoided.

1 INTRODUCTION

1.1 Parramatta Light Rail

The NSW Government's Greater Sydney Region Plan *A Metropolis of Three Cities* (Greater Sydney Commission, 2018) outlines a vision for a three-city metropolis. The Central River City covers the four local government areas of the City of Parramatta, Blacktown City, Cumberland City and The Hills Shire. *A Metropolis of Three Cities* highlights Greater Parramatta as the focal point for the Central River City, with employment growth and public transport being of key importance.

The Greater Parramatta and the Olympic Peninsula area (GPOP), which extends from Westmead and Parramatta in the west to Sydney Olympic Park to the east, is fast emerging as the heart of Sydney's Central River City and is set to grow and change significantly over the next 20 years. Forecasts predict that GPOP will accommodate almost 170,000 new residents by 2041. Employment opportunities will also grow, with an additional 100,000 jobs predicted by 2041 (SGS, 2017).

Parramatta Light Rail will deliver an integrated light rail service that supports the population and employment growth expected throughout GPOP. It will integrate with existing and future modes of transport, including buses, trains, ferries and active transport (pedestrian and cycle networks), as well as Sydney Metro West services and the existing road network.

Parramatta Light Rail will be delivered in stages to keep pace with development:

- Stage 1 will connect Westmead to Carlingford via the Parramatta central business district (CBD) and Camellia. The construction and operation of Parramatta Light Rail Stage 1 was approved by the NSW Minister for Planning in May 2018. Major construction is underway, with the track installation complete and light rail stop construction in progress. Stage 1 is expected to start operating in 2024. Further information on Stage 1 is provided at Parramatta Light Rail
- Transport for NSW is now proposing to construct and operate Stage 2 of Parramatta Light Rail ('the project'). Stage 2 would connect the Parramatta CBD and Stage 1 to Camellia, Rydalmere, Ermington, Melrose Park, Wentworth Point and Sydney Olympic Park.

Figure 1.1 provides an overview of the Parramatta Light Rail network showing both stages.

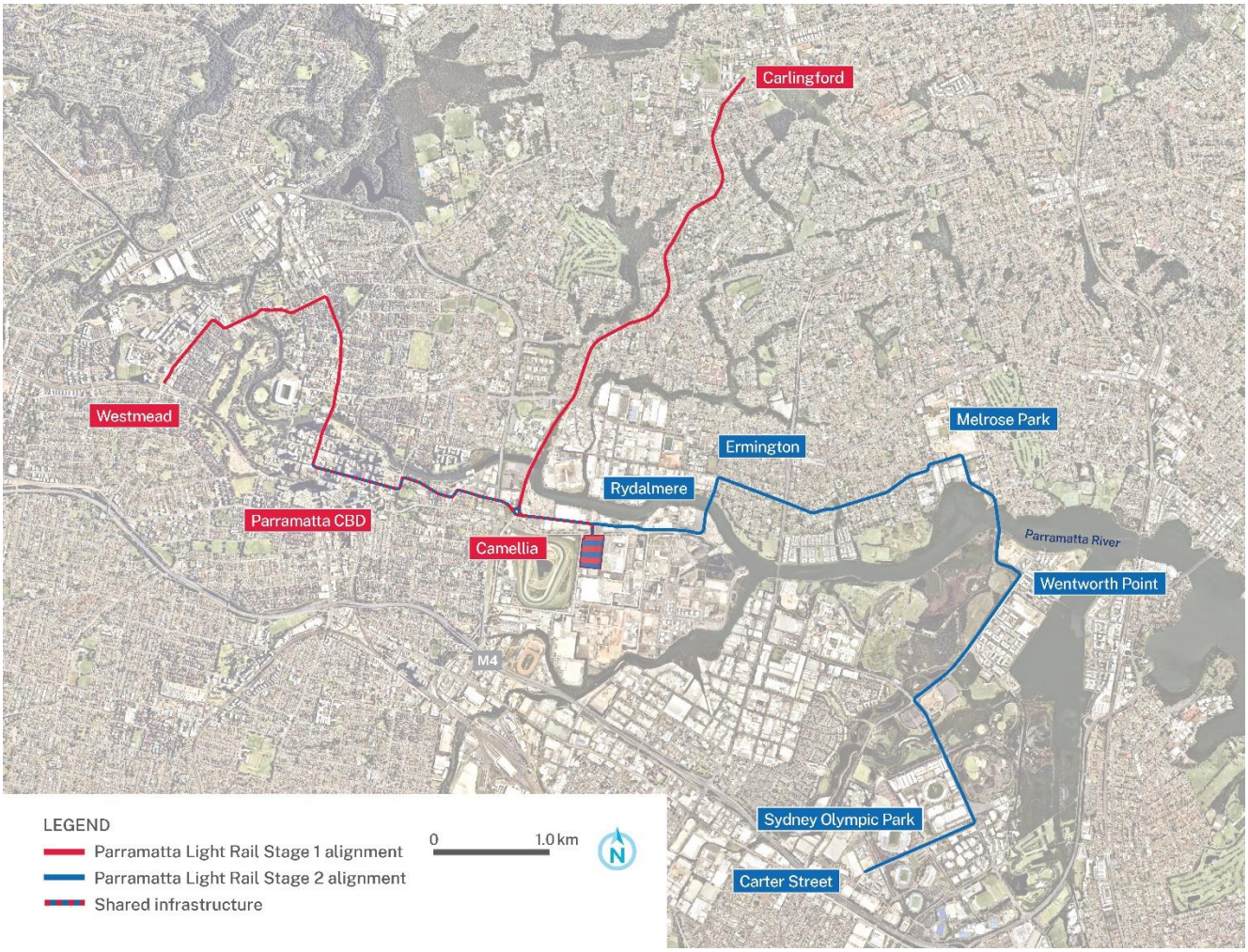


Figure 1.1 Parramatta Light Rail network

1.2 Project overview

The project comprises two main elements:

- construction of about 10 kilometres of light rail infrastructure between Camellia and the Carter Street precinct adjacent to Sydney Olympic Park
- operation of about 13 kilometres of light rail alignment between the Parramatta CBD and the Carter Street precinct, including a section of infrastructure constructed by Parramatta Light Rail Stage 1 between Camellia and the Parramatta CBD.

Further information on the location of the project, and a description of the project site for the purposes of this document, is provided in the environmental impact statement (EIS).

1.2.1 Key features

The key features of the project, which are shown on Figure 1.2, include:

Light rail track and bridges

- new 10 kilometre long dual light rail track, with 14 stops, between the Parramatta Light Rail Stage 1 line in Camellia and the Carter Street precinct adjacent to Sydney Olympic Park
- two bridges over the Parramatta River between Camellia and Rydalmere, and between Melrose Park and Wentworth Point
- a bridge over Silverwater Road between Rydalmere and Ermington

- other bridge works in Ken Newman Park and Sydney Olympic Park.

Active and public transport integration

The project would also deliver:

- about 8.5 kilometres of new active transport links between Camellia and the Carter Street precinct, which would connect with the existing cycling and pedestrian network
- interchanges with other forms of public transport, including trains, ferries, buses and Sydney Metro West, with the main interchanges located in the Parramatta CBD, Rydalmere and Sydney Olympic Park
- a light rail and pedestrian zone (no through vehicle access) within Sydney Olympic Park along Dawn Fraser Avenue between Australia Avenue and Olympic Boulevard
- bus access over the proposed bridge between Melrose Park and Wentworth Point.

Other works

Works proposed to support the project's operation:

- turnback facilities, including along part of Macquarie Street in the Parramatta CBD
- adjustments to the Parramatta Light Rail stabling and maintenance facility at Camellia
- five new traction power substations to convert electricity to a form suitable for use by light rail vehicles
- new and improved open spaces and recreation facilities at Ken Newman Park, the Atkins Road stop and Archer Park.

Further information on the project's features is provided in the EIS (see Chapter 6 (Project description – infrastructure and operation)).

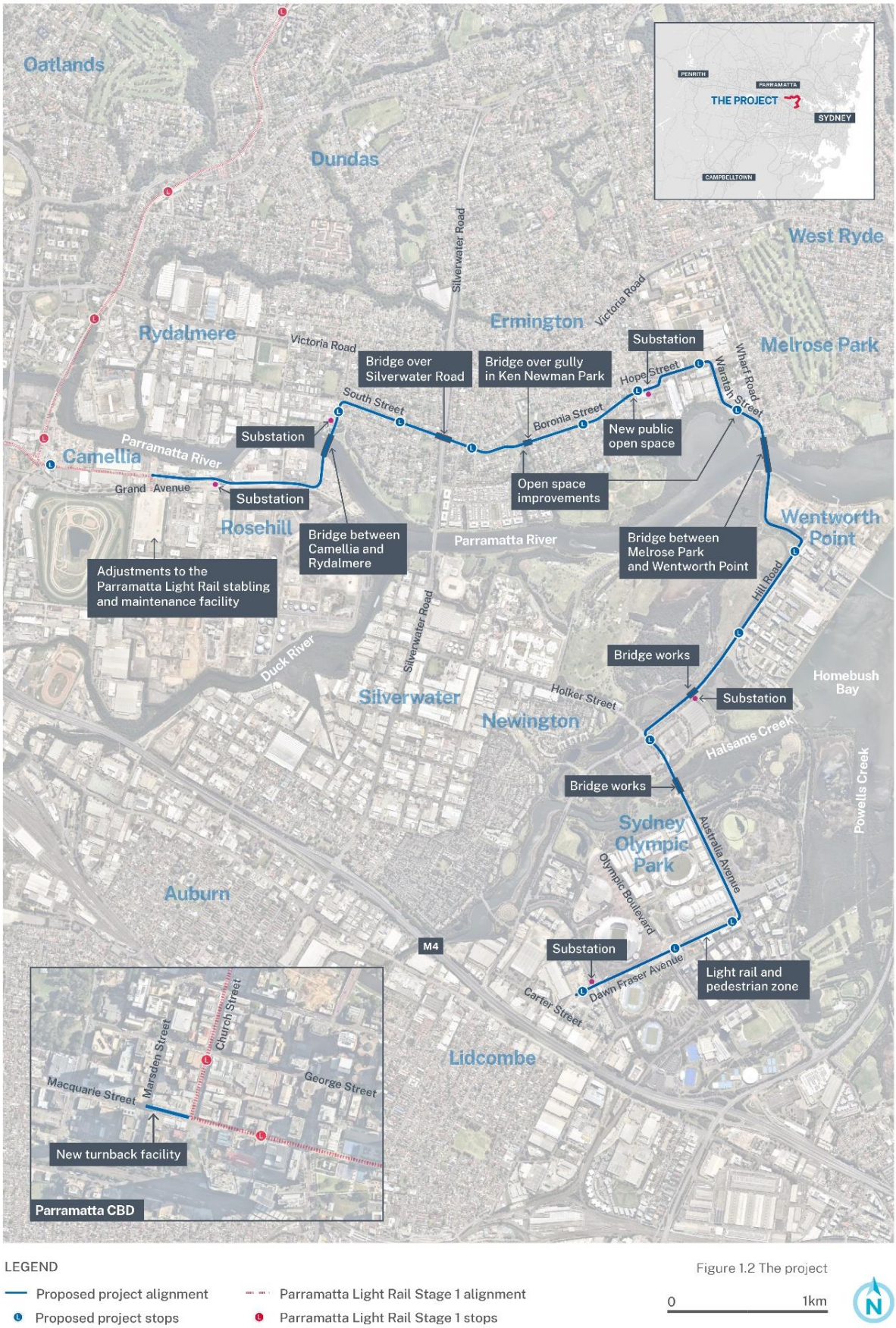


Figure 1.2 Key features of the project

1.2.2 Operation

The project would operate between the Parramatta CBD and the Carter Street precinct, using a section of the Parramatta Light Rail Stage 1 alignment and the alignment constructed as part of the project.

Between the Parramatta CBD and Camellia, the project would operate along about three kilometres of the Parramatta Light Rail Stage 1 alignment. Parramatta Light Rail Stage 2 services would terminate at the Stage 1 Parramatta Square stop to allow customers direct and convenient access to Parramatta's CBD, and interchange with Parramatta Stage 1 light rail services, trains, buses and Sydney Metro West.

From Camellia, the project would operate along the light rail infrastructure proposed as part of Stage 2, terminating at the proposed Carter Street stop.

The project would operate as a turn-up-and-go light rail service from 5am to 1am, seven days a week, in line with Parramatta Light Rail Stage 1. The project would have travel times of around 31 minutes from the Carter Street stop in Lidcombe to the proposed Sandown Boulevard stop in Camellia, and a further seven minutes to the Parramatta Square stop in the Parramatta CBD.

Further information on the project's operation is provided in the EIS (see Chapter 6 (Project description – infrastructure and operation)).

1.2.3 Timing

It is anticipated that construction would start in 2025, subject to obtaining all necessary approvals, and the first passenger services are proposed to start from 2030/2031.

An indicative construction methodology is provided in the EIS (see Chapter 7 (Project description – construction)).

1.2.4 Approval requirements

The project is State significant infrastructure and is subject to approval by the NSW Minister for Planning under Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

The project is also determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) and requires approval from the Australian Minister for the Environment and Water.

1.3 Purpose and scope of this report

This report is a Preliminary Aboriginal Cultural Heritage Assessment Report (Preliminary ACHAR) and has been prepared to assess the potential Aboriginal heritage impacts associated with construction and operation of the project.

A Final ACHAR would be prepared and provide a comprehensive impact assessment, as well as assessment of Aboriginal cultural heritage values informed by consultation with Registered Aboriginal Parties (RAPs) and archaeological test excavation. It is noted Aboriginal cultural heritage values can only be completed following consultation with the Aboriginal community, who are recognised as the determinants of their own heritage.

This report supports an application for approval of the project in accordance with Division 5.2 of the EP&A Act. It addresses the environmental assessment requirements of the Secretary of the Department of Planning and Environment (the SEARs). The report:

- addresses the relevant SEARs listed in Table 1.1
- describes the existing environment with respect to Aboriginal heritage
- provides a preliminary assessment of the impacts of constructing and operating the project on Aboriginal heritage
- recommends measures to mitigate and manage the impacts identified, including the need for any further investigations.

The methodology for the assessment is described in section 1.4.

The guiding documents for this assessment are the *Code of Practice for Archaeological Investigation of Aboriginal objects in NSW* (DECCW, 2010) (The Code), the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW, 2011) and the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Roads and Maritime Services, 2012).

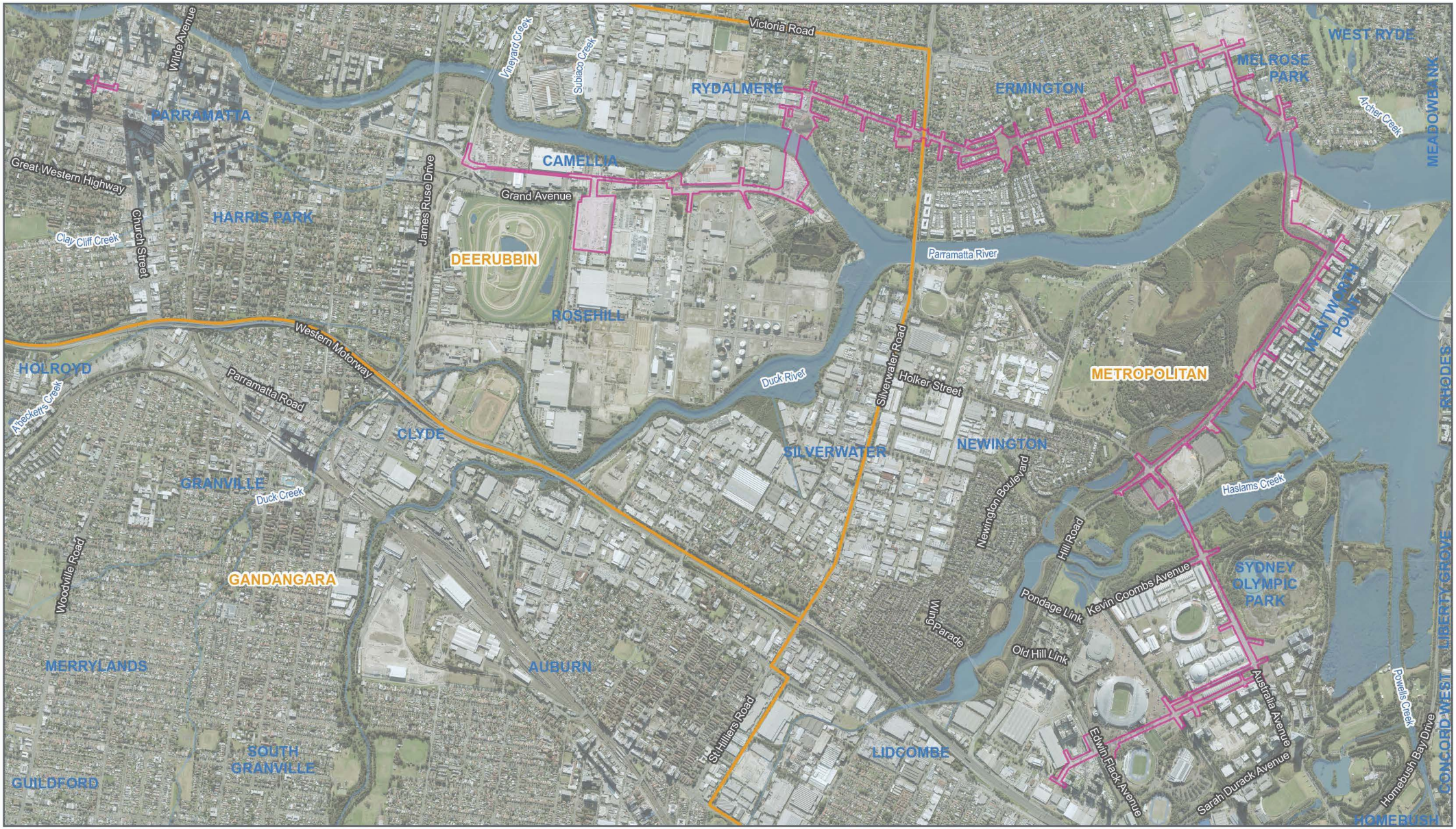
Table 1.1: Secretary's environmental assessment requirements (Aboriginal heritage)

Requirement	Where it is addressed in this report
Direct and/or indirect impacts (including cumulative impacts) to the heritage significance of: a) Aboriginal places, objects and cultural heritage values, as defined under the *National Parks and Wildlife Act 1974* and in accordance with the principles and methods of assessment identified in the current guidelines; and b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan	A summary of the known sites and potential archaeological deposits (PADs) is provided in sections 5.2.3, 7.3.7 and 7.4. A preliminary discussion of cultural heritage values and significance assessment is provided in sections 0 and 8.2. A preliminary discussion of impacts (including cumulative impacts) is provided in sections 9.2 and 9.3. There are no Aboriginal places of heritage significance in the Ryde Local Environmental Plan 2014 or the Parramatta Local Environmental Plan 2011. A comprehensive assessment would be prepared and presented in the Final ACHAR.
Consultation with Aboriginal people must be undertaken and documented in accordance with *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.	Section 3 details Aboriginal community consultation, and a log of consultation activities is provided at Appendix A.
Where Aboriginal cultural heritage values exist, these values must be identified and described in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation.	A preliminary discussion of cultural values is provided in section 8.2 which has been informed by archaeological survey, which is discussed in Section 7. A comprehensive assessment would be prepared to include results of test excavation, cultural values assessment, and a re-evaluation of impacts based on the concept design. The findings would be presented in the Final ACHAR.
Impacts on Aboriginal cultural heritage values must be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts.	A preliminary impact assessment of cultural values is provided in section 9. Recommended mitigation measures are provided in section 11.2.
Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified archaeologist, in accordance with section 1.6 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010).	The Test Excavation Methodology in Appendix C has been prepared and would be overseen by suitably qualified archaeologists (see section 1.5).
Where impacts to Aboriginal objects and/or places are proposed, consultation must be undertaken with Aboriginal people in accordance with the current guidelines.	Section 3 details Aboriginal community consultation, and a log of consultation activities is provided at Appendix A.

1.4 Report methodology

The methodology to prepare the Preliminary ACHAR included the following:

- defining a study area which encompassed route options (plus a 50 metre buffer)
- undertaking background research on the Aboriginal archaeological and historical context of the study area and surrounds, including:
  - reviewing previous studies/investigations
  - searching the NSW Aboriginal Heritage Information Management System (AHIMS) database and State Heritage Inventory (SHI) to identify existing registered sites
- documenting the results of an archaeological survey undertaken in accordance with The Code (see section 7.1 and section 7.2 for more details on the survey methodology)
- undertaking consultation with relevant Government agencies and local Aboriginal stakeholders in accordance with legislative requirement and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a) (see section 3 for more information on the consultation process)
- undertaking a preliminary impact assessment of the direct/indirect (including cumulative impacts) to Aboriginal heritage for the project site (i.e. the area to be disturbed by the construction and operation of the project as shown in Figure 1.3)
- preparing a test excavation methodology in consultation with Aboriginal stakeholders to guide the testing program which is scheduled to commence in around late 2022 (refer Appendix C)
- providing recommendations and mitigation measures to minimise impacts to Aboriginal heritage during the next phases of the project.



Legend

- Project site
- Local Aboriginal Land Council area

Paper Size ISO A4

0 0.5 1

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

rps MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Project site

Project No. **12557728**
Revision No. **2**
Date **17/08/2022**

FIGURE 1.3

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH001_Locality
Print date: 17 Aug 2022 - 11:03

Data source: Study area - GHD2022; Precinct - DPIE2021; Suburb - NSWDFSI2022; Stations, Wharf - TfNSW2018; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 17/08/2022. Created by: lmanasan

1.5 Limitations

1.5.1 Document scope

This report is limited to a high level, preliminary assessment of archaeological potential in the study area and possible impacts to a defined project site (the area where ground disturbing works would be required for construction). The archaeological significance of Aboriginal heritage values is based on identified significance recorded in the NSW Aboriginal Heritage Management System (AHIMS) database, advice and recommendations from Deerubbin and Metropolitan LALC Site Officers and previous studies (refer Appendix E).

A comprehensive significance assessment forms part of the Parramatta Light Rail Stage 2 EIS scope and this assessment would also be presented in the Final ACHAR, incorporating findings of the test excavation program and additional cultural consultation. The Final ACHAR would be prepared in accordance with the *OEH Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW, 2011) following the completion of test excavation and detailed cultural values assessment (through detailed interviews) which are planned for around late 2022. The Final ACHAR would include:

- details and outcomes of Aboriginal stakeholder consultation
- cultural values assessment including findings of cultural interviews
- details and results of archaeological testing
- an assessment of cultural significance for the project site and identification of any specific areas of cultural significance based on consultation with Aboriginal stakeholders
- updated impact assessment based on the outcomes of the above
- a methodology for archaeological management, where impacts cannot be avoided, including any further test excavation and salvage where required as mitigation for the loss of Aboriginal cultural material.

1.5.2 Archaeological survey

An archaeological survey was conducted in consultation with Deerubbin and Metropolitan Local Aboriginal Land Council (LALC) Site Officers and was limited to publicly accessible areas within the study area.

The survey aimed to ground truth areas of potential archaeological sensitivity identified in previous studies and to assess the Aboriginal archaeological heritage potential within the study area. The Parramatta CBD area of the study area was not surveyed, as it had previously been assessed for Parramatta Light Rail Stage 1, as such the information and assessment from the Parramatta Light Rail Aboriginal Cultural Heritage Assessment Report (KNC, 2017) has been relied upon for the Parramatta CBD area.

The survey described in Section 7 does not constitute a comprehensive archaeological survey as, it was considered that a systematic survey of the study area would not contribute much information at this stage due to grass coverage and vegetation being clearly identifiable in all suburbs. As such, a comprehensive archaeological survey was not recommended by the archaeologists, and this approach was supported by the LALC Site Officers.

1.5.3 Project information

The information contained in this report is based on information provided by Transport for NSW, as well as information obtained through the course of this assessment via site visits and previous field work.

1.6 Authorship and acknowledgements

Heritage Consultant Dr. Bengi Selvi-Lamb (PhD in Archaeology) prepared this report with assistance from Senior Heritage Consultant Sarah van der Linde (MA in Cultural Heritage) and Senior Heritage Consultant Dr. Gary Marriner (PhD in Archaeology). Heritage Manager Susan Kennedy (BA in Anthropology/Archaeology, MA in Maritime Archaeology, Bachelor of Laws) has reviewed this report.

The author would like to acknowledge the assistance of Felicity Barry (Senior Heritage Specialist, Transport for NSW) for her contributions to this report.

2 LEGISLATIVE CONTEXT

Aboriginal cultural heritage in NSW is protected by the *National Parks and Wildlife Act 1974* which is overseen by Heritage NSW. Aboriginal cultural heritage includes tangible and intangible cultural heritage values. Aboriginal cultural heritage may also be protected through listings under the *Heritage Act 1977*, also overseen by Heritage NSW. The *Environmental Planning and Assessment Act 1979* (EP&A Act) and other environmental planning instruments trigger the requirement for the investigation and assessment of Aboriginal cultural heritage as part of the development approval process. The EP&A Act includes the sustainable management of built and cultural heritage (including Aboriginal heritage) as one of its objectives.

2.1 National Parks & Wildlife Act 1974

2.1.1 Harm to Aboriginal objects and places

The NSW *National Parks and Wildlife Act 1974* (NPW Act) is the principal act providing protection for Aboriginal cultural heritage in NSW. The objectives of the Act includes the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including but not limited to (i) places, objects and features of significance to Aboriginal people...".

The NPW Act provides protection for Aboriginal objects irrespective of their significance (archaeological or cultural heritage significance) or land tenure. It also protects Aboriginal Places, which can include intangible cultural heritage values as well as Aboriginal objects. However, Aboriginal Places must be assessed and gazetted under the Act and are linked to a specific location. Section 86 of the NPW Act states:

- *"A person must not harm or desecrate an object that the person knows is an Aboriginal object*
- *A person must not harm an Aboriginal object*
- *A person must not harm or desecrate an Aboriginal place."*

Under the NPW Act, it is an offence to harm an Aboriginal object or place. Harm under the NPW Act is defined as any act that: destroys defaces or damages the object; moves the object from the land on which it has been situated; causes or permits the object to be harmed. However, it is a defence from prosecution if the proponent can demonstrate 1) that harm was authorised under Section 90 of the NPW Act, or 2) that the proponent exercised due diligence in respect to Aboriginal cultural heritage. The due diligence defence states that if a person or company has exercised due diligence, liability from prosecution under the NPW Act will be removed or mitigated if it later transpires that an Aboriginal object was harmed. If an Aboriginal object is identified during the proposed activity, all activity within that area must cease and Heritage NSW notified (DECCW, 2010c, p.13). The due diligence defence does not authorise continuing harm.

2.1.2 Notification of Aboriginal objects

Under Section 89A of the NPW Act, the proponent must report all Aboriginal objects and places to the Secretary of Department of Premier and Cabinet of Heritage NSW within a reasonable time, unless already recorded on the Aboriginal Heritage Information Management System (AHIMS).

2.2 National Parks & Wildlife Regulation 2019

The National Parks & Wildlife Regulation 2019 (NPW Regulation) provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage. The NPW Regulation 2019 outlines the recognised due diligence codes of practice, procedures for Aboriginal Heritage Impact Permit (AHIP) applications, and Aboriginal cultural heritage consultation requirements amongst other regulatory processes.

2.2.1 Investigating and assessing Aboriginal cultural heritage

There are a number of procedural guidelines supporting archaeological practice in NSW. The publications relevant to the investigation and assessment of Aboriginal cultural heritage include:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011)
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a)
- *Code of Practice For Archaeological Investigation of Aboriginal Objects in NSW* (The Code) (DECCW, 2010b).

The *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a) codifies a process for consultation with Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal cultural heritage. The requirements are consistent with the NPW Regulation and seek to conserve Aboriginal objects and places of significance to Aboriginal people. Consultation is therefore a fundamental part of the Aboriginal cultural heritage assessment process.

2.3 Heritage Act 1977

The NSW *Heritage Act 1977* provides protection for environmental heritage including historic places, structures, relics, moveable objects and landscapes of significance. The *Heritage Act 1977* also affords protection to Aboriginal cultural heritage and Aboriginal archaeology of State heritage significance through listings on the State Heritage Register (SHR) or being the subject of an Interim Heritage Order (IHO).

No Aboriginal places included on the SHR or subject to an IHO are located within the project site. It is noted that the Newington Armament Depot and Nature Reserve (SHR No. 01850) includes discussion of Aboriginal archaeology within the *Conservation Management Plan* (Tanner Architects, 2013). However, it is not proposed to undertake works within the curtilage of SHR No. 01850. Additionally, Robin Thomas Reserve is listed for Aboriginal cultural heritage values, archaeology (Aboriginal and historical) and a Pleistocene sand body which extends through the Parramatta CBD, as *Ancient Aboriginal and Early Colonial Landscape* (SHR No. 01863) which is 700 metres west of the study area but would not be impacted by Stage 2 works.

2.4 Aboriginal Land Rights Act 1983

The purpose of this legislation is to provide land rights for Aboriginal people within NSW and to establish Local Aboriginal Land Councils (LALCs). The land able to be claimed by LALCs on behalf of Aboriginal people is certain Crown land that (under Section 36):

a. Is able to be lawfully sold, leased, reserved or dedicated.

b. Is not lawfully used or occupied.

c. Will not, or not likely, in the opinion of the Crown Lands minister, be needed for residential purposes.

d. Will not, or not likely, be needed for public purposes.

e. Does not comprise land under determination by a claim for Native Title.

f. Is not the subject of an approved determination under Native Title.

Claims for land are through application to the Office of the Registrar, *Aboriginal Land Rights Act 1983*. The project site is within the boundaries of the Deerubbin and Metropolitan LALCs and is not subject to any Aboriginal land claims.

2.5 Native Title Act 1993

The Commonwealth *Native Title Act 1993* establishes a structure for the protection and recognition of native title where:

- Aboriginal people have a native title interest to maintain traditional customs and laws
- Aboriginal people have sustained connection with the land or waters in question
- the native title rights and interests are recognised by the common law of Australia.

The *Native Title Act 1993* establishes processes to determine where native title exists, how activities affecting upon native title may be carried out, and to provide compensation where native title is impaired or extinguished. The *Native Title Act 1993* provides Aboriginal people who hold native title rights and interests, or who have made a native title claim, the right to be consulted and in some cases, to participate in decisions about activities proposed to be undertaken on the land.

A search of the Native Title Register was undertaken on 31 May 2022 There are no Native Title claims within the study area.

2.6 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* can protect areas and objects that are of particular significance to Aboriginal and Torres Strait Islander people. The Act allows the Environment Minister, on the application of an Aboriginal or Torres Strait Islander person or group of persons, to make a declaration to protect an area, object or class of objects from a threat of injury or desecration.

No places declared under the Act are within the study area.

3 ABORIGINAL COMMUNITY CONSULTATION

3.1 Early engagement

Transport for NSW has developed the PACHCI to provide a consistent means of effective consultation with Aboriginal communities about activities which may impact on Aboriginal cultural heritage and to ensure a consistent assessment process for activities across NSW. The PACHCI aligns with NSW regulatory processes for Aboriginal community consultation as required by clause 60 of the National Parks and Wildlife Regulation 2019.

During earlier planning stages of the project, representatives from Transport for NSW met with Deerubbin LALC on 7 December 2018 to introduce the project including route options being considered.

Representatives from the Metropolitan LALC and the Deerubbin LALC then participated in the archaeological survey conducted on 24 January and 4 February 2022 respectively, in accordance with PACHCI. The Site Officers provided input on cultural significance and identified the potential for impacts on Aboriginal heritage.

3.2 Aboriginal cultural heritage consultation requirements

The aim of consultation is to integrate cultural and archaeological knowledge and provide registered stakeholders with information to make decisions on Aboriginal cultural heritage. For the preparation of this ACHAR, consultation with Aboriginal stakeholders has been undertaken in accordance with the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (OEH, 2010b) ('Consultation Requirements') and the requirements of clause 60 of the *National Parks and Wildlife Regulation 2019.*

The Consultation Requirements outline a four stage Aboriginal consultation process and mandate specific timeframes for each stage, which and are discussed in the following sections. Consultation documentation for each stage undertaken for the project is included in Appendix A.

3.2.1 Stage 1 Notification and registration

Stage 1 requires that Aboriginal people who hold cultural information are identified, notified and invited to register an expression of interest in the assessment. This identification process should draw on reasonable sources of information including: the relevant Heritage NSW Environment Protection and Regulation Group regional office, the relevant LALC(s), the Register of Aboriginal Owners, the Native Title Tribunal, Native Title Services Corporation, local council(s) and the relevant Local Land Services, as well as placing an advertisement in a local newspaper circulating in the general location of the activity. Aboriginal organisations and/or individuals identified should be notified of the activity and invited to register an expression of interest for Aboriginal consultation.

The notification and registration process for the project included the following:

- letters requesting the details of any Aboriginal people that may hold cultural knowledge relevant to the study area were sent to the following organisations on 10 September 2021 (in accordance with step 4.1.2 of the Consultation Requirements):
  - City of Parramatta Council
  - City of Ryde Council
  - Local Land Services - Greater Sydney
  - Deerubbin LALC
  - Metropolitan LALC
  - NTScorp
  - Heritage NSW
  - Office of the Registrar (under the *Aboriginal Land Rights Act 1983*)
- a notice was placed in Auburn Review, Koori Mail and Parramatta News on 11 October 2021 (in accordance with step 4.1.3)

- an online search of the National Native Title Tribunal was undertaken on 20 September 2021, returning no native title claims in the study area
- Aboriginal people or organisations identified at step 4.1.2 were then provided with a letter on 28-29 October 2021 inviting them to register for the project.

At the completion of stage 1, a total of 29 individuals representing 27 groups registered their interest (see Table 3.1).

Table 3.1: RAPs who registered interest for Parramatta Light Rail Stage 2

Organisatiyon	Representative
A1 Indigenous Services	Carolyn Hickey
Aragung Aboriginal Cultural Heritage Site Assessments	Jamie Eastwood
Barraby Cultural Services	Lee Field
Butucarbin Aboriginal Corporation	Jennifer Beale & Lowanna Gibson
Clive Freeman	Clive Freeman
Darug Custodian Aboriginal Corporation	Justine Coplin
Didge Ngunawal Clan	Lillie Carroll & Paul Boyd
Gilay Consultants	Carolyn Slater
Ginninderra Aboriginal Corporation	Krystle Carroll-Elliott
Goobah Developments	Basil Smith
Kamilaroi Yankuntjatjara Working Group	Phil Khan
Merrigarn	Shaun Carroll
Muragadi Heritage Indigenous Corporation	Jesse Johnson
Murra Bidgee Mullangari Aboriginal Corporation	Ryan Johnson
Tocomwall	Danny Franks
Waawaar Awaa Aboriginal Corporation	Rodney Gunther
Wailwan Aboriginal Group	Philip Boney
Warragil Cultural Services	Aaron Slater
Widescope Indigenous Group	Steven Hickey
Wori Wooilywa	Daniel Chalker
Wurrumay Pty Ltd	Vicky Slater
Yulay Cultural Services	Arika Jalomaki
Yurrandaali Cultural Services	Bo Field
Amanda Hickey Cultural Services	Amanda De Zwart
Koori Digs	Korri Currell
Details withheld	Name withheld
Details withheld	Name withheld

3.2.2 Stage 2 Presentation of information about the project

The aim of stage 2 is to provide the registered Aboriginal parties (RAPs), identified during stage 1, information about the scope of the project and the proposed heritage assessment process.

In accordance with step 4.1.6 of the Consultation Requirements, a list of registered Aboriginal stakeholders and a copy of the published step 4.1.3 advertisement were forwarded to Heritage NSW, Deerubbin LALC and Metropolitan LALC (except for two RAPs who requested their details be withheld in accordance with step 4.1.5 of the Consultation Requirements).

The RAPs were invited to participate in an Aboriginal Focus Group (AFG) meeting held on 22 July 2022 and were presented with an overview of the proposed test excavation methodology (now updated with feedback and included in Appendix C), Archaeological Survey Report (ASR) (Appendix D), and cultural assessment methodology. Comments were sought on any areas of cultural significance during this AFG. A site visit was conducted on 8 August 2022 in consultation with RAPs to give an opportunity to visit the study area and to identify cultural heritage values (refer to Table 3.2).

Table 3.2 August site visit attendee list

Organisation/Individual	Attendee name
Murra Bidgee Mullangari Aboriginal Corporation	Ryan Johnson
Muragadi Heritage Indigenous Corporation	Aaron Taylor
Darug Custodian Aboriginal Corporation	Dominic Wilkins
Wailwan Aboriginal Group	Philip Boney
Widescope Indigenous Group	Steven Hickey
Butucarbin Heritage	Teagan Pittman
Kamilaroi Yankuntjatjara Working Group	Kadibulla Khan

3.2.3 Stage 3 Gathering information about cultural significance

Stage 3 provides the opportunity for RAPs to recommend culturally appropriate research methodologies for the cultural heritage assessment. At this stage RAPs are invited to provide input to determine the cultural significance of Aboriginal objects and/or places within the study area. In turn they are also given the opportunity to have an input into the development of any cultural heritage management options.

In addition to the Aboriginal archaeological process there would be additional consultation with RAPs and other Aboriginal stakeholders regarding the cultural design principles and interpretation aspects of the project. These activities would be undertaken concurrently to feed into the design development process and would be informed by the outcomes of the Aboriginal archaeological process. Cultural design principles and interpretation activities may include:

- heritage interpretation
- Aboriginal participation in design elements including stations, landscape and public spaces
- Aboriginal participation in focus group and other participatory processes (such as interviews for the cultural values assessment which is planned for around late 2022 and would be presented in the Final ACHAR).

Outcomes may include the design of light rail stop elements including Aboriginal heritage interpretation aspects, as a result of consultation with Aboriginal knowledge holders and other Aboriginal stakeholders. In this regard, Bangawarra is preparing Designing with Country elements of project design separately in consultation with Aboriginal knowledge holders.

3.2.4 Stage 4 RAP review of draft ACHAR

A copy of the draft Test Excavation Methodology (now updated and included in Appendix C) and ASR (refer Appendix D) were provided to all RAPs to review between 8 July 2022 and 12 August 2022. RAPs were provided the minimum 28 days to review the documents and make comments, request revisions or provide additions that would be incorporated into this Preliminary ACHAR or the Test Excavation Methodology. Comments on the cultural significance of the study area that were received have been included in section 8.3.2 of this report.

The final stage of the Consultation Requirements requires all registered Aboriginal stakeholders to be provided with a copy of the draft Final ACHAR for a minimum 28 days to review and provide feedback. Further cultural information may be gathered at this stage and all comments received are then incorporated into the final report. Ongoing consultation with the local Aboriginal community must continue throughout the life of the project.

For this project, the Preliminary ACHAR will be publicly exhibited as part of the EIS (minimum 28 days), allowing RAPs to provide feedback. In parallel, test excavations would be undertaken after which the Preliminary ACHAR would be updated and provided for RAPs to review (minimum 28 days). The cultural values assessment, also to be undertaken around the same as the test excavations (and informed by cultural interviews), would also inform the Final ACHAR in terms of providing an understanding of the project impacts and responses to any identified cultural values. The ACHAR would then be finalised and issued to the Department of Planning and Environment with the project's response to submissions report following completion of the public exhibition of the EIS.

4 ENVIRONMENTAL CONTEXT

Natural resources available to Aboriginal people and their utilisation are critical in the study area in terms of environmental context to reflect daily life.

This chapter discusses the study area and wider region as necessary, to build an understanding of the subject landscape and patterns of land use. Site types are, to varying degrees, influenced by the local environment. For example, rock shelter and rock art sites are likely to occur where the necessary geology exists. Another important influence on site distribution is the location of current and former watercourses and the availability of water throughout the year. Over the thousands of years that humans have occupied Australia considerable environmental changes have occurred, impacting on how and where Aboriginal peoples lived.

Reconstructions of Aboriginal land use patterns in the Sydney region have been undertaken predominately based on early historical accounts and reconstructions of language groups. Ethno-historical accounts are inevitably subject to the writer's colonial bias; however, they do provide valuable observations of Aboriginal customs, life and continued presence during the early period of European occupation. In discussing the ethno-history of the local area, efforts have been made to adopt commonly accepted spellings. Research regarding language groups of eastern Australia is also subject to limitations, as Aboriginal populations of the Sydney basin were the first to be decimated by the disease and violence which followed European invasion. As such, even the earliest historical records and language research in the Sydney basin is based on observations of significantly reduced and displaced Aboriginal populations. The spread of smallpox, ongoing conflict with the European colonists and reduction of available resources are key causes of Aboriginal dislocation and depopulation in the area. By 1816 Aboriginal people who remained in the region were increasingly dependent on the Europeans for food, clothing and shelter (Kohen, 1986).

A discussion of European land use provides an understanding of the modifications and disturbances to Aboriginal cultural landscapes and potential archaeological deposits which have occurred since European occupation.

The existing archaeological record is limited to certain materials and objects that were able to withstand degradation and decay and is also affected by how often a site/s were visited. As a result, the most common type of Aboriginal objects remaining in the archaeological record of the Sydney region are stone artefacts. Artefact scatters are common indicators of activity in the landscape and may comprise evidence of previous campsites (which may have high densities of artefacts) or knapping events (where a stone material will be shaped into a stone tool) or hunting activities (which may have low densities of artefacts).

4.1 Geology

The underlying geology of a landscape may provide an indication of the variety and location of Aboriginal site types which may be present within that area. For example, rock shelters may be present in geological formations with rocky outcrops, grinding grooves may be present in sandstone formations and proximity to stone tool making resources (such as a silcrete) may indicate the potential for Aboriginal sites associated with raw material quarrying and tool preparation.

The geological context of the study area is shown on Figure 4.1. In some areas the man- made fill is overlying deeper natural geological formations. Man-made fill includes 'dredged estuarine sand and mud, demolition rubble, industrial and household waste' (Herbert, 1983). The western portion of Grand Avenue and portions of the study area to the north of Parramatta River are located across quaternary deposits consisting of 'silty to peaty quartz sand, silt, and clay, ferruginous and humic cementation in places, common shell layers' (Qha) (Herbert, 1983). Man-made fill overlies a tertiary deposit of sand, clay and peat with variable levels of iron (Tm) in the eastern portion of Grand Avenue, towards Thackeray Street, Camellia.

The portion of the study area located to the north of Parramatta River consists of the Triassic aged Wianamatta Group Ashfield Shale (Rwa) which is a dark grey to black claystone-siltstone and fine sandstone-siltstone laminate (Clark and Jones, 1991). This geological formation would have provided few suitable raw stone materials for the manufacture of stone artefacts. Resources would therefore more likely have been procured from elsewhere. The Triassic Hawkesbury Sandstone geological formation also occurs within the study area, consisting of medium to coarse grained quartz sandstone with minor shale and laminate lenses. The presence of sandstone in the surrounding areas would have been an important factor for Aboriginal occupation as sandstone was used for the maintenance and manufacture of stone artefacts such as axes, as a form of shelter (if rock shelters were present), and as a medium for rock art, including engraved and pigment art. Furthermore, stone raw materials that enable conchoidal fracture played an important role in manufacturing stone artefacts.

Silcrete and quartz are predominant raw materials in Sydney's stone tool assemblages and are readily available in the Cumberland Plain and around the study area. Quartz is widely available around the project site, on the sandstone plateau situated on the Cumberland Basin in Tertiary and Quaternary deposits near the Hawkesbury/Nepean River system (Corkill, 1999). Silcrete occurs in paleochannel deposits near to the coast in Newington and the former Olympic Village near the Parramatta River, along with the western part of the Cumberland Basin, Maroota on the Hornsby Plateau and Holsworthy Army Reserve on the Woronora Plateau in the south of Sydney (Corkill, 1999).

The eastern portion of the study area includes Quaternary fluvial deposits (Qha) associated the Parramatta River estuary, that consist of silty to peaty quartz sand, silt and clay overlain by man-made fill, as well as sections of only man-made fill in the southern section (Herbert, 1983). Hawksbury Sandstone, (Rh), located in the Rydalmere area north of the Parramatta River, also consists of organic mud, peat, clay, silt, marine sand and fluvial sand.

Resource distribution and availability is heavily influenced by the type and nature of soils present within a landscape, as different soils support a range of vegetation cover. Information regarding the depth of soils also contributes to an understanding of levels of historical disturbance. Where deep soil profiles or sand bodies exist, intact archaeological deposits may remain even where substantial earthworks and modification have impacted the upper deposits. As such, it is important to note that superficial disturbance, infill and urban development does not automatically negate archaeological heritage values.

4.2 Soil landscapes

Five soil landscapes are located across the study area, not including the 'disturbed terrain' classification (Chapman et al., 2009; Chapman and Murphy, 1989). The soil landscapes are shown in Figure 4.2.

Disturbed terrain is located across level plains to hummocky landscapes, and exhibits land extensively disturbed by human activity including complete disturbance, removal or burial of soil. Local relief is less than 10 metres, and slopes at less than 30 per cent. Landfill includes soil, rock, building, and waste materials. The original vegetation of disturbed terrain areas has been completely cleared and replaced with turf or grassland. Turfed fill areas are commonly capped with up to 40 centimetres of sandy loam or up to 60 centimetres of compacted clay over fill or waste materials. Disturbed terrain is located in areas that were previously swamps, estuaries and wetlands, and was noted along lower reaches of the Parramatta River foreshores. Land uses for areas classified as disturbed terrain includes commercial and business complexes, such as the Camellia portion of the study area. Soils within areas of disturbed terrain have been disturbed to a depth of at least 100 centimetres (Chapman et al., 2009; Chapman and Murphy, 1989).

The Lucas Heights soil landscape is located across the northern embankment of the Parramatta River, as well as Hope Street, Waratah Street and the eastern portion of Boronia Street. The soil landscape consists of gently undulating crests and ridges on plateau surfaces of the Mittagong formation. Local relief is up to 30 metres, and slopes at less than 10 per cent. Rock outcropping is absent. Soils are moderately deep (50 – 150 centimetres), hard setting yellow podzolic and yellow soloths, with yellow earths on outer edges (Chapman et al., 2009; Chapman and Murphy 1989). The upper topsoil (Horizon A1) consists of up to 30 centimetres yellowish brown sandy loam, overlying 10-30 centimetres of bleached sandy clay loam as lower topsoil (Horizon A2). B Horizon is up to one metre of yellowish-brown clay. These soil layers are usually clear and erosion is low.

The Blacktown soil landscape is located across most of Sydney Olympic Park, as well as part of the north-west corner of the study area where John Street and South Street intersect. The Blacktown soil landscape consists of gently undulating rises on Wianamatta Group shales and Hawkesbury shale. Local relief to 30 metres, slopes are usually less than five per cent. Broad rounded crests and ridges with gently inclined slopes. The Blacktown soil is shallow to moderately deep (less than 100 centimetres) red and brown podzolic soils on crests, upper slopes and well drained areas; deep (150-300 centimetres) yellow podzolic and soils and soloths on lower slopes and in areas of poor drainage (Chapman et al., 2009; Chapman and Murphy 1989).

The Quaternary fluvial deposits are associated with a terrace formation known as the Parramatta Sand Body (Kelleher Nightingale Consulting (KNC), 2017). The river terrace extends from the relatively narrow floodplain along the banks of the river to the base of the adjoining shale slopes and is wider on the southern side of the river channel. The sand body is mapped based on the predictive model and auger holes investigating the extent of this alluvial terrace (Williams et al., 2021; Groundtruth Consulting, 2008; 2011) The extent of the Parramatta Sand Body is well documented beneath much of modern Parramatta which includes the Parramatta turnback facility section of the project site. However, it has not been identified in the disturbed terrain at Camellia or the reminder of the study area. A portion of the sand body is listed on the NSW State Heritage Register (SHR No. 01863) and contains significant Aboriginal archaeology.

The alluvial sand body was first identified in 2003, during salvage excavations for a residential development at the corner of George and Charles Street in the Parramatta CBD. The AHIMS site 5-6-2648 (CG1) uncovered approximately one metre deep archaeological layer which contained the sand body (Jo McDonald, 2005) Geomorphological investigations identified the alluvial nature of this sand body and its characteristics which was divided into two main periods of use:

1. a lower assemblage (between 20-–80 centimetres from the ground surface) broadly considered to be of terminal Pleistocene age (approximately 10,000 to 20,000 years old)
2. and an upper assemblage (less than 20 centimetres from the ground surface) identified to be dated to the last 3,000 years (GroundTruth Consulting, 2008; 2011; Williams et al., 2021).

The Parramatta Sand Body has a well-developed but varied soil profile. Topsoil materials are generally disturbed by European activities. Where the subsoils are intact, they typically consist of yellow orange or yellow brown sandy clay with an earthy (porous) fabric that becomes paler and slightly mottled with depth. The upper parts of the soil profile are usually heavily mixed. In places the sand is cut by deposits of mottled or gleyed clay that were probably deposited in swamps or waterholes on the terrace surface. The reasonably defined levee, 50 to 100 centimetres high, along the terrace edge between Charles and Alfred streets, comprises cleaner and very slightly coarser sand than the sand found around the margins of the levee.

The profile of the sand suggests that the main body of sand is of late Pleistocene age and recent thermoluminescence dates obtained from an excavation undertaken at 140 Macquarie Street (Comber Consultants, 2010), have shown that the top of the undisturbed sand (below the level of Aboriginal occupation) is between 50,000 to 58,000 years old. Deeper sand could be much older and may relate to a period of a higher sea level about 120,000 years ago.

Recent excavations at George Street, Parramatta presented dates between 43,000 to 49,000 years old, however disturbance of a ceramic artefact in lower depths and bioturbation in upper levels raised questions about the intactness of the soil profiles (GML Heritage, 2019; Williams et al., 2021). Furthermore, excavations in Cumberland Hospital in north Parramatta uncovered similar Optically Stimulated Luminescence dates approximately 50,800 (± 3,600) years old.

The deepest sections of the Parramatta Sand Body found on the banks of the Parramatta River via these limited excavations has the potential to contain the complete stratigraphy of human occupation of the region (Williams et al., 2021). Indurated mudstone/tuff/chert stone artefacts in low densities (generally below 10 artefacts per square metre) were evaluated to reflect such deep-time occupation which were indicative of ephemeral or transient occupation. This earlier deposit becomes shallower with increasing distance from the river however, all sections of the Parramatta Sand Body contain extensive evidence from the mid-Holocene (7,000 to 5,000 years ago).

Two major phases of past use were identified by Williams et al. (2021):

1. initial and repeated visitation in the terminal Pleistocene and early Holocene, characterised by an indurated mudstone/tuff/chert artefacts, dominated assemblage of relatively expedient technologies
2. a more intense occupation of the river corridor in the mid-late Holocene, and characterised by a silcrete dominated assemblage with a variety of tool types and increasingly complex technologies (e.g. backed artefacts, heat treatment, ground axes).

Much of the original sand body is likely to have been destroyed by the construction of modern buildings, but patches of the sand body are preserved beneath modern development and on vacant land. The level of disturbance (and hence Aboriginal archaeological potential) is closely related to the nature of excavation works associated with modern development – in many cases deep excavation and the introduction of fill for foundations and basements has severely impacted the sand body. In other cases, where fill material has been placed on the existing surface, the sand body (and any associated archaeology) may be preserved intact beneath the modern urban landscape. The sand deposit is approximately 69 hectares in size, mainly four to seven metres above the Parramatta River's surface area and extending around 2.5 kilometres along the river's southern edge between Parramatta Park and Clay Cliff Creek and extends approximately up to 300 metres to inland (Figure 4.2) (Williams et al., 2021). It is documented that nearly 19 hectares of the deposit has been destroyed through urbanisation mainly in the eastern part of the Parramatta CBD. However, depending on location, the thickness of the deposit can extend up to three metres before reaching underlying geological layers, which were recorded in excavations at 140 Macquarie Street and the adjacent Cumberland Press site. The data from excavations at 2-8 River Road and 95-95A Marsden Street, both found the edge of the alluvial terrace as hypothesised by the desktop data, and proved the accuracy of the mapping.

The Glenorie soil landscape is located across most of South and Boronia Streets within the study area which is an erosional soil landscape and consists of undulating to rolling low hills on Wianamatta Group Shales. Local relief is 50-80 metres, slopes 5 – 20 per cent and includes narrow ridges, hillcrests and valleys. Glenorie soils are shallow to moderately deep (less than 100 centimetres) red podzolic soils on crests, moderately deep (70 – 150 centimetres) red and brown podzolic soils on upper slopes, deep (greater than 200 centimetres) yellow podzolic soils and greyed podzolic soils along drainage lines (Chapman et al., 2009; Chapman and Murphy, 1989). The topsoil (Horizon A1) usually consists of up to 15 centimetres of dark brown loam overlying up to 30 centimetres of brown clay loam as lower topsoil (Horizon A2). B Horizon occurs as reddish-brown clay approximately one metre thick.

The Birrong soil landscape is located across the Sydney Olympic Park Wharf and Hill Road section of the study area and consists of level to gently undulating alluvial floodplain draining Wianamatta Group shales (Chapman et al. 2009; Chapman and Murphy, 1989.) The local relief is up to five metres, slopes are less than three per cent and includes broad valley flats. Soils are deep (greater than 250 centimetres) yellow podzolic soils and yellow solodic soils (indicates a contrast between the texture of the A and B horizons, mostly that the A horizons are acidic and the B horizons are alkaline) on older alluvial terraces, deep (greater than 250 centimetres) solodic soils and yellow solonetz on current floodplain.

The Ettalong soil landscape covers a small portion of the study area to the north of Sydney Olympic Park and consists of level to very gently undulating coastal swamps (Chapman et al., 2009; Chapman and Murphy, 1989). Local relief is less than 5 metres, slopes less than two per cent. The water table is at less than 100 centimetres below ground surface. Areas have hummocky surfaces, shallow lakes and very shallow water tables. Soils are deep (less than 150 centimetres) organic acid peats, peaty podzols, and humus podzols often overlying buried siliceous sands. Soil landscapes and landforms can be indicators of favourable occupation sites. Previous archaeological studies in the region concluded that the Parramatta Sand Body and other alluvial soil landscapes are rich in archaeological deposits.

4.3 Topography and hydrology

The study area is situated on flat to undulating lowlands of the Cumberland Plain generally less than 80 metres in elevation (Attenbrow, 2010). Distance from water is an important factor affecting Aboriginal occupation patterns and therefore site distribution. Availability of fresh drinking water is likely to have had an influence on the selection of areas Aboriginal peoples inhabited, either as a transitory visit or a prolonged (or repeated) campsite area. Saltwater sources may have offered a variety of edible fish, shellfish and other marine life, and within NSW shell middens have been recorded on headlands, beaches, estuaries, and along the banks or inland rivers, creeks and lakes (OEH, 2013). Intensive development and urbanisation of the Western Sydney region has had a considerable impact on the historical alignments of water courses and ephemeral drainage lines. The Parramatta River's riverine landscape was modified as early as 1791 (Hoskins, 2015). Prior to European colonisation, the river was a shared food source, a way for transport and a territorial boundary for the Aboriginal people. These changes in the river landscape reshaped the ecology around the river and affected the natural resources which Aboriginal people can obtain.

White and McDonald (2010, p. 22) considered Aboriginal land use and distance from water in relation to the stream order (stream order assigns a numeric order to links in a stream network, based on their number of tributaries). The stream order model relates the spatial distribution of Aboriginal sites and their distance from water. The model found the following:

> *In first order landscapes, there is no significant difference in artefact distribution with distance from water. In second order landscapes, artefact density is highest within 50 metres of water and decreases with increasing distance from water. In fourth order landscapes, artefact density is highest 51-100 metres from water, lower closer to water and declines with increasing distance more than 100 metres from water.*

The study area crosses the Parramatta River between Camellia and Rydalmere and between Melrose Park and Wentworth Point. The Parramatta River is a mangrove lined, tidal drowned valley estuary and provides both salt and freshwater resources. The river is a Strahler stream order 3 + (CT environmental, 2016, p. 11). The Parramatta River originates at Toongabbie Creek and flows eastward, fed by numerous creeks from the north and south eventually becoming Port Jackson. Creeks in the area include Ponds Creek, Subiaco Creek, Clay Cliff Creek and Vineyard Creek. Haslams Creek (formerly Hackings Creek), a southern tributary of Parramatta River, flows through the study area at Sydney Olympic Park (refer to Figure 4.3). Haslams Creek joins the Parramatta River at Homebush Bay. Prior to the 2000 Sydney Olympic Games, Haslams Creek consisted of a

concrete-lined stormwater channel. The creek was reconstructed in a natural shape prior to the Olympic Games. Haslams Creek is now an important estuarine ecosystem (Education and Communities, 2012).

The Parramatta River catchment is made up of 29 sub-catchments which is referred to as the Upper and Lower Parramatta River. A hydrology, flooding and water quality technical report being prepared for the environmental impact statement notes that the study area is located within the Upper Parramatta River section and are subject to mainstream and overland flooding. Mainstream flooding results from the Parramatta River and its tributaries, including Haslams Creek.

Haslams Creek is located in the south section of the study area and is a highly modified second order stream. The creek is estuarine which drains into the Parramatta River at Homebush Bay. The catchment of Haslams Creek is highly urbanised with the upper extents concrete lined opened channels and pipes. Nuwi Wetland is open to Haslams Creek which connects Narawang Wetland via a floodway under Hill Road. The floodway allows flood flows from Haslams Creek to enter Narawang Wetland. These hydrological systems encompassing the study area would have provided a variety of resources for Aboriginal people, however, the recent modifications and channelling of these waterways would have impacted most of the intact soil profiles.

4.4 Flora and fauna

The study area has been cleared of most native flora, particularly in areas identified as disturbed terrain or consisting of man-made fill. Prior to European occupation, low, eucalyptus open-forest and low eucalyptus woodland with a sclerophyll shrub understorey would have been present in the Lucas Heights soil landscape region. The Blacktown, Glenorie and Birrong soil landscapes have been almost completely cleared of eucalyptus woodland and tall open-forest (wet sclerophyll forests). The Ettalong soil landscape is located across swampy areas and vegetation is often arranged in concentric zones around the swamp. Species variation is dependent on local salinity levels and height above the water table (Chapman et al. 2009; Chapman and Murphy, 1989). The Haslams Creek's associated wetland is the Narawang Wetlands. Narawang Wetlands is an artificially constructed freshwater wetland at Sydney Olympic Park covering approximately 26 hectares. It extends along a 1.6 kilometre corridor and consists of an ornamental lake, three large stormwater collection ponds and 22 smaller habitat ponds. Remnants of the eucalyptus forest are preserved in the Newington Armory (Perrin, 2008).

Original vegetation communities would have provided habitats for a variety of animals, as well as potential food and raw material sources for Aboriginal peoples. Various banksia species were collected and used to manufacture needles for basket and mat weaving, while the fruit of the geebung (*Persoonia*) was eaten and string and fishing lines were soaked in a geebung bark infusion to prevent fraying (Nash, 2004, p. 2-4). Eucalyptus trees were a particularly important resource; leaves were crushed and soaked for medicinal purposes, bowls, dishes and canoes were made from bark, and spears, boomerangs and shields were crafted from the hard wood (Nash, 2004, p. 8). Canoes were likely to have been made from the bark of the Bangalay (*Eucalyptus botryoides*), Stringybark (*Eucalyptus agglomeratis*), She Oak *(Casuarina stricta*) and River Oak (*Casuarina cunninghamiana)* trees, which were present in the forests surrounding the Parramatta River (Dallas, 2003, p.33).Typical animals which may have been hunted, trapped, smoked, speared, fired or clubbed by Aboriginal peoples include possums, flying foxes, goannas, wallabies and kangaroos (Dallas, 2003, p. 33). The hides, bonesand teeth of some of the larger mammals may have been used for Aboriginal clothing, ornamentation, or otherimplements (Attenbrow, 2010, p. 70-76). Smaller animals and native fruits and berries were also important to theParramatta Aboriginal economy. Ants and grubs were valuable protein and carbohydrate sources (Dallas, 2003, p.34). The close proximity to the saltwater portion of the Parramatta River meant that fish, shellfish, eels and fishing also provided a varied diet (City of Parramatta, 2017a). Fresh water streams entering the river supportedducks, mullet, crayfish, shellfish and turtles (Dallas, 2003, p. 33).

Threatened species within the study area are presented and assessed in Technical Paper 9 (Biodiversity Development Assessment Report).

Much of the study area consists of disturbed land, which has been subject to historical vegetation clearing. While the majority of original vegetation and other natural features along the project site have been removed or modified, some natural features still remain. Native vegetation communities in the study area, particularly in Melrose Park, Wentworth Point and Sydney Olympic Park, are associated with riparian and intertidal environments along the Parramatta River and are characterised by mangroves, saltmarsh and Casuarina glauca (Swamp Oak). Estuarine Swamp Oak Forest and Estuarine Saltmarsh are consistent with threatened ecological communities listed under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). A series of wetlands occur south of the Parramatta River and adjacent to the project site in the Newington Nature Reserve and Millennium

Parklands, and along Haslams Creek. A range of listed threatened species are associated with these areas, including the Green and Golden Bell Frog.

The main potential for adverse impacts on biodiversity would occur during construction. About 2.6 hectares of native vegetation would be removed. This includes about 1.6 hectares of vegetation that is listed as a threatened community under the *Biodiversity Conservation Act 2016* and/or the EPBC Act. Construction of the proposed bridges has the potential to affect about one hectare of aquatic habitats (wetlands) classified as protected marine vegetation under the *Fisheries Management Act 1994.*

Construction also has the potential for indirect impacts on biodiversity as a result of activities within the project site, including edge effects and noise impacts on fauna.

Biodiversity offsets would be finalised to mitigate potential residual impacts on biodiversity in accordance with the NSW Biodiversity Offsets Scheme and in consultation with the NSW Department of Planning and Environment (Environment, Energy and Science Directorate). The potential impacts that are not avoided or offset would be managed in accordance with the biodiversity management plan.

4.5 Land use and disturbance

The environmental context of the study area indicates that it would have been most suitable for utilising resources and occupation by the Aboriginal communities of western Sydney prior to colonisation. The area would have been rich in natural resources, with the Parramatta River and freshwater creeks forming a focal point of cultural and economic activity.

Large parts of the study area, in particular the areas to the south of Parramatta River in Camellia and Sydney Olympic Park, were subject to extensive vegetation clearance, introduction of man-made fill and land remediation/reclamation from as early as 1810.

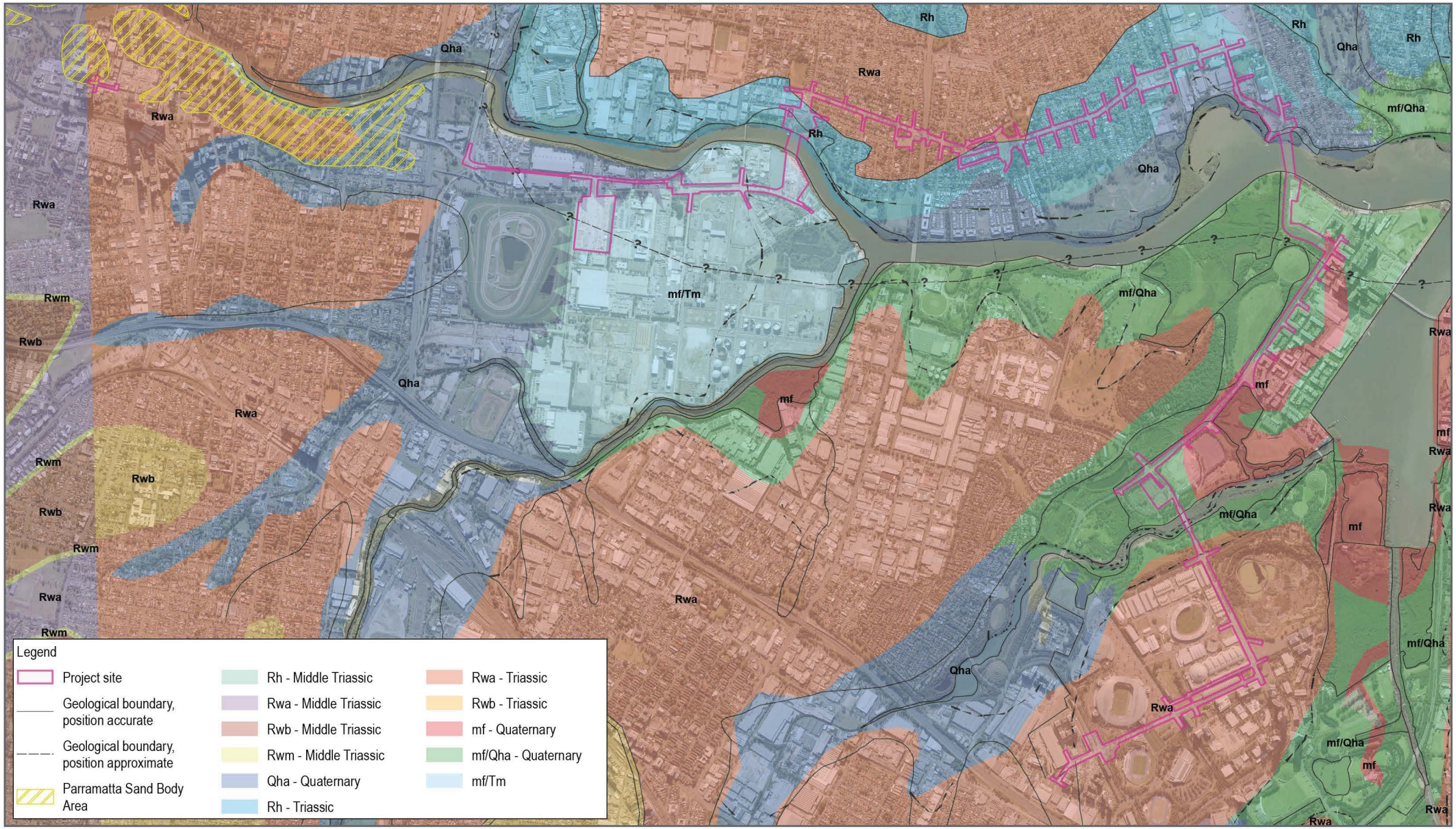
Soils within areas identified as disturbed terrain have been characterised up to a depth of 100 centimetres. However, it is possible that areas of potential archaeological deposits remain underneath areas of remediated land in Sydney Olympic Park as intact soils and geological formations may be effectively capped by overlying layers of disturbance and fill. The industrial area in Camellia is associated with land reclamation of up to 2.6 metres where intact soil profiles extend between 2.6 metres to 15.8 metres.

The study area is a rich cultural landscape whereby Aboriginal people maintained cultural practices prior to and following colonisation. Landscape markers surrounding the study area, such as Parramatta River are culturally significant, and there is a growing body of archaeological evidence, Aboriginal memories and historical records that demonstrate the continuation of Aboriginal cultural practices into the colonial period. Soon after Governor Phillip's arrival with the First Fleet in 1788 and founding of a penal colony at Sydney Cove, Captain Arthur Phillip and others landed at the junction of the Parramatta River and Duck River and explored the upper reaches of the Parramatta River and surrounds (Kass et al., 1996). During the exploration, Phillip’s party came across Aboriginal campsites, hunting traps and fireplaces (Kass et al., 1996). Parramatta (originally known as Rose Hill) was developed as a farming settlement to feed the new English colony. Phillip chose the area as the soil was found to be more suitable for farming than the area surrounding the settlement of Port Jackson. This colonisation led to the immediate displacement of local Aboriginal communities from the land that they had inhabited for thousands of years (City of Parramatta, 2017b).

By 1790 fruit trees were planted, cattle introduced and crops, including wheat, barley, maize and oats, were being cultivated. Timber was rapidly exploited, and land was cleared for agricultural purposes, dramatically altering the landscape. One hundred convicts worked on the ‘Experiment Farm’ and the construction of Parramatta town. By 1789 James Ruse was occupying and cultivating land at Experiment Farm, which was later granted to him (Kass, 2008). In 1792, 30 acres of land was granted to Charles Smith on the site of what is now the North Parramatta Cumberland Hospital Precinct (Arfanis, 2015). Farming continued in the area under a succession of governors (City of Parramatta, 2017a). Tensions rose as the European colonists inexorably claimed land for their uses and depleted the resources available for local Aboriginal communities.

The traditional methods for food procurement were becoming increasingly difficult for Aboriginal people (Tanner Kibble Denton Architects (TKD Architects), 2017). Similarly, food-gathering patterns were disrupted by the lack of access to their traditional lands, due to farming by the new settlers. Limited opportunities were offered by the Europeans willing to barter spirits and tobacco, and even food, for fish. At the turn of the century, conflicts were recorded between the settlers and the Aboriginal communities in the Nepean and Hawkesbury districts. Records indicate the Parramatta region was relatively peaceable compared to the massacres of Aboriginal peoples in places such as Appin and Mulgoa (Dallas, 2003). However, it is important to note that the lack of

records does not indicate that violence did not occur in a region, merely that it was not recorded, or records no longer exist.



Paper Size ISO A4

0 0.5 1

Kilometres

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Geology of the project site and surrounds

Project No. **12557728**
Revision No. **2**
Date **17/08/2022**

FIGURE 4.1

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH002_Geology
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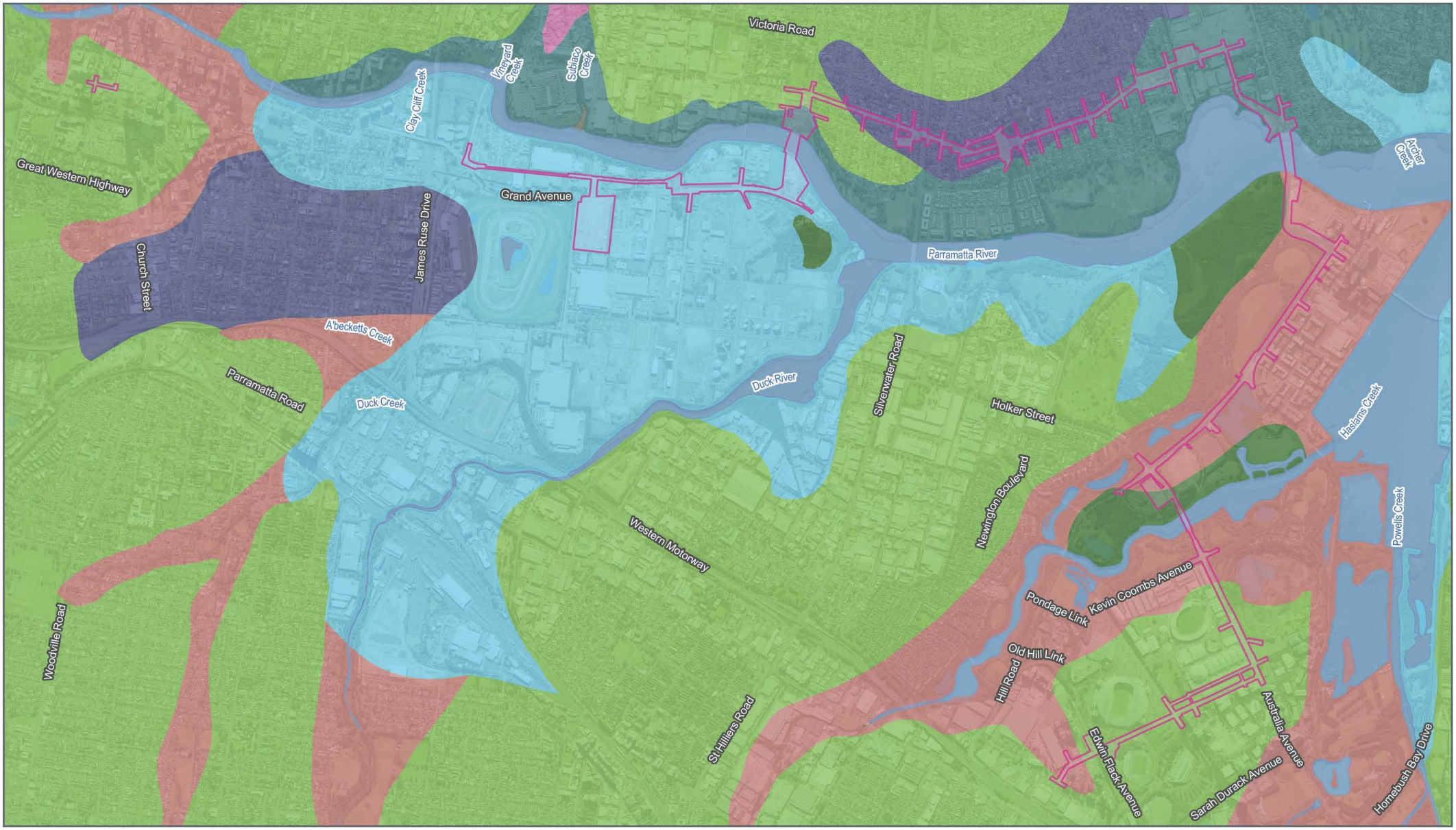
Data source: Study area - GHD2022; Geology - GSNSW2022; Imagery - Metromap Tile Service: extracted 17/08/2022 . Created by: lmanasan



Legend

- Project site
- Birrong
- Blacktown
- Disturbed Terrain
- Ettalong
- Glenorie
- Gymea
- Lucas Heights
- Waterbodies

Paper Size ISO A4

0 0.5 1

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Soil landscapes of the project site and surrounds

Project No. **12557728**
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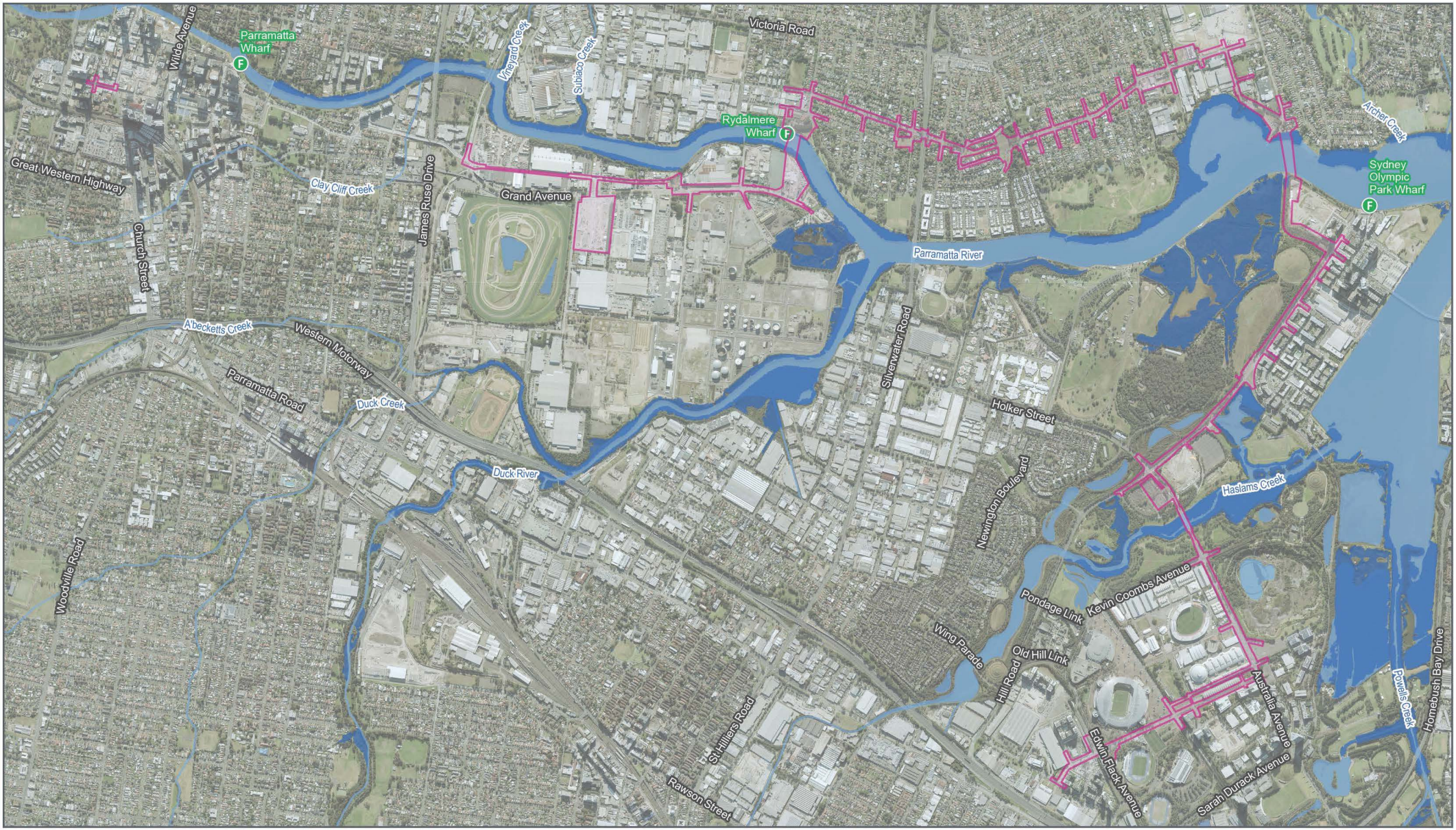
FIGURE 4.2

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH003_SoilLandscape
Print date: 17 Aug 2022 - 11:18

Data source: Study area - GHD2022; Soil landscape - ESS2018; Imagery - Metromap Tile Service: extracted 17/08/2022 . Created by: lmanasan



Legend

- Project site
- Coastal wetlands
- Waterbodies
- Watercourse
- Ferry Wharf

Paper Size ISO A4

0 0.5 1

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Aboriginal Cultural Heritage

Hydrology of the project site and surrounds

Project No. **12557728**
Revision No. **2**
Date **17/08/2022**

FIGURE 4.3

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH004_Hydrology
Print date: 17 Aug 2022 - 11:18

Data source: Study area - GHD2022; Wetland - DPIE2018; Watercourse - NSWSS2022; Wharf - TfNSW2018; Imagery - Metromap Tile Service: extracted 17/08/2022 .
Created by: lmanasan

5 ARCHAEOLOGICAL CONTEXT

5.1 Aboriginal history in the area

The original inhabitants of the Parramatta region are the Burramattagal peoples, of the Darug people who first settled on the upper reaches of Parramatta River (City of Parramatta, 2017a). The term ‘Darug’ was only applied to a language group after 1870 (Attenbrow, 2010).

The Darug comprised a number of sub-groups often referred to as ‘clans’. The Burramattagal peoples are the western-most Eora clan, who are part of the harbour-side katungal ‘sea people’. Parramatta marks the border between the cultures of the sea people, and the inland paiendra or ‘tomahawk people’ (Flynn, 1995). The Wangal peoples are also a clan of the Eora and inhabited the southern shore of the Parramatta River. The Darug, or Dharruk, language was spoken across the Cumberland Plain region, which stretched from Appin in the south to the Hawkesbury River in the north, and west of the Georges River, Parramatta and Berowra Creek (Attenbrow, 2010, p.34). The Burramattagal peoples are likely to have spoken a common dialect with other groups who lived on the lands between Sydney Cove and Parramatta, with local variances between people on the coast and those inland. The Burramattagal peoples appear to have belonged to smaller groups, consisting of multiple extended families. These groups ranged in size from 30 to 70 plus (Dominic Steele, 2013, p. 41). The Burramattagal and Wangal peoples rotated seasonally through campsites, depending on their needs (McClymont, 2008).

Parramatta was a resource rich zone which supported Aboriginal occupation and was at the centre of human activities. The Parramatta River banks and the mostly freshwater stream now known as Clay Cliff Creek (located to the west of James Ruse Drive) were vital sources of food and living resources. The boundary between Burramattagal country and their neighbours, the Wategora clan, seems to have been the Duck River (Kohen, 1993 in McClymont, 2008).

The bark canoes of Burramattagal peoples have been recorded as holding a ‘central small fire, built on a mound of soil, to cook up their fresh catch’ and 'fire-stick farming', employed to burn vegetation to facilitate hunting and to change the composition of plant and animal species in the area, was also practiced by the Burramattagal people.

Aboriginal site types recorded in the Parramatta region frequently include rock shelters with deposits, open campsites (artefact scatters) and open middens. Surface scatters are generally sparse and partially disturbed (Dallas, 2003, p. 29). Grinding grooves and shell middens have also been recorded and are generally located adjacent to watercourses. Burials can be associated with shell middens, and also can be found in coastal sand dunes (Attenbrow, 2012). Culturally modified trees (or scarred trees) have been recorded on suitable remnant old growth trees. Cultural modification may comprise evidence of bark removal for the purposes such as construction of bark containers canoes or shields and, as such, vary greatly in size (Dallas, 2003,p. 29).

The history of Aboriginal people after the arrival of the First Fleet and subsequent occupation of the land by British colonists is presently poorly understood. In part this is due to a tendency to study sites away from urban centres (Irish and Goward, 2012). Aboriginal people living around Parramatta tended to avoid the early exploratory parties but as the settlement at Parramatta was established and grew in size, interactions became more frequent with European colonists. Exchanges between local Aboriginal people and the military officers were recorded as indicators of good relations during the early years of the settlement. Collins (1798) described the exchanges of fresh fish for bread and salted meat: *“Since the establishment of that familiar intercourse which now subsisted between us and the natives, several of them had found it their interest to sell or exchange fish among the people of Parramatta; they being contented to receive a small quantity of either bread or salt meat in barter for mullet, bream and other fish. To the officers who resided there this proved a great convenience, and they encouraged the natives to visit them as often as they could bring them fish*”. Unfortunately, this trade was stopped following the destruction of a canoe by convicts, with the ensuing conflict effectively souring the previously friendly relations (KNC, 2017).

By the 1810s, a ‘Native Institution’ was suggested by William Shelley to teach Aboriginal children literacy as well as religious values, domestic and agricultural skills planned to be opened in Parramatta (Brook and Kohen, 1991). The school was located on a large area (encircled by Macquarie, Marsden and Hunter Streets) near ‘the Church of Parramatta’. Governor Macquarie announced the first Aboriginal Annual Feast on 28 December 1814 to mark the opening of the institution at the marketplace encouraging Aboriginal families to send their children to the institution. The feast continued as an annual gathering and event in Parramatta from 1814-1835. Macquarie and subsequent Governors used the event as an opportunity to diffuse tensions between Aboriginal people and

new settlers, to promote the Native Institution as well as to distribute clothes and blankets (Turbet, 1989). The site for the Native Institution lies within the study area in the Parramatta CBD.

Historical records from the first years of the colony document the disastrous effect smallpox had on the Aboriginal people of the area (Collins, 1798,496) which decimated the population and had an irrevocably damaging impact on social organisation (McDonald, 2008). Inevitably, with increasing British settlements and land use from the late 18th century onwards, Aboriginal people became alienated from their land and marginalised within their own country. A recent shift in research focus has however, begun to provide some indicators of the nature of continuing Aboriginal settlement in areas of the Sydney Basin after 1788 (Karskens, 2019).

This research suggests an enduring culture that adapted to change and integrated new material culture into existing practices. Art sites continued to be created in the area with new imagery such as axes and rifles being incorporated, indicating a continuation of cultural practice (Irish, 2017). At least 70 historical Aboriginal settlements are known (Irish and Goward, 2012) across the Sydney basin dating to the late 18th and 19th centuries. These include sites where Aboriginal adaptation and tenacity are present as evidenced by the creation of new object types such as flaked glass and, in a few instances, knapped ceramic. Midden sites from the post-1788 period have also been found to contain introduced items such as metal and buttons, however others from this period are known to be devoid of any introduced material. The adaptation of burial practices has also been documented, with examples including the burial of a 30 year old woman in Rose Bay whose body was arranged in a traditional manner but with the inclusion of introduced items such as scissors and other metal objects (Donlon, 2003; 2008 in Irish and Goward, 2012).

It is important to note that sites of significance to Aboriginal peoples are not limited to physical objects, markers or landscapes. Intangible cultural heritage is a living tradition and continued expression of culture. The Parramatta region is located within a culturally significant landscape to Aboriginal peoples of the past, present and future.

5.2 Aboriginal Heritage Information Management System

5.2.1 Search parameters

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken on 5 April 2022 encompassing the study area with a buffer of around 500 metres. There are known limitations within the AHIMS database. AHIMS data has been recorded over many years in various geographic recording systems. Due to errors in reprojection of data, the registered location of some sites can be in error of up to 200 metres which is why a buffer is usually applied when undertaking searches.

The following search parameters were used:

- Parramatta Light Rail Stage 2 Alignment

  Datum: GDA 94 MGA Zone 56

  Eastings: 316850 – 322860

  Northings: 6252200 – 6257530

  Sites: 16

- Parramatta CBD turnback facility

  Datum: GDA 94 MGA Zone 56

  Eastings: 314842 – 315370

  Northings:6256355 – 6256795

  Sites: 13

The extensive search results are included in Appendix B.

5.2.2 Summary of extensive search

The extensive search identified 29 Aboriginal sites (refer to Table 5.1 and Figure 5.1). Of the 29 sites, two are listed as 'not a site' (AHIMS 45-6-2636 and AHIMS 45-6-2682), therefore the total number of registered Aboriginal sites is 27. The most common site types in the study area are PADs (16 in total), followed by artefacts (six in total) in relation to the other site types (refer to Table 5.2). The status of the sites provided is based on the extensive search results and some of these site cards may not be up to date.

Table 5.1 Summary of AHIMS within the searched coordinates

AHIMS	Site Name	Site Type	Status
45-6-2312	Subiaco Ck 1	Open Camp Site	Valid
45-6-2313	Subiaco Ck 2	Open Camp Site	Valid
45-6-2559	Sydney Turf Club Carpark, STC Carpark	Open Camp Site	Valid
45-6-1961	Ermington 1	Midden	Valid
45-6-2636	Ermington PAD	Potential Archaeological Deposit (PAD)	Not a Site
45-6-2682	Wanngal Woodland Axe-Marked Tree	Modified Tree (Carved or Scarred)	Not a Site
45-6-2683	Wanngal Woodland IF1	Potential Archaeological Deposit (PAD)	Valid
45-6-2684	Wanngal Woodland IF2	Potential Archaeological Deposit (PAD)	Valid
45-6-2685	Wanngal Woodland IF3	Potential Archaeological Deposit (PAD)	Valid
45-6-2785	Wanngal Woodland PAD2	Potential Archaeological Deposit (PAD)	Valid
45-6-2786	Wanngal Woodland PAD1	Potential Archaeological Deposit (PAD)	Valid
45-6-2864	George Kendall Ermington	Shell	Valid
45-6-3108	42 Bridge Street Rydalmere PAD	Potential Archaeological Deposit (PAD)	Valid
45-6-3039	Meadowbank Park Tennis Courts RYDE 203	Grinding Groove	Valid
45-6-3151	UWS Rydalmere OS 1	Artefact	Valid
45-6-3827	Clyde PAD 01	Potential Archaeological Deposit (PAD)	Valid
45-6-2679	Parramatta Children's Court	Potential Archaeological Deposit (PAD)	Valid*
45-6-2978	41 Hunter Street PAD	Potential Archaeological Deposit (PAD)	Valid
45-6-1523	George St Parramatta; Family Law Courts;	Artefact	Valid**
45-6-4015	Church St PAD-1	Potential Archaeological Deposit (PAD)	Valid
45-5-3630	Macquarie St PAD	Potential Archaeological Deposit (PAD)	Destroyed
45-6-2977	Macquarie St PAD 3	Potential Archaeological Deposit (PAD)	Valid
45-6-3818	St Johns Cathedral Background Artefact Scatter	Artefact	Valid
45-6-2795	150 Marsden Street Parramatta PAD	Potential Archaeological Deposit (PAD)	Valid
45-5-4097	O'Connell St PAD1	Potential Archaeological Deposit (PAD)	Valid
45-6-3767	85-97 Macquarie St	Potential Archaeological Deposit (PAD)	Valid
45-6-2751	Marsden St Carpark	Artefact and Potential Archaeological Deposit (PAD)	Valid**
45-6-3582	Macquarie Street PAD	Potential Archaeological Deposit (PAD)	Valid
45-6-2686	Civic Place PAD	Artefact and Potential Archaeological Deposit (PAD)	Partially Destroyed

* The site noted as destroyed on the site card, **the site was subject to test excavations

Table 5.2: Summary of extensive AHIMS search results by site type

Site type	Frequency	Percentage
Artefact	6	22%
Potential Archaeological Deposit (PAD)*	16	59%
Midden	2	7.5%
Grinding Groove	1	4%
Artefact and Potential Archaeological Deposit (PAD)	2	7.5%
Total	**27**	**100%**

* Two sites from the search results have not been included as they are not considered a valid site.

5.2.3 AHIMS within project site and surrounds

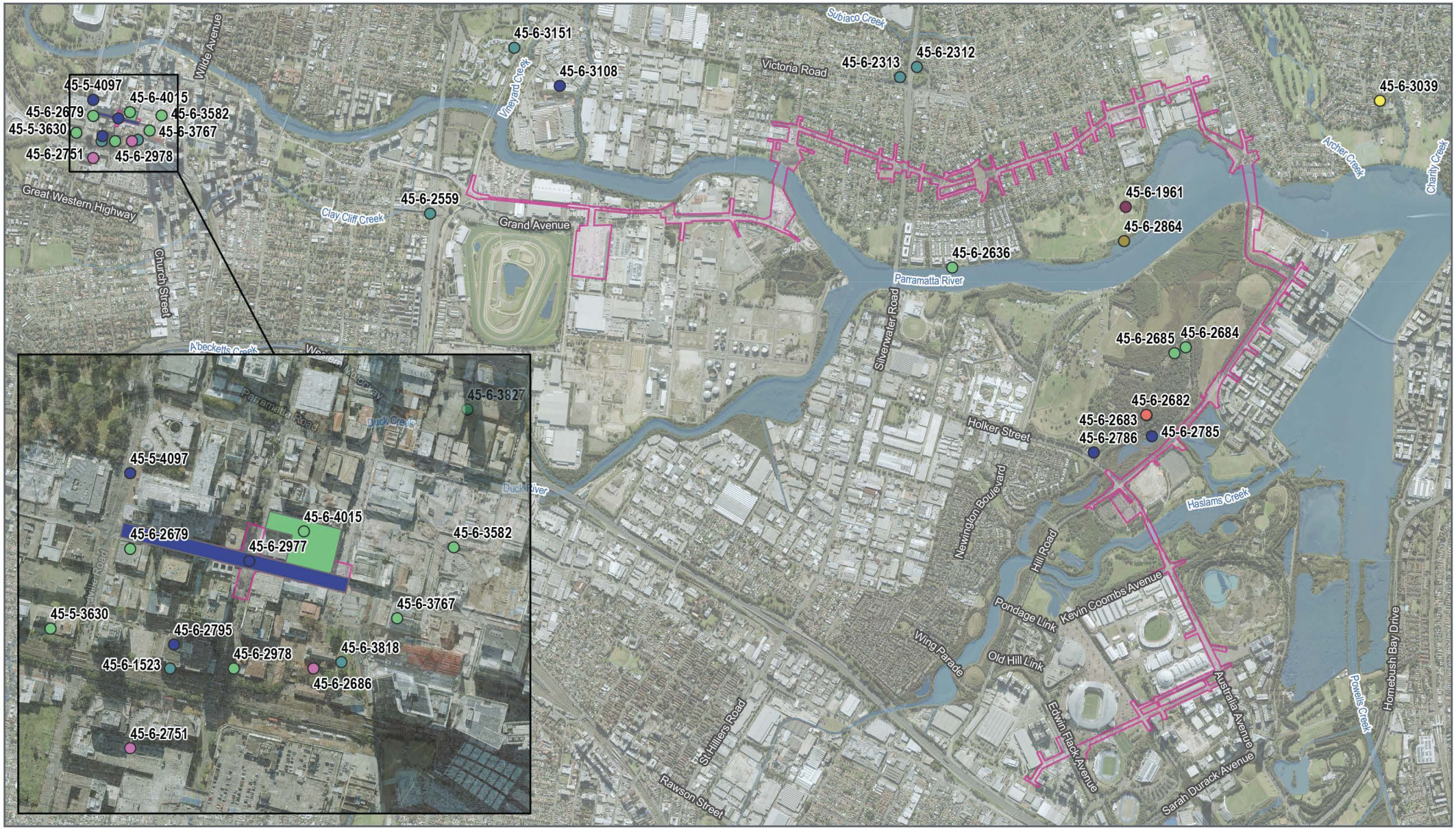
Two registered AHIMS sites are located within the project site.

- **AHIMS 45-6-2977** is located on Macquarie Street, based on the site card map, between the intersections of Church Street and across to the intersection of O'Connell Street. The site was registered in 2011 by Comber Consultants as a PAD located in an area where the Parramatta Sand Body was identified with intact soil profiles.
- **AHIMS 45-6-4015** is located at 197-207 Church Street and 89 Marsden Street. The site includes a PAD within the Parramatta Sand Body which has potential for Aboriginal heritage and contact archaeology. The site was recorded by Biosis in 2022 as it may hold evidence for early 19th century feasts between Aboriginal and European people including, the Native Institute for Aboriginal Children.

Thirteen registered sites are located within 200 metres:

- AHIMS 45-6-2785
- AHIMS 45-6-2786
- AHIMS 45-6-2683
- AHIMS 45-6-2559
- AHIMS 45-6-3582
- AHIMS 45-6-3767
- AHIMS 45-6-3818
- AHIMS 45-6-2686
- AHIMS 45-6-1523
- AHIMS 45-6-2978
- AHIMS 45-6-2795
- AHIMS 45-6-2679
- AHIMS 45-6-4097.

Of these, the closest to the project site is AHIMS 45-6-2785 in Sydney Olympic Park. It was identified in 2006 and has geocoordinates showing it being located 20 metres west of the study area along Hill Road in Sydney Olympic Park. It is in an area observed to have a thin amount of remnant soil with the potential to contain archaeological deposits. However, based on the description and site card map, the actual location of this PAD is around 50 metres west of the project site along Hill Road in the Millennium Parklands.



Legend

- Project site
- Artefact : -
- Artefact : -, Potential Archaeological Deposit (PAD) : -
- Grinding Groove : 3
- Modified Tree (Carved or Scarred) : -
- Potential Archaeological Deposit (PAD) : -
- Potential Archaeological Deposit (PAD) : 1
- Shell : -
- Shell : -, Artefact : -

Paper Size ISO A4

0 0.5 1

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

AHIMS sites

Project No. **12557728**
Revision No. **2**
Date **17/08/2022**

FIGURE 5.1

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH005_AHIMS
Print date: 17 Aug 2022 - 16:01

Data source: Study area - GHD2022; Watercourse - NSWSS2022; Wharf - TfNSW2018; Imagery - Metromap Tile Service: extracted 17/08/2022 . Created by: lmanasan

5.3 Archaeological literature review

City of Parramatta Council Aboriginal Heritage Study, Dallas Consulting 2003

Dallas Consulting was commissioned by City of Parramatta Council to undertake an Aboriginal heritage study, to inform future land planning, development control processes and to ensure ongoing protection and management of Aboriginal heritage places. The study used the existing AHIMS site database and environmental context to inform a predictive model of Aboriginal heritage sensitivity to inform Council's strategic planning.

The predictive modelling also used council zonings for the Parramatta LGA to inform Aboriginal sensitivity. For example, areas within 200 metres of watercourses, or with undeveloped land, were considered to hold high sensitivity. The Dallas Consulting study included the Camellia, Rydalmere and Ermington parts of the project study area and most of this was defined as having low sensitivity. Undeveloped parts of the project study area, such as Ken Newman Park, were identified as holding high sensitivity.

The entire Camellia portion of the Dallas Consulting study area was identified as an area of 'Aboriginal Association', which are areas identified as having some significance to present day Aboriginal people through current social or historical connections. However, in 2014, Dallas Consulting reviewed their study (which is summarised below) and noted that the "Areas of Aboriginal Association" (places of historical or cultural significance that are not registered Aboriginal sites) component of the Aboriginal heritage sensitivity mapping was unclear, incomplete and suggested it be removed.

Aboriginal Archaeological Assessment Report, Newington Armoury Adaptive Re-use and Rail Extension Project, Sydney Olympic Park, Paul Irish 2004

Paul Irish was engaged by the Sydney Olympic Park Authority to prepare an Aboriginal archaeological assessment in Newington Armoury, which is located around 200 metres west of the project study area. A survey was conducted within the woodland and nature reserve buffer zone of the Newington Armoury Precinct in 2003. This assessment established that the trees within the woodland were of insufficient age to contain scars of Aboriginal cultural origin and he determined that the scarred trees identified in previous studies were not Aboriginal modified trees.

During the survey three isolated silcrete and chert artefacts and two PADs were identified with possible silcrete manuports (stone material thought to have been transported to the area by Aboriginal people) also identified. The assessment concluded that the lack of Aboriginal archaeological material is likely to be a reflection of the early urban development of the Parramatta River, before the preservation of sites and the necessity for archaeological assessments, rather than an indication of less intense Aboriginal occupation of the area.

Preliminary cultural heritage assessment: Rosehill recycled water scheme, AMBS 2008

Australian Museum Business Services (AMBS) was commissioned by Parsons Brinckerhoff Australia Pty Ltd (PB) on behalf of Alinta Asset Management Pty Ltd (Alinta) to prepare a Preliminary Cultural Heritage Assessment in relation to the potential impacts of the Rosehill Recycled Water Scheme pipeline between Fairfield and Camellia, in western Sydney. The pipeline comprised an approximately 20 kilometre route and traverses a portion of the project study area in Camellia. The preliminary study found that areas with Aboriginal and historical archaeological potential were located within and adjacent to the pipeline corridor and were likely to be impacted by the proposal. The report recommended consultation with the Aboriginal community and continued archaeological investigations.

Parramatta Aboriginal Cultural Heritage Study Review, Dallas Consulting 2014

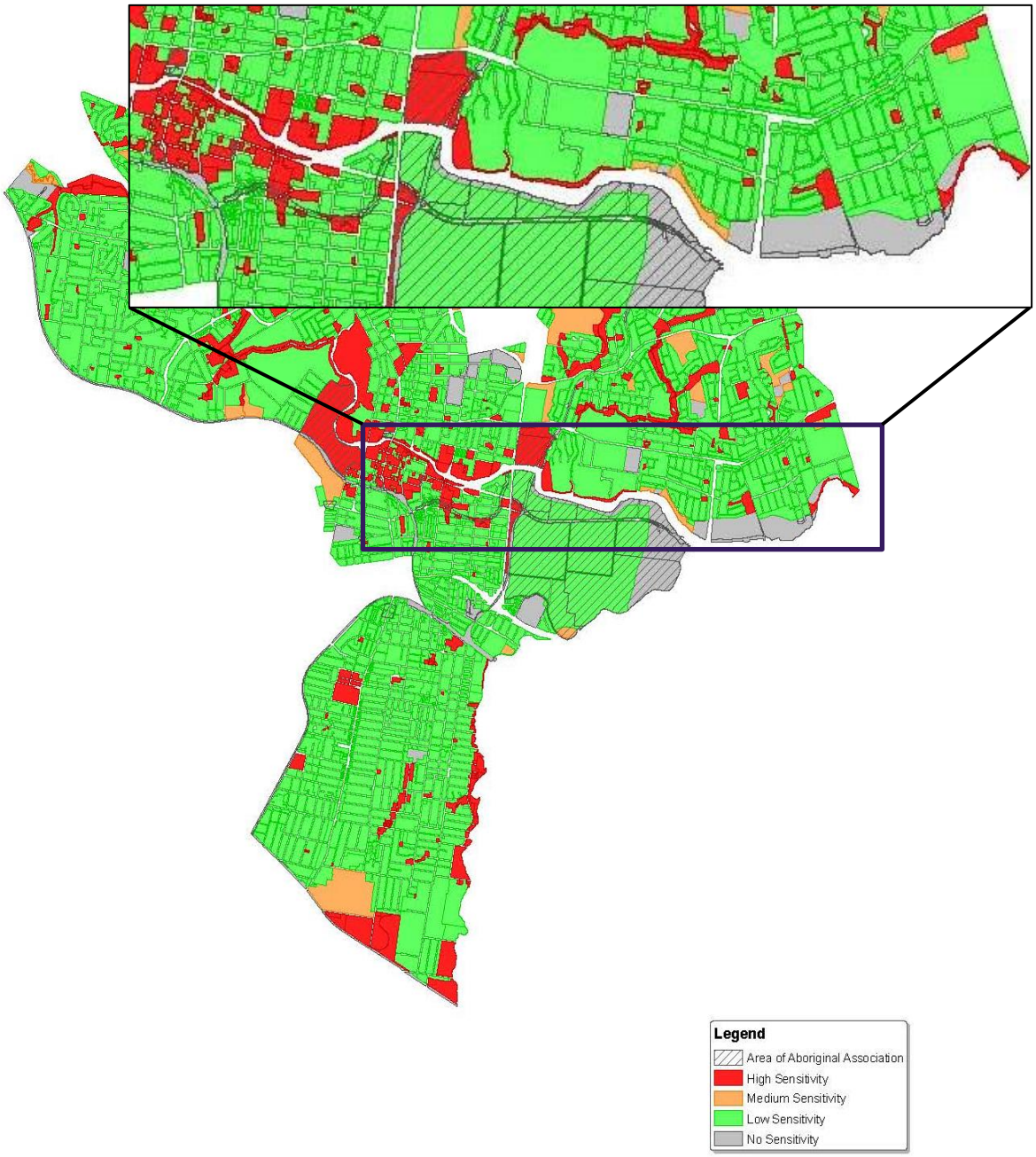
Dallas Consulting was commissioned by City of Parramatta Council to review the previous *City of Parramatta Council Aboriginal Heritage Study* (2003) and provide an updated predictive model. The review of the Aboriginal Sensitivity Map was considered necessary due to the following factors which had occurred since the 2003 study was published:

- a large number of Aboriginal heritage sites had been recorded that were not reflected in Council's mapping
- Council had revised its Local Environmental Plan (LEP) and Development Control Plan (DCP)
- NSW Aboriginal heritage legislation was amended in 2010, in a way that affected the role of councils in Aboriginal heritage management

- a number of anomalies in the Aboriginal heritage sensitivity mapping had become apparent that required investigation and correction.

The revised sensitivity mapping (Plate 5.1) reassessed part of the study area as low sensitivity, upgraded from nil (except for the mangroves along the southern embankment of Parramatta River at Camellia). Areas at Rydalmere Wharf and Ermington Boat Ramp were reassessed from medium sensitivity to high sensitivity. The area of Aboriginal Association that the 2003 study identified in Camellia was removed, as it did not include detailed or complete advice on these areas.

Plate 5.1 Revised Aboriginal Sensitivity Map (Parramatta Development Control Plan 2011)



Aboriginal heritage assessment Parramatta Light Rail Stage 1 EIS, KNC 2017

Kelleher Nightingale Consulting Pty Ltd (KNC) was engaged by WSP/Parsons Brinckerhoff on behalf of Transport for New South Wales to prepare an ACHAR to inform the EIS for Stage 1 of the Parramatta Light Rail network.

Three previously recorded Aboriginal archaeological sites, namely Cumberland Hospital East (AHIMS 45-6-3195), Harris Street Footpath/ Robin Thomas Reserve (AHIMS 45-6-3157 and AHIMS 45-6-3158) and the Sydney Turf Club Carpark (AHIMS 45-6-2559), and the presence of the Parramatta Sand Body (a geological formation dating to the Pleistocene associated with significant Aboriginal archaeology) were identified within the Stage 1 project boundary.

Site surveys identified seven PADs, along with the three previously recorded sites. Archaeological test excavation of the PADs was subsequently undertaken using a combination of hand excavated archaeological test squares and push-tubed core boreholes. Given the widespread disturbance across large portions of the investigation area, testing aimed to determine whether the project area contained intact subsurface Aboriginal archaeological deposit associated with the Parramatta Sand Body or other intact subsurface soils.

The test excavation identified intact sands containing artefacts below modern and historical disturbance in several locations within the investigation area. The test excavation results also supported previous assessments regarding the variable depth, nature and disturbance levels of the sand body. Deep excavation/removal of upper levels and replacement with fill has impacted the archaeological potential of some areas, while introduced fill above less severe disturbance has preserved artefact-bearing layers of the sands in situ at other sites.

In total, the Stage 1 project area contained five identified Aboriginal archaeological sites. Significance assessments focussed on the intactness, representativeness and research potential of these sites within the landscape and determined that the sites displayed between low and moderate-high significance. Impact assessments determined that all five sites would be at least partially impacted by the Stage 1 project. It was recommended that mitigative salvage excavation would be required for the four archaeological sites exhibiting at least moderate significance prior to any impacts. These are: Cumberland Hospital East (AHIMS 45-6-3195), Robin Thomas Reserve (AHIMS45-6-3157-8), Sydney Turf Club Carpark (AHIMS45-6-2559). The site known as PLR AFT 1 (AHIMS 45-6-3312) (exhibiting low levels of significance) required no mitigative action. A management strategy (heritage management plan) was outlined in the ACHAR which recommended a salvage excavation if the impact to AHIMS 45-6-2559 cannot be avoided.

The closest AHIMS site (45-6-2559) from Stage 1 is located 100 metres west of the Stage 2 project site.

Robin Thomas Reserve Masterplan Aboriginal Cultural Heritage Assessment Report (ACHAR), Artefact 2018

Artefact Heritage was engaged by Transport for NSW to prepare an Aboriginal Archaeological Survey Report. The survey report identified one registered AHIMS site, Robin Thomas Reserve (AHIMS 45-6-3157/ 45-6-3158), which had the potential to provide information on contact archaeology and required a section 60 approval for testing to be conducted as the site is State heritage-listed (*Ancient Aboriginal and Early Colonial Landscape*, SHR No. 01863). Therefore, an ACHAR was prepared to support an AHIP application for test excavations. The study area is included within the mapped extent of the Parramatta Sand Body which has potential to contain stratified archaeological deposits.

Previous test excavations undertaken by KNC (2017) uncovered nine silcrete artefacts below the disturbed layers. The area of Robin Thomas Reserve as indicated by AHIMS ID 45-6-3157/AHIMS 45-6-3158 was reported as having a high archaeological significance and a rare opportunity to investigate the Parramatta Sand Body. During the Aboriginal consultation undertaken as part of the ACHAR, the RAPs identified that the wider landscape in Parramatta is of significant cultural heritage value to Aboriginal people. A test excavation methodology was prepared and endorsed by the RAPs which included 18 one metre by one metre test pits within the study area aiming to understand the presence of the Parramatta Sand Body.

Robin Thomas Reserve is listed on the State Heritage Register as the *Ancient Aboriginal and Early Colonial Landscape* (SHR No. 01863) and the NSW Department of Primary Industries section 170 Heritage and Conservation Register, as well as on the Parramatta Local Environment Plan (LEP) 2011 (A2) as an archaeological site. The significance of the Parramatta Sand Body and its values are listed on the SHR register as:

> *The geomorphic origin of the sand body is uncertain but the present interpretation is that the sand body was deposited by the Parramatta River on a terrace 4 to 6 metres above normal water level, on either side of the river between Charles and Alfred Streets and in the eastern margin of*

Parramatta Park. The sand body was deposited as a terrace (abandoned flood plain) over time during floods. The bulk of the sand body forms a levee located on the south side (right bank) of Parramatta River just above the 1:100 average recurrence interval flood level. The sand body has a well-developed, but varied, soil profile. Topsoil materials are generally disturbed by European activities. Where subsoils are intact they typically consist of yellow orange or yellow brown sandy clay with an earthy (porous) fabric that becomes paler and slightly mottled with depth. The upper parts of the soil profile are usually heavily mixed.

The profile of the sand suggests that the main body of sand is of late Pleistocene age and recent thermoluminescence dates obtained from an excavation undertaken at 140 Macquarie Street by Comber Consultants in 2010, have shown that the top of the undisturbed sand (below the level of Aboriginal occupation) is between 50,000 to 58,000 years old.

From a geomorphic perspective, the sand body has the potential to provide insight into patterns of river flow and flood events that could lead to a better understanding of the formation of the Parramatta River Valley. On a broader scale, the sand body may be able to provide valuable information about changing sea levels in the Pleistocene period with implications for possible future sea levels and coastal geography under a warming climate. In addition to the archaeological and geomorphic research value of the sand body, the Parramatta Sand Body also has the potential to provide valuable insight into the natural environment of Parramatta CBD in pre-colonial times. The fluvial sand terrace is evidence that Parramatta had a more diverse natural environment than might otherwise have been known from historical accounts, which provide few details about the natural vegetation of area. Pollen, which may be preserved within the sand body, could yield valuable information about the original vegetation of the Parramatta CBD area.

Robin Thomas Reserve – Masterplan Stage 1 Interim Aboriginal Test Excavation Report, Extent 2019

Extent Heritage was engaged by Transport for NSW to prepare an Aboriginal test excavation program and prepare an Aboriginal test excavation report following the AHIP application mentioned above. The Aboriginal archaeological test pit locations aimed to investigate the areas which will be impacted, reduce the impacts to the Parramatta Sand Body and to avoid the locations of potential historical archaeological features in this study area.

Seventeen test pits were excavated by hand tools and twenty-five Aboriginal artefacts were found in total, fifteen of which were recovered from test pit 1. Most of the artefacts were found at depths below 50 centimetres from the surface, underlying the modern fill layers. Indurated mudstone/tuff was the dominant raw material type in the assemblage (total of 17 equating to 68 per cent), followed by silcrete (total of six equating to 24 per cent). Most of the artefacts were flakes (total of 18) with three cores.

The preliminary results of the test excavation suggested that the assemblage presented a low density of artefacts, which is mostly reflective of random discards and isolated events. Test pit 1 had a higher density, with 15 artefacts recovered (60 per cent), which may be evidence of knapping in this area. Based on the artefact typology and raw material procurement and use, occupation of this study area likely occurred in the late Pleistocene/early Holocene. The disturbance of the Parramatta Sand Body by historical activity has likely removed most evidence of mid-late Holocene occupation, which is supported by few silcrete artefacts and lack of backed artefacts. Artefacts typically occurred between 20 and 140 centimetres, with peak concentrations between 60-70 centimetres (total of eight equating to 32 per cent).

Parramatta Square 2 (PS2), 160-182 Church St Parramatta, Aboriginal Archaeological Excavation Report, AHIP No. C0001379, Comber Consultants 2019

Comber Consultants were engaged to undertake salvage excavations on behalf of the City of Parramatta Council for the redevelopment of Parramatta Square (previously Civic Place), a three hectare precinct located in the Parramatta CBD. The precinct is bound by Macquarie, Church, Darcy and Smith Streets. Within the precinct are six sites numbered Parramatta Square (PS) 1-6, which is located in the south eastern corner of the study area in the Parramatta CBD.

PS2 (now known as 8PS) is located at 160-180 Church Street, Parramatta, opposite St John's Cathedral. It is on the corner of Church and Darcy Streets. Testing and salvage excavation was undertaken by AHIP (No. C0001968) due to the redevelopment of Parramatta Square. The site historically sat on an alluvial terrace and water holes around the ephemeral creek line within the site possibly created a landscape rich in resources, such as fresh water, wetland plants and animals.

The lithic analysis of the assemblage of PS2 indicated a low density artefact scatter and similar to adjacent PS3 and PS5&6 sites was occupied repeatedly from at least around 7,000 Before Present (BP). The northern boundary of the site adjacent to the Town Hall (the location of the former Market Place and Aboriginal Annual Feasts) revealed the greatest concentration of artefacts. The trend was observed in this report in comparison with other sites throughout Parramatta which indicated that the density of artefacts at PS2 is consistent with its distance from the Parramatta River. Seventy four flaked glass and two stone artefacts were subject to use-wear and residue analysis. A number of glass flaked artefacts showed use-wear from shaping wood/woody plants or for sawing or engraving bone or shell, and one glass piece was used as a core to produce microblades.

Across the Parramatta Square sites a similar trend was observed where the lithic assemblage demonstrates a change over time in raw material with the deeper deposits indicating dominance of indurated mudstone/tuff/chert, while the upper deposits revealed silcrete artefacts. A silcrete knapping concentration is present along the northern boundary of the site which indicates production and/or discard of small numbers of artefacts.

Parramatta Square 3 (PS3): 153 Macquarie St Parramatta, Excavation Report, AHIP No. C0001379, Comber Consultants 2018

Aboriginal archaeological and cultural heritage assessment for the proposed redevelopment in PS3 (now known as 3PS) was undertaken by Comber Consultants. The site is the former Post Office site located at 153 Macquarie Street, Parramatta. The testing and salvage excavations uncovered an alluvial terrace across site at PS3, however, no evidence of the Parramatta Pleistocene Sand Body. The lithic analysis recorded 617 cultural lithics, including 369 artefacts. The assemblage indicates that the site was occupied repeatedly from about 10,000 years BP, in the terminal Pleistocene, through to the Holocene and contact periods.

Previous analysis across Parramatta Square contributed greatly to the knowledge of the Aboriginal occupation in the area. The artefact assemblage collected from PS3 shares similarities with the assemblages to some sites (such as 15 Macquarie Street and the RTA-G1), however they differ from those collected from other Parramatta sites (such as CG1, CG3, 101 George Street, 1 Smith Street). The results of the excavations at PS3 uncovered low artefact density (the average density across PS3 was 2.7 items per square metre) and indicate evidence for change over time in the use of raw materials. Generally, evidence for this change over raw material preference has only been identified on the Parramatta Terrace Sand previously, which was not present at PS3.

Parramatta Square 5 & 6 (PS5&6): 12-38 Darcy St Parramatta, Excavation Report, AHIP No. C0001379, Comber Consultants 2019

Comber Consultants were engaged to conduct testing and salvage of PS5 & 6 (now known as 4&6 PS) under the AHIP No. C0001413. The site comprised the former Parramatta Library, Parramatta City Council building, several Victorian terraced shopfronts, located at 12-38 Darcy Street, Parramatta CBD.

The excavations at PS5 & 6 uncovered an alluvial terrace of the Parramatta River like the other Parramatta Square sites. A similar trend to PS 2 and 3 in raw material preference which indicates a change over time with silcrete in the upper deposit and indurated mudstone/tuff/chert preferred in the lower deposit. This implies a long and ongoing Aboriginal occupation of Parramatta as a whole and Parramatta Square in particular. The excavations uncovered three hearths, and clay balls formed into a rough circle which indicates evidence of Aboriginal people cooking meat over small, leaf fuelled fires across the PS5 & 6 site. These features meet the criteria as a heat retainer hearth.

A total of 221 cultural lithics, including 126 artefacts, were recovered. The artefacts recorded evidence of being used for cutting meat and woodworking. The artefact analyses and dating of the hearths indicates that the site was initially occupied prior to 7,500 BP, continuing into around 1830. Four sets of conjoining artefacts recovered from adjacent spits provide evidence for specific cultural activities and some vertical integrity despite intensive modern land use.

The archaeology of Parramatta Square is exceptionally rare demonstrating evidence of ongoing occupation from 10,000 years ago through to the contact period well into the colonial period, when the Aboriginal Annual Feasts occurred in the market square in front of the Town Hall. The site as a whole has high significance to the Aboriginal community.

Aboriginal Archaeological Test Excavation Report AHIP C0001588: Site 45-6-3195, Parramatta North Growth Centre, Comber Consultants 2018

Comber Consultants undertook Aboriginal archaeological test excavations for the Parramatta North Urban Transformation on behalf of Urban Growth NSW. The Cumberland Hospital East (AHIMS 45-6-3195) site, which is about 1.5 kilometres north of the Parramatta CBD Stage 2 turnback facility, was excavated, and uncovered

around 1,800 Aboriginal artefacts, most of which were made from silcrete. Other raw material including glass had been knapped into stone tools, indicating archaeological evidence of contact between Aboriginal people and the new settlers and adaptation of new materials. It was suggested that these glass artefacts were likely to have been utilised for shaping, cutting and engraving of wood. The occupation density of the site was noted to be higher close to the Parramatta River, however, stretched across the site. It was suggested that the occupation in the western and southern sides of the site began more than 7,500 years ago, but as the river changed with sea level rises people appeared to move to the north and centre of the site.

There was a wetland within the centre of the site, at the location of the current oval which was occupied approximately 2,000 years ago. The location overlooked the Parramatta River and provided easy access to the resource rich wetlands. The higher density of occupation was recorded along the riverbank and up to 150 metres from the river and evidence of the Parramatta Sand Body was also found up to 150 metres from the river when the sea levels were rising and the landscape was changing dramatically, around 7500 years ago. It was noted that a site of with a long time span and with substantial numbers of artefacts and three phases of occupation is rare on the Cumberland Plain.

Desktop Aboriginal Due Diligence Rosehill Public School, RPS 2017

RPS was engaged by Conrad Gargett AMW to prepare a desktop Aboriginal due diligence report for the proposed upgrade of the Rosehill Public School, in 2017. This study area is located around 570 metres to the south-west of the project study area. No registered Aboriginal sites were located within the Rosehill study area.

The *City of Parramatta Council Aboriginal Heritage Study* (Dallas Consulting, 2003) originally assessed the Rosehill study as low Aboriginal sensitivity. However, the review of the heritage study (Dallas Consulting, 2014) upgraded the sensitivity of part of the school property to high. A contamination assessment (Douglas Partners, 2017) prepared for the project area indicated that some of the school grounds, including parts of the playing field, may contain imported fill between 10 and 140 centimetres in depth.

As the study area contained an area of high sensitivity, relating to the playing field in the west of the school grounds, RPS recommended further assessment in the form of an archaeological survey report in accordance with The Code.

Parramatta Light Rail Stage 2: Aboriginal Heritage Constraints Assessment, KNC 2018

In 2018 KNC was engaged by WSP Australia Pty Limited (WSP) to prepare a preliminary Aboriginal heritage constraints assessment for Stage 2 of the Parramatta Light Rail network (this project). The purpose of the assessment was to inform the early designs of the project. The assessment included two alignment options, the first option was located along South Street, Rydalmere (the northern option, but which was not progressed), and a second option located along and adjacent to Grand Avenue, Camellia (the southern option).

The KNC constraints assessment identified five archaeological features: two AHIMS registered sites and three PADs. As the alignment has been refined since the KNC constraints assessment was undertaken, three archaeological features identified by KNC are relevant to the current study area:

- Two areas of PAD located within the study area:
  - Area 2: which is located south of the Parramatta River within Sydney Olympic Park in the alluvial flats and associated mudflats.
  - Area 3: which is located between River Road and Spur Street, is situated within the low and mid slopes of a small ridgeline with limited previous ground disturbance.

Information on Areas 2 and 3 is provided below.

Area 2:

> *An area south of the Parramatta River within the Sydney Olympic Park is within the alluvial flats and associated mudflat. As such they provided abundance of resources for Aboriginal people in the past. Aboriginal heritage recorded within the nearby Millennium Park supports this location occupation model. However, the entire area has been through ground disturbances stemming from recent European occupation. The majority of the area was reclaimed in the 1880's that included dredging, placing of the fill material and modifications of the Haslams Creek alignment. The entire northern section of Newington and Wentworth Point are reclaimed estuary areas that have nil archaeological potential. The area south of Haslams Creek and to the immediate west of Homebush Bay was used for brickworks. These recent*

land use activities would have removed any Aboriginal archaeological material that would have been present within this area. Considering that natural soils consist of deep alluvial deposits, it is possible that remnant patches occur north and south of Haslams Creek under imported fill material. One of these potential remnant patches may be located at the proposed Haslams Creek crossing. Further soil assessment would be required in order to confirm the presence of natural soil layers that may contain Aboriginal cultural material. This area is mapped as having moderate to low archaeological potential.

Area 3:

A section of the study area located between River Road and Spur Street is situated within the low and mid slopes of a small ridgeline with limited previous ground disturbance. Soils in this area consist of erosional clay loams that have the potential to contain archaeological depositsat shallow depths. Considering very limited and unknown levels of previous disturbance, thereis a moderate to low potential for subsurface archaeological deposits to occur in this area.

One registered site is located around 100 metres west of the study area - Sydney Turf Club Carpark (AHIMS 45-6-2559).

20 Waterview Street, Putney, Curio Projects 2020

Curio Projects was engaged by Lilac Pty Ltd/Willow Frank to prepare an ACHAR for a Planning Proposal for enabling additional permitted uses including residential and retail. The site is located 2.5 kilometres east of the project study area.

The test excavation program completed as part of the ACHAR aimed to identify the extent of potential relics associated with occupation of the locale by notable emancipist James Squire and his nineteenth century brewing operation. James Squire (1754? -1822), arrived in New South Wales with the First Fleet in 1788, who was sentenced to seven years and was brewing beer for soldiers' private consumption during his time until his sentence expired in 1792.

In 1795, Squire was granted thirty acres of land in the Parish of Hunters Hill and expanded his land by purchasing nearby allotments. Squire began to cultivate hops on his Kissing Point Farm, establishing a brewery and tavern known as 'The Malting Shovel' in close proximity to the Parramatta River, accessible via Squire's private wharf. Squire was known to be sympathetic to the local Aboriginal people of the Wallumedegal people, Bennelong and Squire are known to have developed a friendship, with Bennelong eventually being buried within Squire's orchards. It was recently announced that the location of Bennelong's burial place was found, using a combination of archival evidence and physical techniques (survey and ground-penetrating radar) (Sydney Morning Herald, 20 March 2011) which is believed to be located within the front garden of 25 Watson Street, Putney- approximately 120 metres north of the 20 Waterview Street.

One isolated artefact was identified during the testing program. The Aboriginal archaeological potential of the 20 Waterview Street, Putney is considered to be low, with the most likely site type to be present being isolated artefacts in a disturbed context a site type which generally has little archaeological significance.

The historical (non-Aboriginal) test excavation program did not identify any archaeological resources associated with the Squire Brewery and Inn complex. Although, one isolated Aboriginal object was identified in Trench 3 within a highly disturbed context. The report recommended an exclusion zone be maintained around the Aboriginal object in Test Trench 3 if the artefact was to remain *in situ*, or preparation of an AHIP application to remove the Aboriginal object, if the object was required to be removed as part of the site's redevelopment.

The excavation works ceased in that area and the artefact was protected *in situ*. This ACHAR was prepared following this unexpected find. A field survey was conducted in consultation with RAPs and no Aboriginal artefacts were recorded. Based on the results of the AHIMS search, the environmental context, predictive model and physical inspection of the landform of this project area, the most likely Aboriginal site types would be shell middens, isolated artefacts and open camp sites within the project area. Therefore, based on the comments provided by the RAPs and the distance to Parramatta River, further test excavations were recommended in this report.

6 ARCHAEOLOGICAL PREDICTIVE MODEL

6.1 Overview

The purpose of an archaeological predictive model is to provide an indication of the Aboriginal objects predicted to occur within the study area and the likelihood that these objects will occur within the study area. It draws on the review of existing information from the regional and local archaeological context and from the landscape context. Another essential aspect to predicting the archaeological potential is previous land uses and the degree of disturbance across the study area. The predictive model should inform the approach to the archaeological survey and to the assessment of the archaeological sensitivity, potential, and significance. There are a number of factors that influence Aboriginal occupation of an area. These include essential subsistence resources such as food (flora and fauna) and fresh water, and secondary resources such as raw stone materials, wood and bark, animal skins and reeds for basket weaving, string, clothing and similar. Landscape features such as ridges, flat elevated areas, rock shelters and similar, may have also influenced Aboriginal occupation of an area. In addition, cultural activities may have also occurred at certain locations in the landscape for example, corroborees and initiation sites.

6.2 Predictions for study area

The Cumberland Plain region provided abundant resources for Aboriginal subsistence, especially near permanent water, and was conducive to Aboriginal occupation in the past. The Parramatta River runs through the study area, with multiple second and third order streams encircling the area. These creeks would have provided access to permanent water. These water sources would have provided the resource base for occupation, including habitats for freshwater fish, eel, and shellfish, along with larger marsupials and mammals typical of the inland area. Likewise, outcrops of silcrete nearby, and formerly deposited river gravels associated with past fluvial activity, would have provided the stone raw materials for stone tool manufacture. Resources in the study area would have been ample to enable occupation, hunting, gathering, stone procurement, ceremonies, and other cultural activities to be conducted throughout the region. Burials are mostly found in coastal shell middens and no large burials sites have been reported in the Sydney region (Attenbrow, 2010). However, burials sites can be marked by carved trees in south-eastern Australia. Carved trees associated with burials are reported in south of Sydney near Narellan and Picton (Etheridge, 1918).

The Aboriginal material most visible in the archaeological record are stone artefacts. The most frequent archaeological objects are stone artefacts in the Cumberland Plain. These objects are found as open scatters or isolated finds, and as finds and stratified deposits of flaked stone below the surface. Importantly, the presence of subsurface archaeological deposits cannot be accurately assessed based on the presence or absence of the surface archaeological record. Likewise, sub-surface archaeological deposits have been shown to be present in areas of past agricultural disturbance.

Both natural and anthropomorphic disturbance is widespread throughout Parramatta. The fluvial sand terraces of the Parramatta Sand Body have created a depositional context that is favourable to deep, stratified deposits of Aboriginal archaeology. Previous excavations have demonstrated that where these sands are intact beneath modern and historical development they can curate and contain highly significant deposits beneath the current urban landscape. Therefore, archaeological potential in the study area remains where suitable substrate exists intact below surface disturbance, or in other areas of low disturbance conducive to the preservation of archaeological deposit.

The test excavations of Parramatta Light Rail Stage 1 identified intact sands containing artefacts below modern and historical disturbance in several locations within its project area, such as Cumberland Hospital East, Robin Thomas Reserve and the intersection of Purchase Street and George Street. Recently, Williams et al. (2021) identified that the Parramatta Sand Body aligns with the Parramatta CBD section of the Stage 2 project site (Figure 4.1), however the Parramatta Light Rail Stage 1 heritage assessment of the Parramatta Sand Body has been relied upon for this part of the study area.

The test excavation results for Stage 1 also concurred with previous assessments regarding the variable depth, nature and disturbance levels of the sand body. Deep excavation/removal of upper levels and replacement with fill has impacted the archaeological potential of some areas, while introduced fill above less severe disturbance has preserved artefact- bearing layers of the sands in situ. Significant deposits are those where integrity and stability of the archaeological context is high, as this is what gives the objects meaning. High integrity also leads to increased confidence in interpretation, especially where depositional context has retained potentially stratified

layers. The project site may contain undiscovered parts of the Parramatta Sand Body (Figure 4.1) which would contribute to this knowledge.

There are no known historical Aboriginal sites or Aboriginal missions within the study area. However, this general area has greater significance to local Aboriginal people and post contact Aboriginal archaeology may be unearthed during the test excavation program especially in relation to the Parramatta Sand Body, if identified.

Scarred trees may occur, but only in areas of remnant native woodland, which are uncommon in the heavily cleared wider Cumberland Plain as well as within the study area. Grinding grooves as well as stone quarries may be found on exposed bedrock in the wider region, though no evidence for either site type has been recorded within the study area since rock outcrops are mostly absent. Raw material sources around the study area may have not been found yet, however, it is more likely that many paleochannel deposits containing knappable rocks and sandstone outcrops are now buried beneath, or have been destroyed by, urban development (Corkill, 1999).

Most high-density archaeological sites have been associated with creek lines or other sources of permanent water. Stream order has been shown to be correlated with the size and complexity of archaeological deposits within certain distances from a waterway. Archaeological potential increases with stream order and more complex sites are often close to permanent water sources, with confluences being key locations for occupation sites. The highest artefact densities are likely to occur on terraces and lower slopes associated with second or higher order streams, especially 50 to 100 metres from fourth order streams.

These observations indicate that landforms associated with streams of second and higher order and areas that are undisturbed will have the highest archaeological sensitivity in the Cumberland Plains region.

The following predictions have been made based on the landscape context, available ethnographic observations of Aboriginal people in the region, comments and advice from the Metropolitan and Deerubbin LALC Site Officers and previous archaeological studies, in particular White and McDonald (2010).

- most of the study area has been affected by past land clearance, development, landfill and landscaping
- Parramatta Sand Body is mapped within the Parramatta CBD part of the study area which is considered to have high archaeological potential
- based on the previous research, the floodplains of the Parramatta River in the north shoreline have high archaeological potential
- the areas of relatively less disturbed parklands in the mid slope and lower slope landforms north of the Parramatta River are considered to have moderate archaeological potential, especially the areas around Ken Newman Park and Broadoaks Park
- based on the results of the AHIMS search, the environmental context and survey and consultation with LALC Site Officers, the most likely Aboriginal site types that have potential to be present in the study area would be shell middens, stone artefact scatters, isolated artefacts and subsurface archaeological deposits.

7 ARCHAEOLOGICAL SURVEY RESULTS

7.1 Approach

Representatives from the Metropolitan LALC and the Deerubbin LALC participated in an archaeological survey of the relevant sections of the study area on 24 January and 4 February 2022 respectively, to provide input on cultural significance in accordance with PACHCI Stage 2. The Deerubbin Local Aboriginal Land Council survey report was received on 26 April 2022 with a recommendation for further investigations due do the proximity of a major waterway (Appendix E).

The Parramatta CBD area of the study area was not surveyed, as it had previously been assessed for Parramatta Light Rail Stage 1, as such the information and assessment from the Parramatta Light Rail Aboriginal Cultural Heritage Assessment Report (KNC, 2017) has been relied upon for the Parramatta CBD area for survey. A desktop study of the Parramatta CBD is discussed in Section 7.3.7 including the most recent research publications for the Parramatta CBD.

7.2 Sampling strategy and field methods

The aim of the archaeological survey was to conduct a representative coverage of the study area (excluding the Parramatta CBD) on foot and to record any Aboriginal archaeological sites or potential archaeological deposits (PADs).

The survey objectives were the ground-truthing of existing Aboriginal sites, land disturbances visible based on historical aerial photographs and management plans and the assessment of the subsurface archaeological potential of landforms. The targeted areas were decided based on preliminary desktop review including the review of current and historical aerial photography.

The study area was divided into nine survey units (SUs) in six suburbs based on their physical location (i.e. landform and distance to water courses). The survey covered the accessible areas of survey units with ground surface visibility. The areas where no visible disturbance to ground surface was evident, and where intact subsurface artefacts could be present, were targeted for the survey. SUs were later recorded to Avenza Maps with their GPS coordinates based on their disturbance levels.

The following survey units were nominated for investigation:

- Melrose Park included two SUs where SU 1 encompassed Ermington Boat Ramp and the nature strip adjacent to power easements. SU2 was located on the northern road boundary of Waratah Street (refer to Figure 7.1)
- Ermington included one SU where SU3 encompassed Ken Newman Park and the council land strip to the west (refer to Figure 7.2)
- Rydalmere included two SUs where SU4 comprised Broadoaks Park and the council land strip on the northern side of South Street and SU5 is at Rydalmere Wharf which extended from John Street in the north-east to the Sydney Water easement in the west within Eric Primrose Reserve (refer to Figure 7.3)
- Camellia included one SU where SU6 encompassed the wetlands (mangroves) on the western side of the Thackeray Street and the council strips on both sides of Thackeray Street (refer to Figure 7.3)
- Wentworth Point and Sydney Olympic Park comprised three SUs where SU7 extended from the riverside walk to the Sanctuary Wentworth Point development and an additional section along the western boundary of Hill Road (refer to Figure 7.4). SU8 was located north of the Haslams Creek on both sides of the Holker Busway and SU9 encompassed the grassed sidewalk area on the western side of Australia Avenue, adjacent to the Brickpit (refer to Figure 7.5).

Two key survey variables were assessed across the study area and within each landform: visibility and exposure. Exposure addresses the areas which erosion might have revealed archaeological deposits, and visibility determines the amount of ground surface that is not covered by any vegetation. Overall survey coverage and calculated survey effectiveness was recorded in Table 7.1.

Overall visibility during the survey was 10 to 15 per cent due to grass coverage with limited exposure. Effective coverage areas in all SUs were lower due to low visibility which indicates a lower effective coverage ratio. The areas of exposure in the study area were targeted for stone artefacts, shells and other evidence of Aboriginal occupation.

Table 7.1 Summary of survey coverage in the study area

Survey Unit (SU)	Landform	SU Area (m^2)	Visibility (%)	Exposure (%)	Effective Coverage Area (m^2)	Effective Coverage (%)
SU1	Flat (partially disturbed)	9,538	20	10	190.76	2
SU2	Flat (partially disturbed)	3,036	20	10	60.72	2
SU3	Mid and low slope	32,191	5	5	80.47	0.2
SU4	Mid slope	4,968	10	10	49.68	1
SU5	Flat (partially disturbed)	20,290	20	20	811.60	4
SU6	Flat (disturbed)	4,610	5	-	230.00	4
SU7	Flat (disturbed)	49,910	20	10	998.20	2
SU8	Side slope (partially disturbed)	9,513	5	10	47.56	0.5
SU9	Flat (partially disturbed)	13,084	10	10	130.84	1

The total surveyed areas varied between SUs (refer Table 7.2), and some areas of sensitivity were not able to be surveyed as property access could not be arranged. Melrose Park Public School Oval was identified as an area of sensitivity/PAD, however as it is outside the project site boundary and would not be impacted, further survey is not considered to be required. Transport for NSW has committed to completing a survey of ten residential properties in Melrose Park which are considered to have potential for Aboriginal archaeology, should it be confirmed they could be impacted by the project and once property access can be arranged, prior to commencement of any physical works (refer to Figure 7.7 and Section 9). The wetlands on the eastern side of Thackeray Street in SU6 was not accessible however the Deerubbin LALC Site Officer confirmed no additional survey would be required, as a result of the disturbed nature of this SU.

Table 7.2 Total survey area in each SU

SU	Surveyed area
SU1	70 per cent
SU2	35 per cent
SU3	35 per cent
SU4	50 per cent
SU5	35 per cent
SU6	12 per cent
SU7	30 per cent
SU8	5 per cent
SU9	15 per cent

Legend

- Study area
- SU1 Ermington Boat Ramp
- SU2 Waratah St
- SU7 Hill Road and River Walk

Paper Size ISO A4

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Survey Units in Melrose Park

Project No. **12557728**
Revision No. **2**
Date **25/07/2022**

FIGURE 7.1

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Print date: 25 Jul 2022 - 14:14

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 25/07/2022 . Created by: dschmidt

Legend

- Study area
- SU3 Ken Newman Park
- SU4 Broadoaks Park

Paper Size ISO A4

0 100 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Aboriginal Cultural Heritage

Survey Units in Ermington and Rydalmere

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Date **25/07/2022**

FIGURE 7.2

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Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 25/07/2022 . Created by: dschmidt

Legend

- Study area
- SU4 Broadoaks Park
- SU5 Rydalmere Wharf
- SU6 Camellia

Paper Size ISO A4

0 100 200 Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Survey Units in Rydalmere and Camellia

Project No. **12557728**
Revision No. **2**
Date **25/07/2022**

FIGURE 7.3

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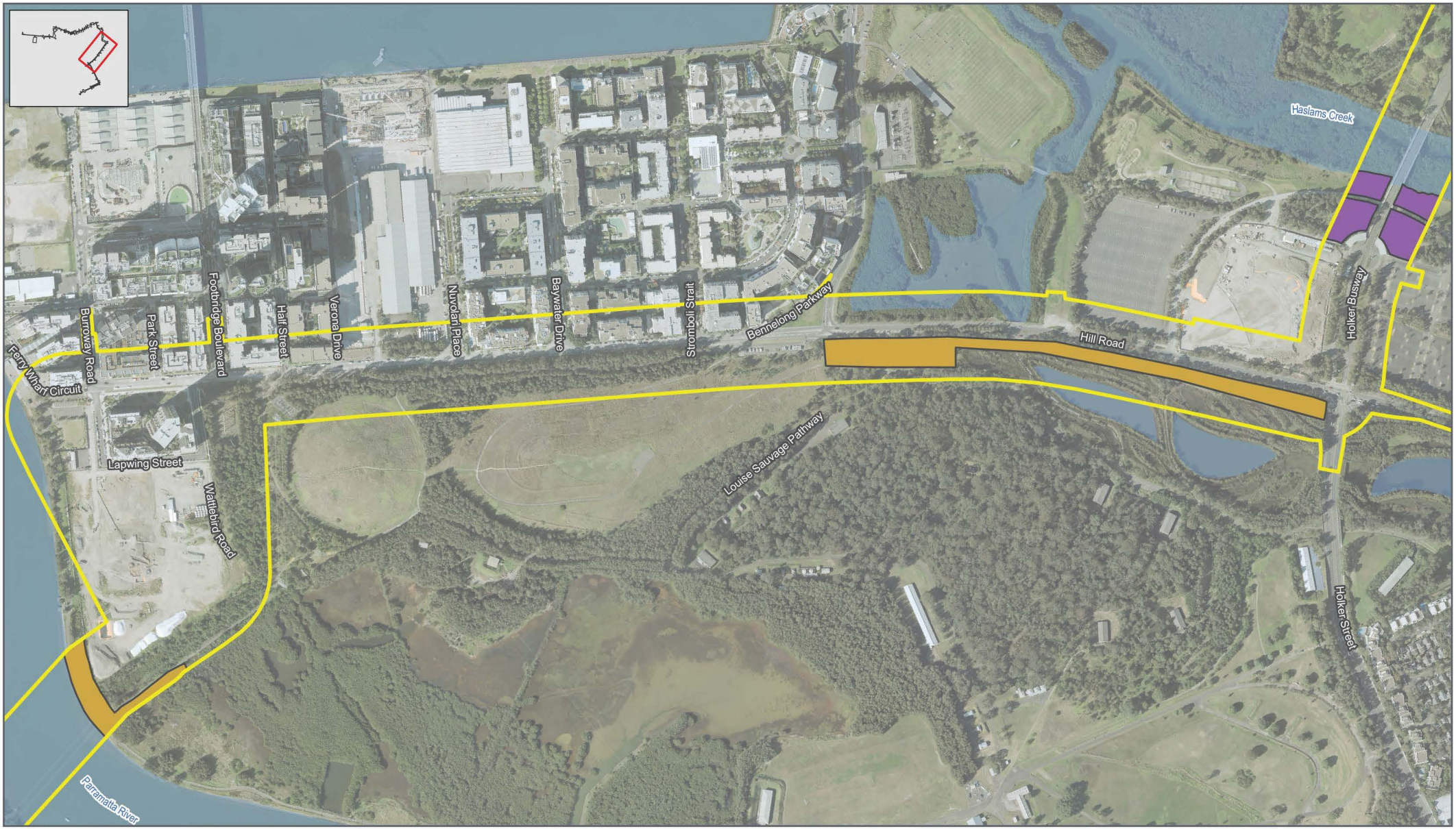
Print date: 25 Jul 2022 - 14:14

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 25/07/2022 . Created by: dschmidt



Legend

- Study area
- SU7 Hill Road and River Walk
- SU8 Haslams Creek

Paper Size ISO A4

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Survey Units in Wentworth Point

Project No. **12557728**
Revision No. **2**
Date **25/07/2022**

FIGURE 7.4

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Print date: 25 Jul 2022 - 14:15

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
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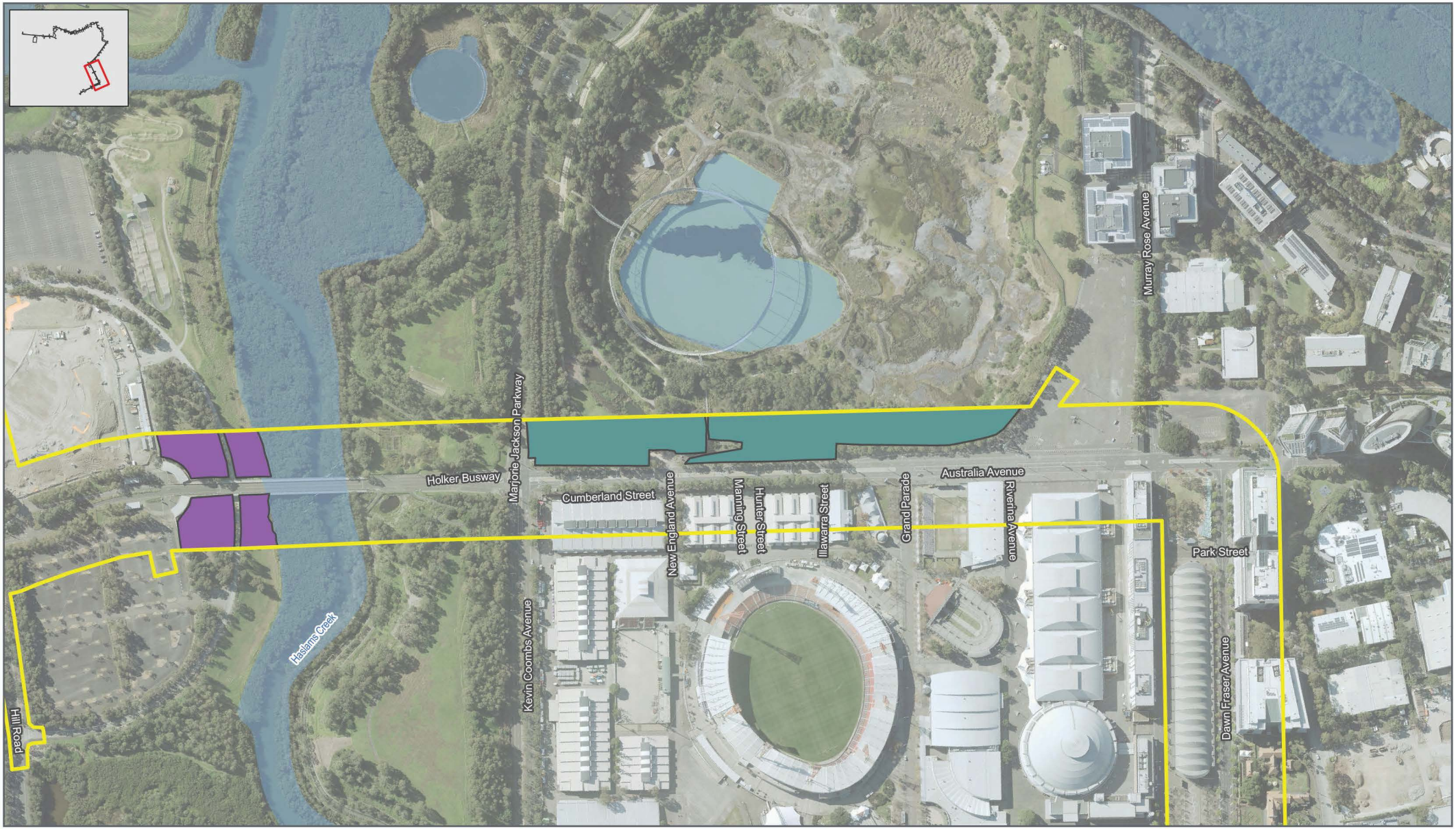

Legend

- Study area
- SU8 Haslams Creek
- SU9 Brickpit

Paper Size ISO A4

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Survey Units in Sydney Olympic Park

Project No. **12557728**
Revision No. **2**
Date **25/07/2022**

FIGURE 7.5

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Print date: 25 Jul 2022 - 14:15

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021, Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 25/07/2022 . Created by: dschmidt

7.3 Results of the field survey

7.3.1 Melrose Park

Survey Unit 1 – Ermington Boat Ramp

SU1 is located on a flat landform, 100 metres from the Parramatta River. This was the first survey unit inspected on foot. The ground visibility was nil to very low due to dense grass coverage.

Disturbance was noticed in the wetlands area adjacent to Wharf Road, Ermington Boat Ramp and car park. This disturbance was associated with the presence of bitumen, demolition material and sandstone retaining walls of the historic wharf (refer to Plate 7.1 and Plate 7.2). Previous geotechnical investigations for the project also indicate a degree of disturbance. Previous studies from this location recorded the presence of fill material to a depth of 125 centimetres, consisting of sand and sandy clay and then alluvial silty clay to a depth of 185 centimetres and sandstone bedrock beneath this.

The grassed flats in those areas were considered to be disturbed during the regeneration of mangroves. Further north-west of the car park area, the grasslands exhibited less disturbance except for the northern boundary, which has been disturbed by the Viva Gore Bay high pressure fuel line. The northern boundary of the car park area consists of possible intact deposits which were partially disturbed on south-eastern section via the overhead power infrastructure high voltage lines (refer to Plate 7.3 and Plate 7.4). Throughout the later half of the 20th century, the former agricultural land west of Wharf Road was industrialised. Between 1971 and 1985 modification to the foreshore was undertaken including the construction of an artificial island to house an electricity pylon.

SU1 consists of 9,538 square metres of which 6,676 square metres was surveyed on foot. Two per cent of the area had surface exposure and was inspected. No Aboriginal artefacts were located during the survey. The Site Officer from the Metropolitan LALC, noted that shell middens can be the most common Aboriginal site type in this area due to the proximity to the river. Due to the proximity to known midden as well as the landform and disturbance context, the portion of the surveyed area shown on Figure 7.8 has been assessed as having high archaeological potential.

Plate 7.1 Looking south-east, mangroves on Ermington Boat Ramp

Plate 7.2 Looking east, retaining walls of shoreline

Plate 7.3 Looking north-east, electrical easement in the parking area

Plate 7.4 Looking north, intact parts of the parklands

Survey Unit 2 – Waratah Street

SU2 is located on the northern boundary of Waratah Street around 120 to 150 metres from the Parramatta River which was previously assessed as having high Aboriginal heritage potential (section 5.3), as shown on Figure 7.1. This SU was considered to have a high potential for Aboriginal heritage as intact residual soils were recorded from 40 centimetres below surface based on previous geotechnical investigations for the project. SU2 consists of 3,036 square metres of which 1,062 square metres was surveyed on foot. Two per cent of the area had surface exposure and was inspected and no Aboriginal artefacts were located during the survey. The ground visibility was around 20 per cent and mostly covered with gravels and clayey loam (refer to Plate 7.5 and Plate 7.6).

Plate 7.5 Looking north-west along Waratah Street

Plate 7.6 Looking north along Waratah Street

7.3.2 Ermington

Survey Unit 3 – Ken Newman Park

KNC previously reported SU3 as having potential for archaeological deposits located at shallow depths (KNC, 2018). Previous geotechnical studies undertaken as part of the project unearthed an intact clay rich residual soil profile at greater than 30 centimetres depth.

Ken Newman Park is located in mid and low slopes which have been disturbed through the installation of the Sydney Water potable water pipelines in one third of the northern section of the park (refer to Figure 7.2) (refer to Plate 7.7 and Plate 7.8). SU3 consists of 32,191 square metres of which 11,266 square metres was surveyed on foot. Ground surface visibility was 0.2 per cent and no Aboriginal artefacts were located during the survey.

The disturbed corridor to Hilder Road was excluded from the survey, except for the eastern part of the council strip on Hilder Road which has not been disturbed (refer to Plate 7.9). The small area of spoil shown in Plate 7.10 is comprised of silty sand and is located on the disturbed section of part by the Sydney Water potable water pipeline, therefore, does not contain intact soil profile. The ground visibility was nil except for this exposure due to the thick grass. The current tree line implies a water course is running through the park, however, no earlier water course was identified in historical imagery.

The park lies in a north-south direction and is located around 300 to 600 metres from the Parramatta River in the south and north respectively. Even though the distance to the river is greater than the archaeological predictive model proposed distance (less than 200 metres to a watercourse), this mid slope may have been preferred as campgrounds or other activities during high tides or floods as Parramatta River is subject to flooding. This assumption was supported by the Metropolitan LALC Site Officer.

Plate 7.7 Looking north to Ken Newman Park

Plate 7.8 Looking west to the Sydney Water pipeline easement

Plate 7.9 Looking north on the Hilder Road east

Plate 7.10 Looking west, disturbed soil in Ken Newman Park

7.3.3 Rydalmere

Survey Unit 4 – Broadoaks Park and surrounds

The dominant portion of SU4 is located at Broadoaks Park which is located between Primrose Avenue and Fallon Street in an east-west direction. The park is located in mid and low slopes, with disturbance areas in one third of the north section due to topsoil erosion (refer to Figure 7.2, Plate 7.11 and Plate 7.12). The remainder of SU4 is located on the northern section of South Street, however as this council strip/easement was observed to be disturbed by the Sydney Water potable water pipelines, it was not considered to have archaeological potential.

In total, SU4 consists of 4,968 square metres of which 1,046 square metres was surveyed on foot. One per cent of the area had surface exposure and was inspected and no Aboriginal artefacts were located during the survey.

The Deerubbin LALC Site Officer noted that the northern half of the Broadoaks Park was subject to topsoil erosion of the A horizon, with insect nests exposing the soil which consisted of clayey silt with iron stone and pebble inclusions. The remainder of the park had no ground visibility due to high grass.

Plate 7.11 Looking north-west in Broadoaks Park

Plate 7.12 Looking south to soil exposure

Survey Unit 5 – Rydalmere Wharf

SU5 has been subject to levels of disturbance from various activities including landscaping, construction of walking paths, bicycle paths and car parks as well as Sydney Water utilities. However, based on the Aboriginal heritage sensitivity map of Parramatta LGA (refer to Plate 5.1) the parklands of the wharf have been recorded as high archaeological sensitivity (refer to Figure 7.3).

Rydalmere Wharf is situated on a flat landform on the north shore of the Parramatta River, with landscape gardens and young trees (refer to Plate 7.13 and Plate 7.14). The foreshores of the wharf have been disturbed by the retaining wall and a footpath (refer to Plate 7.15 and Plate 7.16). Parklands around the wharf extend from the Sydney Water potable water pipelines in the west to John Street in the east. The northern extent of the wharf is bordered by the car park (refer to Plate 7.17 and Plate 7.18). The parklands are slightly elevated to the northern areas which may indicate soil integrity.

During the wharf upgrade a desktop Aboriginal heritage assessment was undertaken as a part of the Statement of Heritage Impact (City Plan Services, 2018). This report suggested that Aboriginal people have a long and enduring connection with the Rydalmere area. However, the PACHCI Stage 1 Assessment determined that it was unlikely that the proposed wharf upgrade works would impact Aboriginal cultural heritage (WSP Australia & RMS, 2018). Previous geotechnical studies in 2019 recorded intact soil matrices from beneath 120 centimetres depth, therefore, Aboriginal archaeological potential may be present under the modern disturbed layers.

SU5 consists of 20,290 square metres of which 7,245 square metres was investigated during the survey. Four per cent of effective coverage was recorded on foot via an unsystematic walk because of the low visibility. The ground visibility during the survey was very low to nil during the survey except for the tree line in the northern boundary of the parkland. One quartz piece with no diagnostic features was recorded from the surface exposure under a tree around 50 metres from the river during the survey. This quartz could have been redeposited by

disturbance or tumbling in the river (refer to Plate 7.18 and Plate 7.19). This SU has been recorded as high archaeological potential based on the distance to the river and the Aboriginal heritage sensitivity map (section 5.3).

Plate 7.13 Looking north-west in parklands

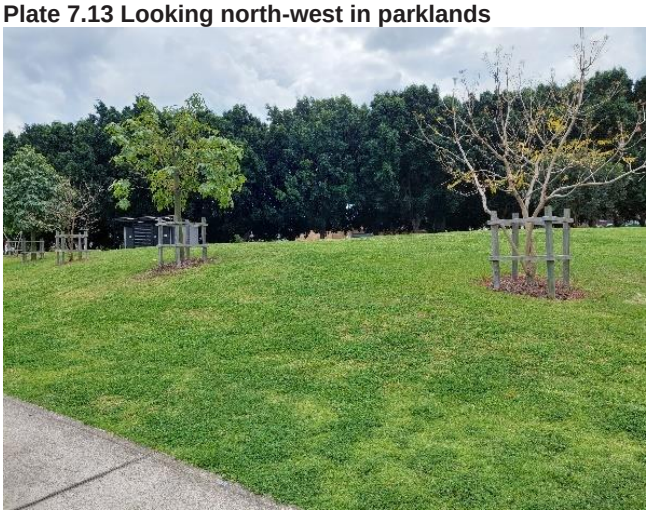


Plate 7.14 Looking south at Rydalmere Wharf

Plate 7.15 Looking west to retaining walls of the wharf

Plate 7.16 Looking south-west to the wharf parklands

Plate 7.17 Looking north to the car park

Plate 7.18 General location of quartz piece

Plate 7.19 Quartz piece found at the wharf

7.3.4 Camellia

Survey Unit 6 – Thackeray Street and mangroves

Camellia precinct is highly industrialised and disturbed. Therefore, within the study area SU6 is limited to the nature strips on Thackeray Street and the mangroves on Parramatta River (refer to Figure 7.3). Previous geotechnical investigations for the project recorded ground conditions at the south bank of the Parramatta River comprising up to 2.6 metres of fill, generally associated with land reclamation, overlying very soft silty clay and sandy clay. Holocene Alluvium was reached from 2.6 metres to 15.8 metres in depth. While much of Camellia has been subject to development from various industries, the *Wetlands* comprising mangrove swamps and salt marshes along the banks of the Parramatta River has remained largely undeveloped.

SU6 consists of 4,610 square metres however the grassland had no visibility and the elevated street line suggested that this area has high levels of ground disturbance (refer to Plate 7.20 and Plate 7.21). A total of 230 square metres of this SU was surveyed on foot and no Aboriginal artefacts were found during this survey.

Plate 7.20 Mangroves in Camellia

Plate 7.21 Looking south on Thackeray Street

7.3.5 Wentworth Point

Survey Unit 7 – Hill Road and river walk

Previous landfill and chemical contamination in Wentworth Point has affected the archaeological potential in the area. Therefore, SU7 was divided into two separate parts, avoiding the remediated landfill areas containing compacted waste material in Woo-la-ra (refer to Figure 7.4). In total, SU7 consists of 49,910 square metres of which 13,463 square metres was surveyed on foot.

The northern part of SU7 is located along the river walk, adjacent to Parramatta River (refer to Plate 7.22 and Plate 7.23). This part of the survey unit was previously considered to be less impacted by previous disturbance except for the footpath construction and electrical easement. The saltmarsh wetland habitat in this area is an important component of the remaining saltmarsh community in New South Wales. Since European occupation, over 80 per cent of the saltmarsh habitat in the Sydney region has been lost, and in the Upper Parramatta River area, there has been a loss of 92 per cent of the original saltmarsh area (Millennium Parklands Heritage Precinct SEPP (PCRC) Item A). However, at Wentworth Point and Sydney Olympic Park (north of Haslams Creek) the study area is situated on manmade fills with a thickness of more than two metres over the Quaternary estuarine and alluvial deposits, to allow for industrial development. The adjacent 'Sanctuary' development in Wentworth Point also recorded the presence of highly disturbed and contaminated soil samples based on geotechnical results (Roads and Maritime Services, 2013).

This section of SU7 is located on a flat landform with very low surface exposure (five per cent) due to vegetation and grass. No Aboriginal artefacts were found during the survey and based on the results from previous geotechnical studies no further investigation is required in the river walk.

The second part of SU7 is located on the west bound section of Hill Road where AHIMS 45-6-2785 was recorded by GPS coordinates. AHIMS 45-6-2785 was previously recorded as a PAD within the Newington Nature Reserve and was mapped around 50 metres outside of the project site based on the site card map and description. This area was subject to landscaping of the wetlands and located on a flat landform (refer to Plate 7.24 and Plate 7.25). The surface visibility was low to nil due to shrubs and leaves. No Aboriginal artefacts were identified during the survey.

Plate 7.22 Looking north to Parramatta River

Plate 7.23 Looking south-west on river walk

Plate 7.24 Looking south to Millennium Parklands

Plate 7.25 Looking south to Millennium Parklands

7.3.6 Sydney Olympic Park

Survey Unit 8 – Haslams Creek

SU8 consists of Haslams Creek, mangroves and the banks of the creek (refer to Figure 7.5). The broad area has been remediated due to previous landfilling activities and now contains waste material which has been compacted and capped. The creek's riverbed has also been subjected to change via concrete channelling. However, KNC previously identified that the slopes on each side of the Holker Busway bridge, north of Haslams Creek, have low to moderate potential (KNC, 2018).

The alluvial flats in the area would have provided many resources to the Aboriginal people (refer to Plate 7.26 and Plate 7.27). Therefore, the presence of the intact soil profile may have archaeological potential due to the close distance to the watercourse. SU8 consists of 9,513 square metres of which 0.5 per cent was survey for effective coverage. In total, 470 square metres was surveyed on foot. The ground surface visibility was nil due to grassland and no Aboriginal artefacts were identified during the survey.

Plate 7.26 Looking north-east to Holker Busway

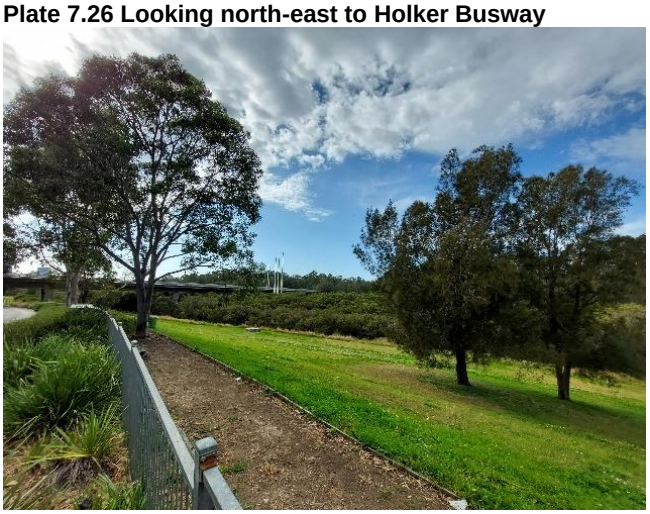
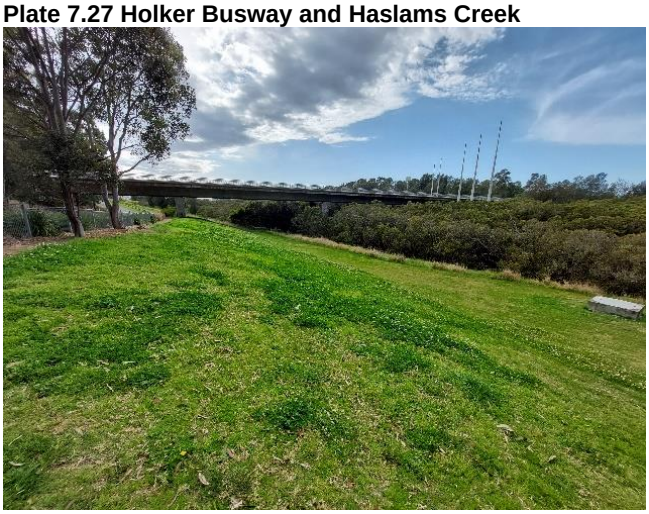


Plate 7.27 Holker Busway and Haslams Creek



Survey Unit 9 – Brickpit

SU9 consists of the nature strip on the eastern side of Australia Avenue adjacent to the Brickpit at Sydney Olympic Park (refer to Figure 7.5). The area is within a flat landform with extensive grass coverage and disturbance from a footpath/cycling lane and may present an intact soil profile.

SU9 consists of 13,084 square metres of which 1,962 square metres was surveyed on foot. Ground surface exposure was around one per cent of the area. The ground surface visibility was low (10 per cent) during the survey due to the grass. The area was subject to an unsystematic visual inspection as a result of this low visibility (refer to Plate 7.28 and Plate 7.29). Dark brown silty loam was exposed on the ground surface and additional disturbance was visible from an old stormwater pipe on the eastern side of the nature strip towards the Brickpit. No Aboriginal artefacts were identified during the survey. The undisturbed nature strip in this location is partially within the project site.

Plate 7.28 Looking north-west to Brickpit

Plate 7.29 Looking east towards to Brickpit

7.3.7 Parramatta CBD (desktop)

As noted previously, the area of the project site in the Parramatta CBD was not confirmed at the time of the archaeological survey conducted on 24 January 2022 and documented in the ASR for the project (refer Appendix C). However, this area was previously assessed for Parramatta Light Rail Stage 1. As such, information and assessment from *Parramatta Light Rail Aboriginal Cultural Heritage Assessment Report* (KNC, 2017) and subsequent investigations have been relied upon for this area. Since, Parramatta Light Rail Stage 1 was assessed, additional analysis and research in the Parramatta CBD has updated the knowledge on heritage values in this area. The following section identifies the key results from both the KNC study and an updated desktop analysis. This section also considers archaeological results from sites excavated immediately adjacent to the Parramatta CBD turnback facility to provide relevant context.

The Parramatta CBD area was surveyed by KNC in December 2016. Based on the archaeological background and landform context, the survey inspected areas of surface exposure for artefacts and evidence of intact soils and considered long term flood activity. The survey concluded that most of the study area contained little to no potential for subsurface archaeology due to disturbance from land use practices. These included the construction of buildings and roads, the installation of utilities, landscaping, and bulk earthworks. Low lying areas along the banks of Parramatta River and major creeks were likely to have been heavily disturbed by high energy flooding events, which could washout subsurface deposits. Soils on adjacent slopes were often disturbed and eroded. Aboriginal archaeological sites/PADs that were identified by KNC's survey in the Parramatta CBD is shown in Table 7.3, and Plate 7.30, Plate 7.31.

Table 7.3 Identified Aboriginal archaeological sites/PADs in the Parramatta CBD precinct following field survey (KNC, 2017)

Location of precinct	Identified Aboriginal sites/PADs
Between Victoria Road and Purchase Street (inclusive of Robin Thomas Reserve)	Harris St Footpath/Robin Thomas Reserve
	PLR PAD 1
	PLR PAD 2
	PLR PAD 3

Plate 7.30 Identified Aboriginal archaeological sites/PADs in each precinct following field survey (KNC, 2017)

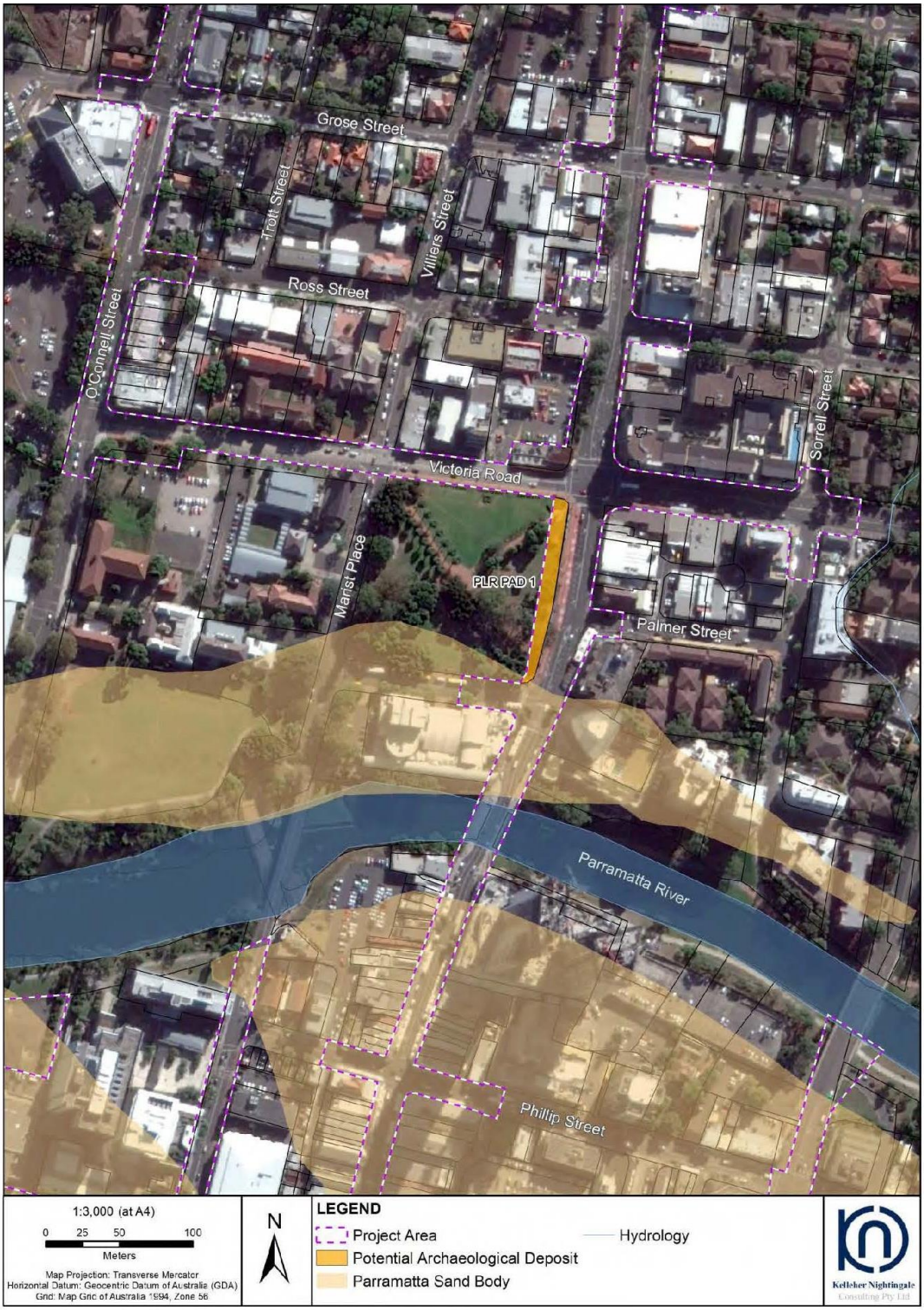


Figure 7. Aboriginal archaeological survey results – central west

Plate 7.31 Identified Aboriginal archaeological sites/PADs in each precinct following field survey (KNC, 2017)

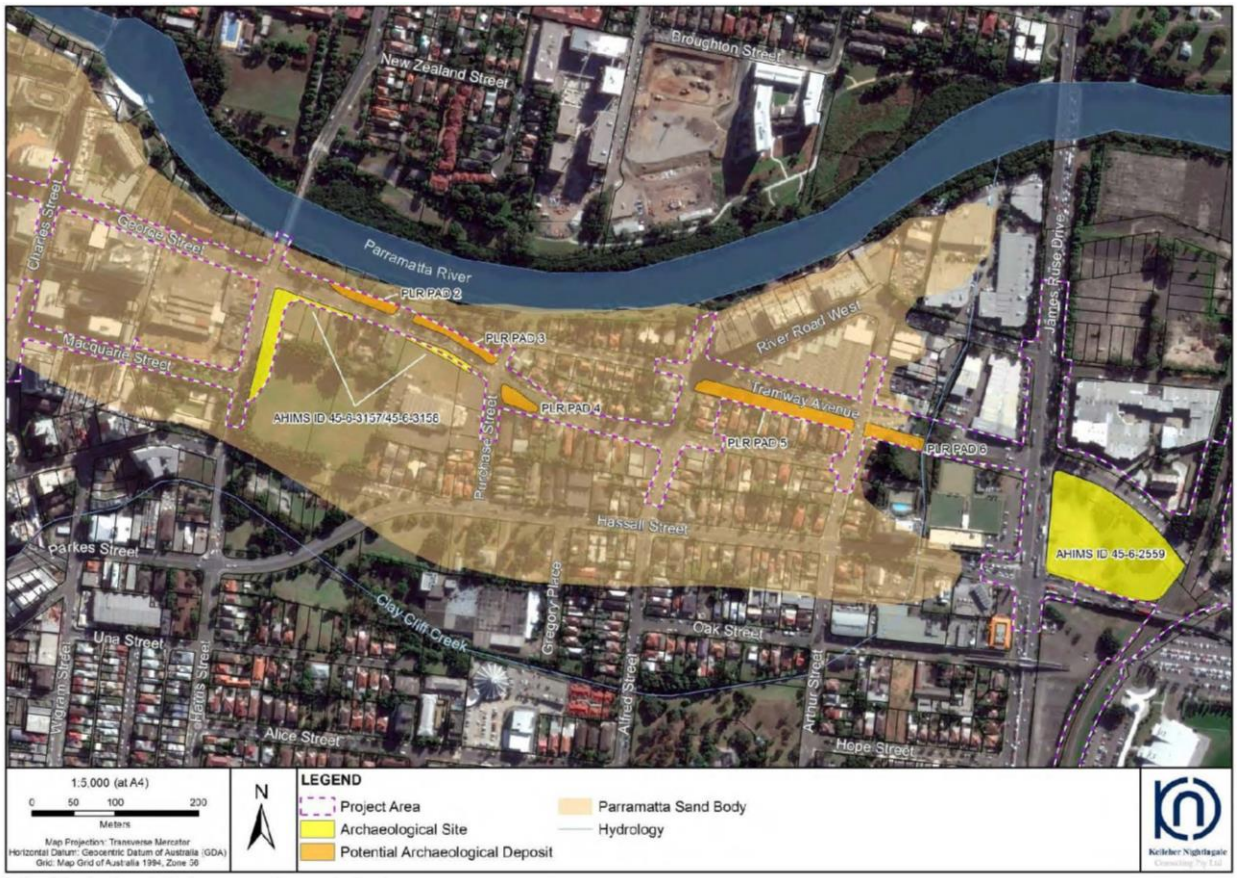


Figure 8. Aboriginal archaeological survey results – central east

In addition to database searches which revealed two AHIMS sites (AHIMS 45-6-2977 and 45-6-4015) within the project site, a high-level desktop assessment has been undertaken for the section of the Parramatta CBD project site. This was undertaken to capture further research and investigation that has taken place since the Parramatta Light Rail Stage 1 assessments as seen in Williams et. al. 2021. This section aims to identify Aboriginal archaeological potential for the Parramatta CBD turnback facility by analysing the investigations in proximity to the project site.

150 Marsden Street

Studies on Marsden Street uncovered archaeological potential in the Parramatta CBD. While the focus of these studies was historical archaeology, the results provide an indication of the surviving resource immediately west of Marsden Street and should be considered when assessing the likelihood of any Aboriginal archaeological potential. The site was recognised in the Parramatta Historical Archaeological Landscape Management System (PHALMS) study to be one of exceptional archaeological value and of possible State significance (GML, 2000).

The excavations at 150 Marsden Street revealed that the area was at the base of a depression running between the higher ridges of Macquarie and George Streets (Thorp, 2007). This site was substantially modified over the course of two centuries of occupation which resulted in the removal of the A1 topsoil. Very few small remnants of the A2 soil profile remained on site. B-horizon clay was uncovered largely during the excavations (Cultural Resources Management & Austral Archaeology Pty Ltd (CRM & Austral), 2009a). Channels were dug to control water run-off across the site.

The site had a substantial slope running from the higher end at the east gradually levelling to a flat area at the western end. There was evidence to indicate that a small stream or creek crossed the site at the base of this slope. The excavation also revealed that the topsoil from the site had been comprehensively removed possibly around the mid-19th century. The 150 Marsden Street site remained part of the backyard of allotments to the north and south up until around 1811. After 1811, the site became a residential allotment and construction of two dwellings, by Thomas Shaw sometime between 1811 and 1823 caused the removal of all topsoil and its replacement by a thick clay layer.

Nevertheless, the 150 Marsden Street site was subject to test excavations for Aboriginal occupation prior to the commencement of the historical excavation and fourteen test pits were excavated and recorded (CRM & Austral, 2009b). No evidence of Aboriginal occupation was found in this phase or the subsequent historical excavation, even though several Aboriginal heritage sites have been excavated within proximity. The topography and the poor condition of the land suggested that this was not a place attractive to either the earliest European colonists or to the local Darug people.

134-140 Marsden Street and 45-47 Macquarie Street

Excavations on 134-140 Marsden Street & 45-47 Macquarie Street revealed the remains of four 'convict huts', one of which had a brick lined well adjacent to the cellar. A test trench around this site was excavated to determine the depth of significant archaeological layers and ascertain the surviving condition of the site. The test trench indicated that the whole of the Macquarie Street frontage was well preserved, except for disturbance from the concrete piling (Edward Higginbotham & Associates (EH&A 2017), 2017). However, on Marsden Street the A1 and A2 horizons had been largely disturbed by 20th century demolition, leaving only features cut into the natural clay. Most of the archaeological evidence (artefact dating and stratigraphy) dates the construction of the cellar to the 1830s, when the site was partially occupied by the Shepherd and Flock Inn (1825-1870), but there is some evidence to suggest that the cellar may have belonged to the Wheatsheaf Hotel between 1801-1808. These convict huts were located around eight metres AHD under the footings of the late 19th century terraced house which had destroyed any earlier evidence.

No Aboriginal heritage assessment took place at this site except for pollen analysis of one natural soil sample. The 'natural' soil sample that preserved microfossil evidence of the pre-European vegetation, revealed savannah grassland occupying the higher river terraces within the Parramatta District and stands of casuarinas (presumed to be the river-oak *Casuarina cunninghamii*) growing along the upper (freshwater) reaches of the Parramatta River (Macphail, 2012). Eucalypt trees seem to have been rare around the site.

An analysis of findings relevant to the study area

The Parramatta Sand Body was uncovered during excavations at 15 Macquarie Street and the Children's Court (about 200 metres west from the project site). The approximate height of the upper layer with Aboriginal cultural deposits was nine metres AHD (Owen et al., 2022). The Parramatta Sand Body generally formed a sand terrace with an upper surface between four to nine metres AHD on the south side of the Parramatta River and eight to 14 metres AHD on the northern side. A section of the sand body was also mapped in the area bounded by O'Connell, Macquarie and Marsden Streets which intersects with another body of alluvium between these two locations an area of high ground (about 10 metres AHD). This body appears to be underlain by a mixture of clay and sand that is probably older than the Parramatta Sand Body (Groundtruth Consulting, 2008). This body has been mapped separately, however, the exact location where the two materials interface and its distribution remain uncertain.

Modern buildings have destroyed a very large proportion of the original sand body in the Parramatta CBD, however any remaining nineteenth century buildings are likely to retain some undisturbed sand beneath their foundations except where cellars have been excavated (Groundtruth Consulting, 2008). Another example of this is at 330 Church Street, where the development excavated to nine metres below ground surface, whereas the excavations indicated that the already truncated sand unit occurred only between two to three metres below the surface in this location (Williams et al., 2021).

On the other hand, it was noted by Groundtruth Consulting (2008) that most roads and footpaths can also be expected to preserve some intact sand. Particular attention should be given to any proposed excavation of roads and footpaths in areas of the sand body and investigation of major works for service line installation etc, by test excavation or drilling to check the presence and integrity of the sand body and its archaeological potential. However, recent monitoring works conducted by Umwelt Environmental & Social Consultants along Macquarie Street footpath uncovered disturbed soil profiles (personal communication with Umwelt). It is noted the results these works have not been formally reported at the time of writing and have been provided by Heritage NSW to inform this report. Monitoring works took place on 20-31 and 44 Macquarie Street and 144 Marsden Street. The trench on 144 Marsden Street (refer to point B on Plate 7.32) which is within the project site revealed a layer of fill up to 800 millimetres in depth, including a layer of road base, redeposited Blacktown soil landscape with historical fill of small sandstone and bricks. No intact soil profiles with potential Aboriginal archaeology were identified. A second trench location overlapping with project site is located on 20 Macquarie Street (refer to point C on Plate 7.32) which uncovered fill layers of builders' sand and concrete rubble up to a 700 millimetre depth. No natural soil profiles were identified in this location.

Recently, an overview on the Parramatta Sand Body discussed that archaeological deposits found immediately beneath the layer of current development across Parramatta, usually were found within approximately 40

centimetres of the current surface (Williams et al., 2021). Previous excavations on Marsden and Macquarie Streets uncovered disturbance and removal of topsoil and A horizons. However, the street frontage was found undisturbed on 45-47 Macquarie Street which may suggest intact soil profile of the Parramatta Sand Body under the road alignment (Figure 7.6). 150 Marsden Street displays a different landform than the project site, which was a depression, therefore A horizons may be intact on the project site of Marsden Street which was on the ridgeline of Macquarie Street.

The archaeological investigations in 134-140 Marsden Street & 45-47 Macquarie Street uncovered historical archaeological deposits at depth below the road surface as the site was built up due to localised flooding. Based on the excavations in the vicinity and previous assessments on intactness of the Parramatta Sand Body within the project site, there is a high possibility that the road alignment would contain preserved and intact sand body surviving underneath existing road fabric (AHIMS 45-6-4015 and AHIMS 45-6-2977), considering this area has been not disturbed by prior infrastructure.

Plate 7.32 Monitoring locations along Macquarie Street (Umwelt Environmental & Social Consultants 2022)

Legend

- Artefact : -
- Artefact : -, Potential Archaeological Deposit (PAD) : -
- Potential Archaeological Deposit (PAD) : -
- Potential Archaeological Deposit (PAD) : 1
- Project site
- Parramatta Sand Body Area
- Previous excavations

Paper Size ISO A4

0 50 100

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Previous studies in proximity to project site

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Date **17/08/2022**

FIGURE 7.6

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH010_PreviousStudies
Print date: 17 Aug 2022 - 11:21

Data source: Study area - GHD2022; Watercourse - NSWSS2022; Wharf - TfNSW2018; Imagery - Metromap Tile Service: extracted 17/08/2022 . Created by: lmanasan

7.3.8 Areas not surveyed

As noted in section 7.2, some areas identified as having Aboriginal archaeological sensitivity were not able to be surveyed.

Melrose Park Public School (oval) is located partially within the study area on a flat landform with likely minimal disturbance 200 metres from the Parramatta River and as such is considered to have high Aboriginal heritage potential. During the survey, the oval was observed from the nearby footpath and the ground exposure seemed to be very low due to high grass. It was also noted that the path in the middle of the oval was being resurfaced exposing some topsoil in the process (refer to Plate 7.33 and Plate 7.34). No Aboriginal artefacts were observed from the footpath. No further investigations are recommended for the Melrose Park Public School (oval) as it is outside of the project site boundary and would not be impacted.

Ten residential properties, adjacent to Wharf Road, are located within the study area (refer to Figure 7.7). Any undisturbed gardens and backyards of these properties may hold Aboriginal heritage potential based on their distance to the Parramatta River and PAD1. Transport for NSW has committed to completing a survey of the ten residential properties in Melrose Park, in consultation with the LALC Site Officers, should it be confirmed they could be impacted by the project and once property access can be arranged (refer to section 10).

Additionally, the mangroves along Camellia were not accessible to survey. As a result of the disturbed nature the Deerubbin LALC Site Officer confirmed that no further investigations are necessary in Camellia.

Plate 7.33 Looking south to Melrose Park Public School oval

Plate 7.34 Looking east, the construction works in the school oval

Legend

- Project site
- Archaeological senstivity areas not surveyed

Paper Size ISO A4

0 20 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Aboriginal Cultural Heritage

Areas of Aboriginal archaeological sensitivity recommended for future survey

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Date **27/10/2022**

FIGURE 7.7

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_3.aprx\12557728_ACH009_SensitivityAreasForSurvey
Print date: 27 Oct 2022 - 07:51

Data source: Study area - GHD2022; Wetland - DPIE2018; Watercourse - NSWSS2022; Wharf - TfNSW2018; Imagery - Metromap Tile Service: extracted 27/10/2022 .
Created by: dschmidt

7.4 Summary of archaeological survey and desktop analysis

The survey was undertaken in accordance with the recording requirements stipulated in The Code and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW, 2011*).* This included identifying landforms and landscapes including visibility and exposure for each survey unit. The effective coverage data (around 13 per cent) for the survey indicated that generally there were poor ground surface visibility across the study area which significantly reduced the possibility of identifying surface evidence of past-Aboriginal occupation.

Where Aboriginal sites are present in the study area, these are likely to be within pockets of undisturbed parklands, nature strips adjacent to watercourses and within 200 metres of the river with limited previous ground disturbance. A total of eight PADs were identified within the study area, as a result of the archaeological field survey and in consultation with LALC Site Officers. Four PADs were identified with high archaeological potential (as they were in close proximity to a known site or landform such as a river or creek) and an additional four PADs were identified as having moderate archaeological potential (which despite their distance to watercourses being greater than 200 metres, it was considered that these areas could be routes to inland).

No Aboriginal artefacts were identified during the survey.

The survey also included general discussion with the LALCs with respect to the Aboriginal cultural heritage values of the study area and surrounds. Both Site Officers emphasised the important role of the Parramatta River for surrounding Aboriginal communities as a food source, as well as gathering and ceremonial places along the river. Eel traps and shell middens associated with the river are considered highly significant for Aboriginal people.

7.4.1 PADs identified with high archaeological potential

This section summarises the PADs identified in the study area during the survey or desktop research, and documented in the ASR. As this is a Preliminary ACHAR, the PADs have been defined for a large area in order to address archaeological potential and to accommodate options for design refinement in the Final ACHAR.

PLR2 PAD1 Ermington Boat Ramp, Melrose Park (9,204 m^2)

The Ermington Boat Ramp area has been previously identified as having high archaeological potential (Dallas Consulting, 2014), and the less disturbed parts of this area have been recorded as an area of potential archaeological deposit following the survey (refer to Figure 7.8) The less disturbed areas include:

- the nature strip north-west of the overhead high voltage lines
- the northern (SU2) boundary of Waratah Street.

PAD1 is located in the Lucas Heights Soil Landscape, which is formed *in situ* by weathering material, namely residual soil. This soil type is favourable for artefact durability, except for organic material, which may result as an accumulation of artefacts from the different occupation levels. The survey indicated that the area had been modified by landscaping, the Viva Energy fuel pipeline and the high voltage power easement, however, archaeological investigations at sites in the region have uncovered intact archaeological deposits beneath modern disturbance. The area has been assessed as having the potential for subsurface Aboriginal archaeological deposits due to its proximity to the Parramatta River and the shell midden (AHIMS 45-6-1961) on the west coast of the unnamed bay in Ermington.

PLR2 PAD2 Melrose Park Public School Oval (7,972 m^2)

Melrose Park Public School oval has been identified as an area of potential archaeological deposit based on landform features and distance to Parramatta River and noting the likely minimal disturbance of the oval which indicates potential for sub-surface archaeological deposits (refer to Figure 7.8). The location was observed from the footpath with the Metropolitan LALC Site Officer, although not directly surveyed. The elevation of this area associated with the Parramatta River would have been less impacted by flooding and so the disturbance from historic and modern land use has been limited.

PLR2 PAD3 Rydalmere Wharf (18,447 m^2)

Rydalmere Wharf and parklands around the wharf have been identified as an area of potential archaeological deposit on the flat, gently sloping area to the north of the parklands (refer to Figure 7.9). While previous construction of amenities, car parks and vegetation removal has been undertaken in the area, the landform remains largely intact. Although bicycle paths and landscaping have partially disturbed

the area; the wharf has been assessed as having potential for subsurface archaeological deposits below the modern disturbance due to its proximity to the Parramatta River.

PLR2 PAD4 Haslams Creek, Sydney Olympic Park (3,650 m^2)

The grassland adjacent to Holker Busway is an area of potential archaeological deposit which was previously identified based on the likelihood for natural soils comprising deep alluvial deposits along the riverbank of Haslams Creek being located under imported material (refer to Figure 7.10). Therefore, due to the proximity to the watercourse this area has been assessed as having high potential for Aboriginal occupation deposits.

AHIMS 45-6-2977 (Macquarie St PAD 3)

This PAD is located on Macquarie Street, based on the site card map, between the intersections of Church Street and across to the intersection of O'Connell Street (refer to Figure 7.11). The site was registered in 2011 by Comber Consultants as a PAD located in an area where the Parramatta Sand Body was identified with intact soil profiles.

7.4.2 PADs identified with moderate archaeological potential

PLR2 PAD5 Broadoaks Park, Rydalmere (4,369 m^2)

Broadoaks Park is located on a mid slope with very limited and unknown levels of previous disturbance (refer to Figure 7.9). The topsoil (A horizon - brown clay loam) was observed during the survey to be eroded in the central areas of the park but intact in the south. These erosional soils are associated with poor preservation of archaeological material which is likely to occur at shallow depths.

Broadoaks Park was initially assessed as having high archaeological potential in the Aboriginal Sensitivity Map (Dallas, 2014) but based on the distance to the water, was revised to moderate archaeological potential. This assessment is subject to change following archaeological testing. Due to the elevation of the parkland and undisturbed condition in the south of this area was assessed to have a moderate level of archaeological potential.

PLR2 PAD6 Ken Newman Park, Ermington (32,191 m^2)

Ken Newman Park is situated on the low and mid slopes of a small ridgeline (refer to Figure 7.9). The park is located on the intersection of two soil landscapes – Lucas Heights and Glenorie. Residual and erosional loams in this area have the potential to contain archaeological deposits at shallow depths. Ken Newman Park was initially assessed as high archaeological potential in the Aboriginal Sensitivity Map (Dallas, 2014) but based on the distance to the water has been revised as moderate archaeological potential. This assessment is subject to change following archaeological testing. Considering the very limited previous disturbance, except for Sydney Water potable water pipelines crossing the parkland, this park has been assessed as having moderate archaeological potential, especially noting the limited impact the site would expect to see from flooding due to its elevation.

PLR2 PAD7 Hill Road West, Sydney Olympic Park (adjacent to AHIMS 45-6-2785) (21,495 m^2)

The PAD shown on Figure 7.10 associated with AHIMS 45-6-2785 was recorded in 2006 within Sydney Olympic Park (Irish, 2006) (also refer to Figure 5.1). It contained a thin level of remnant soil to contain archaeological deposits. No surface cultural material was identified within PAD in 2006. The PAD is around 50 metres west of the project site.

However, due to the close proximity of the site, and analysis by this predictive model, an adjacent area to the west of Hill Road, has been nominated as a PAD and to be included in the test excavation program to investigate this prediction. AHIMS 45-6-2785 was not visited during the field survey for the current study as it is located within a fenced off area of woodland in Newington Armoury.

PLR2 PAD8 Brickpit, Australia Avenue (5,411 m^2)

A small area of nature strip adjacent to the Brickpit has been recorded as having moderate to low potential for archaeological deposits (refer to Figure 7.10). The broad area is disturbed by development and brick works. However, this flat nature strip may have subsurface Aboriginal cultural material due to its proximity to Haslams Creek.

AHIMS 45-6-4015 (Church St PAD 1)

This PAD is located at 197-207 Church Street and 89 Marsden Street, which partially overlaps with AHIMS 45-6-2977 on the footpath of Macquarie Street (refer to Figure 7.11). The site includes a PAD within the Parramatta Sand Body which may hold evidence for early 19th century feasts between Aboriginal and European people including, the Native Institute.

Legend

- Project site
- PAD 1 - Ermington Boat Ramp

Paper Size ISO A4

0 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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PADs identified in Melrose Park

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FIGURE 7.8

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_3.aprx\12557728_ACH007_PADsIdentified
Print date: 27 Oct 2022 - 09:11

Data source: Study area - GHD2022; PAD - RPS2022, Precinct - Mecone2021; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 27/10/2022 . Created by: dschmidt

Legend

- Project site
- PAD 3 - Rydalmere Wharf
- PAD 5 - Broadoaks Park
- PAD 6 - Ken Newman Park

Paper Size ISO A4

0 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Aboriginal Cultural Heritage

PADs identified in Rydalmere and Ermington

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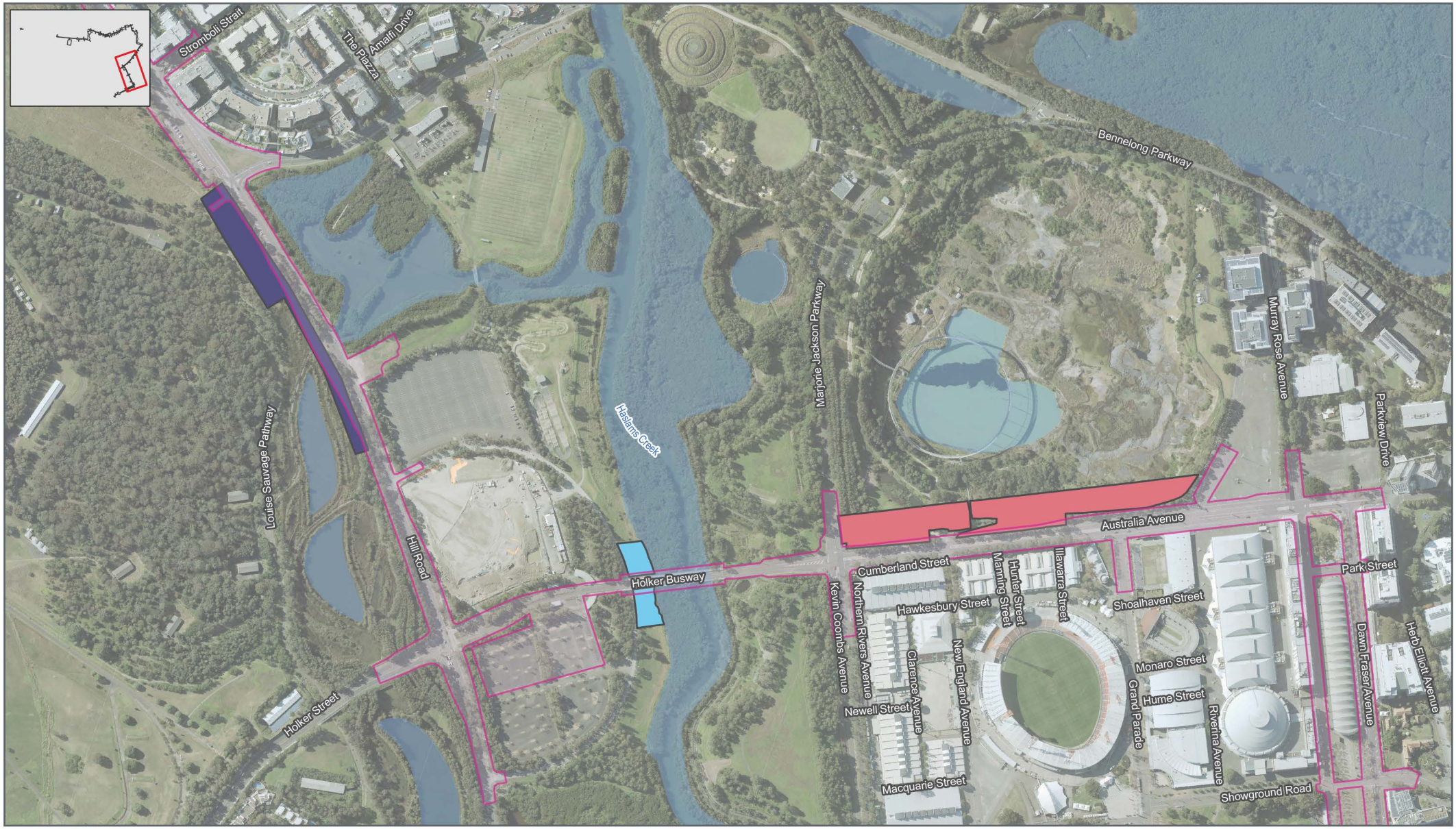
Revision No. **2**
Date **27/10/2022**

FIGURE 7.9

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_3.aprx\12557728_ACH007_PADsIdentified
Print date: 27 Oct 2022 - 09:12

Data source: Study area - GHD2022; PAD - RPS2022, Precinct - Mecone2021; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 27/10/2022 . Created by: dschmidt



Legend

- Project site
- PAD 4 - Haslams Creek
- PAD 7 - Hill Road West
- PAD 8 - Brickpit

Paper Size ISO A4

0 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Transport for NSW
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Aboriginal Cultural Heritage

PADs identified in Sydney Olympic Park

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FIGURE 7.10

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_3.aprx\12557728_ACH007_PADsIdentified
Print date: 27 Oct 2022 - 09:12

Data source: Study area - GHD2022; PAD - RPS2022; Precinct - Mecone2021; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 27/10/2022 . Created by: dschmidt

Legend

- Project site
- PAD 1 - Church Street
- PAD 3 - Macquarie Street

Paper Size ISO A4

0 50 100

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Transport for NSW
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Aboriginal Cultural Heritage

PADs identified in Parramatta CBD

Project No. **12557728**
Revision No. **2**
Date **27/10/2022**

FIGURE 7.11

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_3.aprx\12557728_ACH007_PADsIdentified
Print date: 27 Oct 2022 - 09:12

Data source: Study area - GHD2022; PAD - RPS2022; Precinct - Mecone2021; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 27/10/2022 . Created by: dschmidt

8 PRELIMINARY STATEMENT OF SIGNIFICANCE

In accordance with The Code and the *Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS, 2013) (the Burra Charter), this section assesses the archaeological significance and cultural values of the project site (which refers to the area where works for construction or operation may take place). Assessment of significance can only occur in consultation with RAPs.

Scientific (archaeological) value refers to the importance of a landscape, area, place or object because of its rarity, representativeness and the extent to which it may contribute to further understanding and information. Scientific value is assessed using criteria such as research potential, representativeness, rarity and education potential. The degree to which an area meets the criteria is assessed as low, moderate high or major using the significance assessment matrix shown in Table 8.1, which is based on the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage* (OEH, 2011) under Part 6 of the NPW Act.

Social cultural value refers to "*the associations that a place has for a particular community or cultural group and the social or cultural meanings that it holds them to*" (ICOMOS, 2013).

The consultation process to date has indicated that all Aboriginal objects within the project site and surrounds have social and cultural values to Aboriginal people. Some of these values identified to date through the consultation process are outlined below:

- all Aboriginal objects are important to Aboriginal people and have cultural value
- based on the landscape, the project site was identified as a significant location for gathering, hunting and travelling via the Parramatta River
- the project site is part of a broader cultural landscape, which would be addressed through a comprehensive cultural values assessment
- all Aboriginal objects hold physical, social and cultural value to the past occupation of the area.

Historic value refers to the associations Aboriginal people have with places, historically important people, events and phases. Post contact places include sites such as native institutes, missions, reserves and massacre sites. Previous research has been documented with respect to post contact in the Parramatta CBD, including the Parramatta Native Institute which was located on a large area (encircled by Macquarie, Marsden and Hunter Streets) and it is noted that Aboriginal people have a continued historical connection in this area.

Aesthetic value refers to *"the sensory, scenic, architectural and creative aspects of the place"* this is often linked with social values. These values may consider colour, texture, scale, form, sensory association with place or usage including sound and smell and the fabric or material of the landscape (OEH, 2011). Due to the extent of disturbance and landscape modification within the project site, the aesthetic value is low. However, the sections of the Parramatta River foreshores that relate to mangroves suggest the project site was previously significant.

Table 8.1 Aboriginal Cultural Heritage Significance Assessment Matrix

Significance Assessment Matrix				
Significance	Potential to provide further archaeological information			
		Low	**Moderate**	**High**
	Low	Low	Low	Moderate
	Moderate	Low	Moderate	High
	High	Moderate	High	Major

8.1 Scientific significance assessment

Archaeological value refers to the importance of a landscape, area, place or object based on its rarity, representativeness, and the extent to which it may contribute to further understanding and information about past Aboriginal occupation (OEH 2011:9).

Criteria for archaeological significance have been developed in accordance with the principles of The Code and best practice assessment processes as set out in the Burra Charter. The following archaeological significance criteria have been used: rarity, representativeness, research potential and education potential. These are defined in Table 8.2.

Table 8.2: Archaeological significance criteria

Criteria	Description
Rarity	What are the unique and distinctive features of a site, how many are left? Is this a good example of its type? What characteristics might demonstrate this? Is the subject area important in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practiced? Is it in danger of being lost or of exceptional interest?
Representativeness	How much variability (outside and / or inside the subject area) exists, what is already conserved, how much connectivity is there?
Research potential	What is the potential of a site to shed a light into past human behaviour and to contribute on intra-regional relationships? Is the subject area important in demonstrating a distinctive way of life, custom, process, land-use function or design no longer practised? Is it in danger of being lost or of exceptional interest? Can Aboriginal objects from a site, provide information about changes in the cultural practices of Aboriginal people through time including post contact archaeology? Are there post contact questions that could be investigated here? Where do historical and Aboriginal occupation areas coincide and may require combined investigation as part of this project including Parramatta Sand Body?
Education potential	Does the subject area contain teaching sites or sites that may have teaching potential?

Two known Aboriginal heritage sites (AHIMS 45-6-2977 and AHIMS 45-6-4015) are located within the project site on Macquarie Street in the Parramatta CBD. In addition, seven PADs with either high or moderate archaeological potential were identified in the project site in Rydalmere, Ermington, Melrose Park and Sydney Olympic Park. A preliminary assessment of the archaeological significance of these is summarised in Table 8.3.

One PAD was recorded in Melrose Park (PLR2 PAD2) as within the study area during the site survey, however, it is outside the project site boundary and would not be impacted, and so is not included the table below.

Table 8.3 Preliminary assessment of the archaeological significance of the AHIMS sites and PADs in the study area

PAD/AHIMS	Suburb	Rarity	Represent-ativeness	Research potential	Education potential
PLR2 PAD1 Ermington Boat Ramp	Melrose Park	High	High	High	High
PLR2 PAD3 Rydalmere Wharf	Rydalmere	High	High	High	High
PLR2 PAD4 Haslams Creek	Sydney Olympic Park	High	High	High	High
PLR2 PAD5 Broadoaks Park	Ermington	Moderate	Moderate	Moderate	Moderate
PLR2 PAD6 Ken Newman Park	Ermington	Moderate	Moderate	Moderate	Moderate
PLR2 PAD7 Hill Road West	Sydney Olympic Park	Moderate	Moderate	Moderate	Moderate
PLR2 PAD8 Brickpit	Sydney Olympic Park	Moderate	Moderate	Moderate	Moderate
AHIMS 45-6-2977 (Macquarie St PAD 3)	Parramatta CBD	High/Moderate	High/Moderate	High/Moderate	High/Moderate
AHIMS 45-6-4015 (Church St PAD 1)	Parramatta CBD	Moderate	Moderate	Moderate	Moderate

Comprehensive archaeological significance assessments, and the assessment of cultural significance are key knowledge gaps which will be addressed in the Final ACHAR and cultural values assessment to be prepared for the Parramatta Light Rail Stage 2 EIS.

The project also seeks to identify social and cultural values of the study area to the local Aboriginal community, in order to address appropriate and respectful mitigation strategies for any identified impacts to Aboriginal heritage presented by the project.

8.2 Preliminary significance assessment of significance

To assess the significance of Aboriginal heritage values, consultation with relevant Aboriginal stakeholders must be undertaken as per the *Aboriginal cultural heritage consultation requirements for proponents 2010*. Aboriginal people are recognised as the determinants of their own heritage. As such, consultation is the way in which an assessment of Aboriginal cultural heritage values is informed. As per the Commonwealth *Ask First* guide (Collet and Pocock, 2012), cultural significance is determined in accordance with relevant Aboriginal cultural groups before decisions can be made regarding the management of places and heritage values.

The project seeks to identify social and cultural values of the project site to the local Aboriginal community to address appropriate and respectful mitigation strategies (refer sections 10.1, 10.2 and 10.3 for mitigation measures) for any identified impacts to Aboriginal heritage presented by the project.

Comprehensive archaeological and cultural values significance assessments would be undertaken. Assessment of cultural significance are key knowledge gaps which would be addressed in the Final ACHAR. However, it is considered likely that the project site would contain areas of moderate/high cultural significance.

8.3 Aboriginal stakeholder comments

8.3.1 Local Aboriginal Land Councils

Deerubbin LALC and Metropolitan LALC Site Officers did not report any previously unidentified cultural material within the study area during the survey. Both Deerubbin LALC and Metropolitan LALC Site Officers supported completing the survey when property access can be arranged and prior to any physical works commencing (including any with testing in areas of archaeological potential). Both recommended further investigations to inform the ACHAR and project design, and supported further investigations including test excavations.

The Metropolitan LALC Site Officer also emphasised the high cultural significance of the Parramatta River and its surrounds, and the importance of incorporating this significance into heritage interpretation and the design elements of the project.

8.3.2 Registered Aboriginal Parties (RAPs)

Comments received by RAPs on the Archaeological Survey Report (ASR) and draft Test Excavation Methodology during the consultation period (8 July to 12 August 2022) are summarised below including how feedback was incorporated into the updated Test Excavation Methodology in Appendix C (refer to Table 8.4).

Table 8.4 Summary of RAP comments on the ASR and draft Test Excavation Methodology

Organisation/ Individual	Contact name	Response received via / Date	RAP comments	Project response
Koori Digs	Korri Currel	Email / 17 July 2022	Agrees with methodology for the project.	-
A1 Indigenous Services	Carolyn Hickey	Email / 20 July 2022	Supports the ASR and Test Excavation Methodology.	-
Yurrandaali Cultural Services	Bo Field	Email / 21 July 2022	Supports the methodology for this project, would like to participate in the upcoming fieldwork.	-
Warragil cultural services	Aaron Slater	Email / 22 July 2022	Agrees and supports the methodology in place for the Parramatta Light Rail Stage 2 test excavations. Suggestion to use smaller sieve screen (1-2 mm) to determine smaller artefacts as otherwise could miss micro lithics.	Appendix C Test Excavation Methodology updated to incorporate this feedback: "If the test excavations uncover knapping spaces (stone tool making areas), soil samples will be collected to be sieved in a flotation tank where the upper mesh size is 0.5 millimetres to collect all micro debitage" in consultation with this RAP (see p.18).
Ginninderra Aboriginal Corporation	Krystle Carroll-Elliott	Email / 21 July 2022	Agrees with the recommendations outlined in the Test Excavation Methodology.	-
Barraby Cultural Services	Lee Field	Email / 21 July 2022	Agrees with the methodology for this project, would like to participate in the upcoming fieldwork.	-
Amanda Hickey Cultural Services	Amanda De Zwart	Email/ 26 July 2022	Support the methodology and looking forward to working on this project.	-
Muragadi Heritage Indigenous Corporation	Jesse Johnson	Email/ 26 July 2022	Endorses the recommendations.	-
Kamilaroi Yankuntjatjara Working Group	Kadibulla Khan	In person/ 8 August 2022	1. PAD3 Broadoaks Park. Rydalmere, 10 metre spacing with 50x50 cm pits was suggested due to the small size of the park to increase the sampling size. 2. If hand excavation is not possible within the conservation buffer in Narawang Wetland (due	Suggestion 1 has been incorporated in Appendix C Test Excavation Methodology (see p.8). Suggestion 2 regarding mechanical excavations within PAD7 Hill Road West would be addressed in the Final ACHAR.

Organisation/ Individual	Contact name	Response received via / Date	RAP comments	Project response
			to the level of the water table), mechanical excavations were suggested to gather information on Aboriginal activities in wetlands such as hunting animals, gathering herbs and utilising resources including contact archaeology in disturbed landscape.	
Widescope Indigenous Group	Steven Hickey	In person / 8 August 2022	Supports 1x1 metres test squares in Aboriginal testing program. Additional suggestions: 1. Further investigations suggested within the mangroves at PAD3 Rydalmere Wharf, which would be impacted by the construction works post-approval. It was noted that mangroves were rich in resources and often utilised for hunting and fishing. 2. At PAD7 Hill Road West, if intact topsoil is present, based on the geotech analysis, it is suggested to have monitoring and sieving of the topsoil during early works due to the close distance to a known AHIMS site.	Suggestion 1 regarding the mangroves at PAD3 Rydalmere Wharf would be addressed in the Final ACHAR. Suggestion 2 regarding monitoring excavations at PAD7 Hill Road West, and the recommendations for further site investigations would be addressed in the Final ACHAR.
Muragadi Heritage Indigenous Corporation	Aaron Taylor	In person / 8 August 2022	1. Suggested test pit location change in PAD 5 Ken Newman Park, to include the drainage line that was inspected on 8 August 2022. 2. Further investigations suggested within the mangroves at PAD3 Rydalmere Wharf, which would be impacted by the construction works post-approval. It was noted that mangroves were rich in resources and often utilised for hunting and fishing.	Suggestion 1 has been incorporated in Appendix C Test Excavation Methodology (see p.13). Suggestion 2 regarding the mangroves at PAD3 Rydalmere Wharf would be addressed in the Final ACHAR.
Murra Bidgee Mullangari Aboriginal Corporation	Ryan Johnson	In person / 8 August 2022	If hand excavation is not permitted within the conservation buffer in Narawang Wetlands, mechanical excavations were suggested to gather information on Aboriginal activities in wetlands such as hunting animals, gathering herbs and utilising resources including contact archaeology in disturbed landscape.	Suggestion regarding mechanical excavations within PAD7 Hill Road West would be addressed in the Final ACHAR.
Kamilaroi Yankuntjatjara Working Group	Phil Khan	Email / 9 August 2022	Agrees and supports the ASR.	-

Organisation/ Individual	Contact name	Response received via / Date	RAP comments	Project response
Wurrumay	Vicky Slater	Email / 12 August 2022	Agrees with the minutes of the AFG meeting and methodology, tools and PADs. Made a number of suggestions in relation to the Site Officer application process.	Transport for NSW would review this feedback when selecting Site Aboriginal Officers for the project.
Yulay Cultural Services	Arika Jalomaki	Email / 15 August 2022	Agrees with the methodology for this project.	-
Waawaar Awaa Aboriginal Corporation	Rodney Gunther	Email / 17 August 2022	Supports the draft methodology for the project and supports the following: • avoid or minimise impact to known Aboriginal cultural heritage • conduct a site survey of the proposed development areas • undertake test excavations for any areas of ground disturbance.	The Appendix C Test Excavation Methodology has been prepared and updated in consideration of these principles.
Darug Custodian Aboriginal Corporation	Justine Coplin	Email / 23 August 2022	Supports the recommendations set out in this report. Notes that this area is significant to the Darug people due to the evidence of continued occupation, within proximity to this project site which are all connected that hold Aboriginal heritage and past history, evidence of the Darug lifestyle, however, due to the rapid development of Sydney many of Aboriginal sites have been destroyed. Emphasises the increasing involvement of Aboriginal organisations and individuals who do not hold cultural knowledge of the Western Sydney area which prevents genuine local Aboriginal organisations to care for cultural heritage.	-

9 PRELIMINARY IMPACT ASSESSMENT

Further investigation is required to determine the presence, extent, and scientific significance of areas of identified archaeological sensitivity. This investigation would consist of archaeological test excavations planned for around late 2022. This analysis would be combined with the cultural values assessment to guide an update to the impact assessment and appropriate design responses, to be documented in the Final ACHAR.

9.1 Consideration of the alternatives – avoiding and minimising harm

Background research and archaeological field survey have identified the likely presence of seven Aboriginal archaeological sites and two registered AHIMS sites within the project site.

The confinement of large parts of the project alignment to existing road and rail transport infrastructure corridors has avoided impact to other surrounding sites and PADs and lessened the amount of landscape disturbance required to construct the project, to some degree. However, given the linear nature of the project and surrounding spatial constraints including topography/landscape and existing development, route selection was not able to avoid all potential impacts to Aboriginal archaeological sites.

The preferred southern alignment through Camellia avoided one registered Aboriginal site (AHIMS 45-6-3108) and one PAD (Area 1, in KNC, 2017) in Rydalmere associated with a previous northern alignment option that extended along South Street.

Additionally, 13 registered AHIMS sites (AHIMS 45-6-2785, AHIMS 45-6-2786, AHIMS 45-6-2683, AHIMS 45-6-2559, AHIMS 45-6-3582, AHIMS 45-6-3767, AHIMS 45-6-3818, AHIMS 45-6-2686, AHIMS 45-6-1523, AHIMS 45-6-2978, AHIMS 45-6-2795, AHIMS 45-6-2679 and AHIMS 45-6-4097) and one PAD (PLR2 PAD2) are located within 200 metres of the project site but would not be impacted by construction or operation of the project.

The key potential impacts to PADs within the project site include possible destruction and/or movement during the construction of infrastructure. Specifically, the construction of the two river bridge crossings, are likely to damage areas of high archaeological potential. However, it is noted design development is progressing and would aim to minimise construction impacts. For example, relocation/refinement of compound areas or impacts to mangroves could be mitigated through the use of temporary work platforms that extend over the environmentally sensitive areas, and to enable avoidance of any identified culturally sensitive areas.

9.2 Preliminary impact assessment

Two known Aboriginal heritage sites (AHIMS 45-6-2977 and AHIMS 45-6-4015) are located within the project site on Macquarie Street in the Parramatta CBD. In addition, seven potential archaeological deposits (PADs) with either high or moderate archaeological potential were identified in the project site in Ermington, Rydalmere, Melrose Park and Sydney Olympic Park. These are listed in Table 9.1, along with a summary of the preliminary significance assessment and preliminary assessment of potential impacts.

One PAD was recorded in Melrose Park (PLR2 PAD2) as within the study area during the site survey, however, it is outside the project site boundary and would not be impacted, and so is not included in the impact assessment or table below.

These two AHIMS sites and seven PADs could potentially be impacted by the construction of the project. A high level identification of potential impacts associated with the project is outlined below, based on categories of potential impacts drawn from comparable projects. Identifying potential impacts at this stage of the project links into the overall adoption of precaution taken across the technical assessments.

The categories are:

- construction phase impacts: surface. For example – vehicle and plant movement, compaction impacts from vehicle movements and temporary containers and sheds, impacts to sites, places and Aboriginal cultural landscapes
- construction phase impacts: subsurface. For example – any ground breaking activities i.e. excavation, heavy plant movement, installation of fence posts, geotechnical or contamination investigations which may impact Aboriginal archaeological deposits

- construction phase impacts: indirect / visual. For example – impact to significant views and vistas of heritage items, impact to visual connections between heritage items and landscape features, impacts to Aboriginal cultural landscapes
- operational phase impacts that comprise the individual and cumulative impacts associated with the operation and life of the project. These may include impacts to visual connections between heritage items and landscape features and impacts to Aboriginal cultural landscapes. The operational phase may also include positive impacts for heritage values, such as improved public access to heritage areas and heritage interpretation.

The key potential impacts to sites within the project site include possible destruction and/or movement during the installation of infrastructure. Specifically, the construction of two Parramatta River bridge crossings, are likely to damage areas of high Aboriginal archaeological potential. However, it is noted design development is progressing and would aim to minimise construction impacts. For example, relocation/refinement of compound areas or impacts to mangroves could be mitigated through the use of temporary work platforms that extend over the environmentally sensitive areas, and to enable avoidance of any identified culturally sensitive areas.

However, further investigation is being undertaken in around late 2022 to determine the presence, extent, and significance of areas of identified archaeological sensitivity. This investigation would consist of archaeological test excavation and further cultural consultation, which will inform the comprehensive significance and impact assessment and appropriate design responses (refer Appendix C for the Test Excavation Methodology).

Table 9.1: Preliminary assessment of impacts

Suburb	PAD	Assessed significance	Scope of impact	Type of impact	Consequence of impact
Melrose Park	PLR2 PAD1 Ermington Boat Ramp	High	Total (as all of the PAD is located in the project site)	Direct (ground disturbance, excavation and vegetation clearing resulting from bridge works and from vehicle and plant movements)	Partial or total loss of value
Rydalmere	PLR2 PAD3 Rydalmere Wharf	High	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance, excavation and vegetation clearing resulting from bridge works and from vehicle and plant movements)	Partial or total loss of value
Sydney Olympic Park	PLR2 PAD4 Haslams Creek	High	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance, excavation and vegetation clearing resulting from Holker Busway bridge strengthening works, and vehicle and plant movements)	Partial or total loss of value
Rydalmere	PLR2 PAD5 Broadoaks Park	Moderate	Total (as all of the PAD is located in the project site)	Direct (ground disturbance and vehicle and plant movements at the proposed compound site)	Partial or total loss of value
Ermington	PLR2 PAD6 Ken Newman Park	Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance, excavation and vegetation clearing, and potential landscaping works, and from vehicle and plant movements)	Partial or total loss of value
Sydney Olympic Park	PLR2 PAD7 Hill Road West	Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance, excavation resulting and vegetation	Partial or total loss of value

Suburb	PAD	Assessed significance	Scope of impact	Type of impact	Consequence of impact
				clearing from bridge works, installation of light rail, and from vehicle and plant movements)	
Sydney Olympic Park	PLR2 PAD8 Brickpit, Australia Avenue	Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance and excavation resulting from vegetation clearing and installation of light rail, and from vehicle and plant movements)	Partial or total loss of value
Parramatta CBD	AHIMS 45-6-2977 (Macquarie St PAD 3)	High/Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance and excavation as a result of constructing the turnback facility)	Partial or total loss of value
	AHIMS 45-6-4015 (Church St PAD 1)	Moderate	Partial (as not all of the PAD is located in the project site)	Direct (ground disturbance and excavation as a result of constructing the turnback facility)	Partial or total loss of value

9.3 Cumulative impacts

When considered in isolation, the environmental impacts and benefits of an individual project may not be significant. However, when combined with the effects of other developments, the cumulative effects can potentially result in a greater extent, magnitude or duration of impacts. Identifying potential cumulative impacts assists in developing appropriate management measures and provides a basis for coordinated regional planning and environmental monitoring.

The cumulative impacts of the Parramatta Light Rail Stage 2 project with other development within the vicinity of the alignment has been assessed in Table 9.2.

The cumulative impacts of the project and other development within the vicinity of the alignment would consist of the introduction of new infrastructure along the alignment. This includes light rail track and stops, wires, poles, and associated ancillary works, as well as the introduction of bridges, most notably two across the Parramatta River. The cumulative impacts are considered in Table 9.2.

Table 9.2 Cumulative impacts of the project with other developments in the vicinity of the alignment

Project	Location & description	Impacted AHIMS sites and PADs	Interaction with project
Parramatta Leagues Club Hotel	17-19 O'Connell Street (Lot 369 of DP752058, Lot 7054 of DP1074335). The site is commonly known as 1 Eels Place, Parramatta. It is south of the current Parramatta Leagues Club building and north of Western Sydney Stadium. The site of the building and public domain work has an area of approx. 4,360m^2.	45-5-4630	The project is located approximately one kilometre north from the project site along Macquarie Street. The cumulative archaeological impact of this project would be negligible due to its distance from the project site.

Project	Location & description	Impacted AHIMS sites and PADs	Interaction with project
Private hospital and hotel	41-43 Hunter Street, Parramatta (Lot 1 of DP27310) The site is located on the corner of Hunter Street and Marsden Street and is approximately 200 metres south of the project site along Macquarie Street.	45-6-2978	The project would interact with the project site along Marsden Street. The cumulative impact would be negligible as no additional excavation is proposed. However, due to proximity to the Parramatta Native Institute's proposed location social impacts to local Aboriginal community may be high. The cumulative impact would be high to any Aboriginal and contact archaeology and further mitigation measures would be required. This would be considered during the cultural values assessment and addressed in the Final ACHAR
Sydney Metro West	Sydney Metro West will service Westmead, Greater Parramatta, Sydney Olympic Park, The Bays Precinct and the Sydney CBD linking new communities to rail services with intermediate stations. Works include construction of new underground metro service, metro stations, stabling and maintenance facilities, and associated infrastructure.	45-6-3627 (the Clyde stabling and maintenance facility) 45-6-2977, 45-6-4015, 45-6-3582, 45-6-376, 45-6-2679 in Parramatta CBD	The Clyde stabling and maintenance facility is located approximately 800 metres south of the project site at Camellia on Colquhoun Street. The cumulative impact of this would be negligible due to its distance from the project site. The Parramatta Metro Station construction site would be located on the north-eastern boundary of the project site bounded by George, Macquarie, Church and Smith streets. The cumulative impact of this would be moderate to the registered AHIMS sites along with the Parramatta Light Rail Stage 2 turnback facility and further mitigation measures would be required. Sydney Olympic Park Metro Station construction site connects to the project site along Dawn Fraser Avenue. The cumulative impact of this would be negligible as no known Aboriginal heritage sites will be affected.
Powerhouse Parramatta	34-54 & 30B Phillip Street and 338 Church Street, Parramatta (Lot 1 of DP128474, Lot 2 of DP1247122 and Lot 1 of DP1247122)	45-6-3193	The project is located approximately 550 metres north from the project site at Macquarie Street. The cumulative archaeological impact would be negligible due to the distance from the project site.
Mixed-use development – retail, commercial and hotel	197 Church Street, Parramatta. The development would see the redevelopment of heritage item *Shop (and potential archaeological site)* (Parramatta LEP Item No.I655) Two tower mixed-use development comprising two storey retail podium, 25 storey commercial office tower and 32 storey hotel accommodation tower; and four basement levels for car parking and hotel ballroom.	45-6-4015	The project site interacts with the mixed-use development at the corner of Church and Macquarie Streets. The site has been recorded to have potential for contact archaeology and is adjacent to the project site on Macquarie Street. The cumulative impact would be moderate to potential Aboriginal and contact archaeology and further mitigation measures would be required.

Project	Location & description	Impacted AHIMS sites and PADs	Interaction with project
Draft Camellia-Rosehill Precinct (Place Strategy)	The master plan includes three sub precincts and covers approximately 320 hectares across Camellia, Rosehill, and a portion of Clyde. Development within the immediate vicinity of this project site includes a proposed town centre, a foreshore linear park along Parramatta River, a new urban plaza at James Ruse Drive and a new primary school and central local park.	45-6-2559, 45-6-3627	The master plan interacts the project site along Grand Avenue and the proposed stop 'Sandown Boulevard'. The cumulative impact would be negligible to 45-6-2559 as the harm was avoided during Stage 1 works. However, if future impacts to AHIMS 45-6-2559 is greater than identified an amendment to the mitigation measures would be required. Development of a foreshore park and active transport network along the Parramatta River would have a direct physical impact on Aboriginal archaeological potential, through the construction of pathways and associated amenities as well as would impact from a sociocultural perspective for local Aboriginal people.
Viva Energy Clyde Western Area	Remediation of the south-western part of the Clyde Terminal site. The site is located at Durham Street on the Camellia Peninsula and consists of the following lots: • Lot 398 DP41324 • Lots 100 and 101 of DP1168951 • Lot 101 of DP809340 • Lot 2 of DP224288 • Lot 1 of DP383675	nil	The northern boundary of the site directly interacts with the project site along Grand Avenue (including a section of Durham Street) as it extends across the Parramatta River to John Street. The cumulative impact of these works would be negligible.
Camellia Waste Facility	37 Grand Avenue Camellia (Lot 1 of DP539890) The site is approx. 2.3 hectares in area and is zoned IN3 Heavy Industrial.	nil	The site interacts with the Parramatta Light Rail alignment on the southern boundary along Grand Avenue and the eastern boundary as it runs across Parramatta River. The cumulative impact of this would be nil in relation to identified Aboriginal archaeology.
Melrose Park North Planning Proposal	The Melrose Park North Planning Proposal applies to the Northern Precinct of the Melrose Park Urban Renewal Precinct.	nil	The southern boundary of the site is located along the project site on Hope Street. The site would interact with the project site along Hope Street, Hughes Avenue and Wharf Road. The cumulative impact would be negligible.
Holdmark Planning Proposal (Melrose Park Southern Precinct)	The Melrose Park South precinct comprises of land bounds by Hope Street to the north, Wharf Road to the east, Parramatta River to the south and Atkins Road to the west. The eastern boundary is shared with the City of Ryde Council	45-6-1961 and Ermington Boat Ramp PLR2 PAD1	The site would interact with the project site along Hope Street, Hughes Avenue, Wharf Road, Waratah Street and Mary Street. The site has been recorded to include a shell midden which is close proximity to the project site. Additional PADs are identified within the project site during this assessment, therefore the cumulative impacts would be moderate to potential Aboriginal archaeology and further mitigation measures would be required.

10 RECOMMENDED MITIGATION MEASURES

10.1 Mitigation measures – project design and planning

10.1.1 Test excavation of PADs

Testing is required to determine the presence, limits and extent of any impact to Aboriginal sites and objects. This preliminary assessment has indicated sample testing of a portion of the following areas should be undertaken. This would allow the nature and significance of archaeological evidence to be more accurately assessed, and the impact the project may have on them:

- PAD1 Ermington Boat Ramp
- PAD3 Rydalmere Wharf
- PAD4 Haslams Creek
- PAD5 Broadoaks Park
- PAD6 Ken Newman Park
- PAD7 Hill Road West
- PAD8 Brickpit, Australia Avenue
- AHIMS 45-6-2977 (Macquarie St PAD 3)
- AHIMS 45-6-4015 (Church St PAD 1).

Test excavation (refer to Appendix C for Test Excavation Methodology) would be undertaken in accordance with the SEARs, and the results used to guide the Final ACHAR (see section 10.1.3). Any further archaeological excavation that may be required following a planning approval would include a flexible test/salvage methodology, which should be adhered to in areas of PADs that require testing.

The road alignment of Parramatta turnback facility may contain intact Parramatta Sand Body (AHIMS 45-6-2977 and AHIMS 45-6-4015). Noting the limitations to being able to undertake testing in an active road corridor, a tailored test excavation methodology (and salvage) for this location would be prepared and implemented, following a planning approval being obtained. This testing would seek to confirm the presence and integrity of the Parramatta Sand Body and its archaeological potential and would be undertaken prior to any physical works commencing in conjunction with geotechnical investigations.

Where harm cannot be avoided, it is recommended a testing/salvage methodology be prepared in consultation with RAPs to ensure appropriate management of significant values in instances where they may be impacted. If Aboriginal objects are located during testing, salvage of the site could not be undertaken until the project is approved and a salvage methodology prepared.

10.1.2 Further significance and cultural values assessment

A Final ACHAR would be prepared to include an assessment of cultural significance for the project site and identification of any specific areas of cultural significance based on consultation with Aboriginal stakeholders. Cultural interviews have also been offered and the results of any interviews would be incorporated into the cultural values assessment.

10.1.3 Final Aboriginal Cultural Heritage Assessment Report

Further assessment which considers the Aboriginal cultural heritage values (social/cultural values) and updated archaeological significance following testing would be required for the project. As such, a Final Aboriginal Cultural Heritage Assessment Report (ACHAR) would be prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW,* and provided with the response to submissions report following completion of public exhibition of the EIS. This report would include:

- details and results of Aboriginal stakeholder consultation
- cultural values assessment including findings of cultural interviews

- details and results of archaeological testing (refer to section 10.1.1)
- an assessment of cultural significance for the project site and identification of any specific areas of cultural significance based on consultation with Aboriginal stakeholders
- updated impact assessment based on the outcomes of the above
- a methodology for archaeological management, where impacts cannot be avoided, including any further test excavation and salvage where required as mitigation for the loss of Aboriginal cultural material.

10.2 Mitigation and management measures – construction

Mitigation measures are recommended for sites exhibiting high and moderate – low heritage significance within the project site, as. Aboriginal objects are likely to retain significance to Aboriginal people regardless of their assessed archaeological or scientific values.

- Sites that are identified in the Final ACHAR as being **disturbed with no archaeological value** will not require mitigation. This will be in locations as being highly disturbed and exhibiting low archaeological value.
- **Significant archaeological** sites identified in the Final ACHAR, where harm cannot be avoided and that would be totally or partially impacted, would require mitigation because they exhibit at least moderately intact archaeological deposit, relatively intact soil structure, information bearing archaeological objects and Aboriginal cultural value. Mitigation through archaeological salvage excavation may be required for impacts to these sites.

Recovery of information through archaeological salvage excavation would partially offset the loss caused by construction of the project in these areas. Salvage excavation can only occur after project approval is obtained and must be completed prior to any activities which may harm Aboriginal objects at these site locations.

In cases where the project would have a partial impact information gained from a salvage excavation offers a better understanding of the contents, nature and significance of the remaining non-impacted portions of the sites. Non-impacted portions of the sites would require management measures to be implemented during construction to ensure no impact. Where the project results in a collection of Aboriginal objects recovered during testing and salvage, the project would ensure that the collection is appropriately managed long term in a safe place. This may include cultural repatriation, reburial or lodgement at an agreed and culturally appropriate keeping place.

Table 10.1: Aboriginal heritage mitigation measures – construction

No	Aspect	Mitigation measure
1	Heritage management plan	An Aboriginal Cultural Heritage Management Plan would be required to facilitate a preconstruction mitigation plan, enable the transition to construction and then guide the ongoing archaeological management under the construction program.
2	Aboriginal archaeological sites to be impacted	Design development and construction planning would aim to avoid direct impacts on identified objects/sites of Aboriginal heritage potential as far as reasonably practicable. The Aboriginal archaeological sites identified via test excavations which would be impacted by construction activities would be documented, and site specific mitigation measures identified. Any Aboriginal objects discovered must be identified in the Heritage Interpretation Strategy and include registration in the Aboriginal Heritage Information Management System (AHIMS) register.
3	Salvage excavations	Where project impacts cannot be avoided and salvage is considered a suitable mitigation, a tailored salvage methodology would be prepared for salvage excavations and referred to the RAPs for comment prior to finalisation. Salvage excavations should aim to minimise harm by salvaging the artefacts in consultation with RAPs, where destruction of archaeological sites of significance cannot be avoided.
4	Continued Aboriginal community consultation	The consultation with the Aboriginal community regarding the project should be ongoing throughout the life of the project. Aboriginal consultation would continue to be undertaken in accordance with the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (Roads and Maritime Services, 2012) and the *Aboriginal Cultural Heritage Consultation*

No	Aspect	Mitigation measure
		Requirements for Proponents 2010 (DECCW, 2010b). This includes managing potential impacts on objects/aspects of cultural significance in consultation with registered Aboriginal parties and provided in the Final ACHAR.
5	Heritage interpretation	A Heritage Interpretation Strategy would be developed to guide incorporation of appropriate interpretation and integration of Aboriginal and non-Aboriginal heritage in the design. The strategy would be prepared and implemented in accordance with *Interpreting Heritage Places and Items: Guidelines* (NSW Heritage Office, 2005) and the *Heritage Interpretation Policy* (NSW Heritage Council, 2005). The strategy would include measures to ensure a meaningful design response to Aboriginal heritage and cultural values. It would be developed in consultation with relevant stakeholders, including registered Aboriginal parties. The design would include appropriate interpretation of Aboriginal heritage in accordance with the heritage interpretation strategy
6	Aboriginal cultural heritage induction	All site workers and personnel involved in site impact works associated with the project site must be inducted and briefed the possible identification of Aboriginal objects during construction and their responsibilities according to the provisions of the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*.
7	Unexpected finds procedure for Aboriginal object/s	If suspected Aboriginal objects are identified during construction the Unexpected Heritage Finds Procedure (Transport for NSW, 2022) must be followed. This would be outlined within the Construction Environmental Management Plan (CEMP) and associated subplans for the project.
8	Unexpected finds procedure for human remains	Protocols must be provided that ensure the risk of encountering burials is appropriately managed. If human remains/burials are identified, work must immediately cease, the site must be secured, NSW Police must be contacted and Heritage NSW must be notified. All human remains in, on or under the land must not be harmed. If suspected human remains are located during any stage of the proposed works the Unexpected Heritage Finds Procedure (Transport for NSW, 2022) must be followed. This would be outlined within the CEMP and associated subplans for the project.
9	Short and long term management of Aboriginal objects	Artefacts recovered during the test excavation program would be securely stored in an interim capacity until they are appropriately repatriated (reburied) or transferred to a secure, suitable and culturally appropriate keeping place supported by RAPs. The long term management of Aboriginal objects (recovered from both testing and any salvage) would be resolved in conjunction with RAPs for the project.

10.3 Mitigation and management measures – operation

No additional mitigation measures for Aboriginal heritage are considered necessary specific to operation.

11 CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusions

This report has considered the landscape and archaeological context of the study area, the archaeological potential and significance of the project site, and the potential impacts of the proposed works on the archaeological resources within the project site.

The project site contains several landforms classified as being highly archaeologically sensitive based on previous studies across Parramatta, the distribution of registered AHIMS sites in the vicinity of the project site, and a site survey. If present, the Parramatta Sand Body and associated terrace and lower slope features are the landscape features that are particularly archaeologically sensitive. These landforms would have provided access to permanent water and would have been abundant in resources necessary for pre-contact and post-contact Aboriginal ways of life.

Mitigative salvage excavation would be required for the archaeological sites exhibiting high, moderate and low significance prior to any impacts, as Aboriginal objects are likely to retain significance to Aboriginal people regardless of their assessed archaeological or scientific values. Recovery of information through archaeological salvage excavation will partially offset the loss caused by construction of the project by increasing our understanding, strengthening our interpretation and bettering our recognition of Aboriginal heritage within the modern city of Parramatta. Salvage excavation can only occur after a planning approval is obtained. Salvage excavation must be completed prior to any activities which may harm Aboriginal objects. The results of cultural values assessment and RAP consultation would form a key part of this assessment of Aboriginal cultural heritage, guiding both the significance and management approach of the project.

11.2 Recommendations

Recommendation 1: Further assessment and Final Aboriginal Cultural Heritage Assessment Report

The Final Aboriginal Cultural Heritage Assessment Report (ACHAR) would be prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* and the SEARs. This report would include the results of archaeological test excavation and comprehensive impact assessment based on identification of both archaeological evidence within the area and cultural heritage. It would also include a cultural values assessment and informed by comprehensive consultation with RAPs.

Recommendation 2: Aboriginal Cultural Heritage Management Plan

An Aboriginal Cultural Heritage Management Plan would be required to facilitate a preconstruction mitigation plan, enable the transition to construction and then guide the ongoing archaeological management under the construction program. This plan would be prepared as part of the Construction Environmental Management Plan (CEMP) in consultation with Heritage NSW. Specific measures would be identified in consultation with a qualified archaeologist. The objectives and strategies of the plan in relation to Aboriginal heritage would include the following:

- minimise impacts on Aboriginal heritage values
- details on management measures to be implemented to prevent and minimise impacts on Aboriginal sites.

Aboriginal heritage awareness training should be provided to all contractors to ensure recognition of heritage values and associated procedures to be implemented in the event of the discovery of Aboriginal heritage finds (that is, unexpected finds), or the discovery of human remains.

Recommendation 3: Heritage Interpretation – Aboriginal Heritage

A Heritage Interpretation Strategy would be developed to guide incorporation of appropriate interpretation and integration of Aboriginal and non-Aboriginal heritage in the design.

The strategy would be prepared and implemented in accordance with *Interpreting Heritage Places and Items: Guidelines* (NSW Heritage Office, 2005) and the *Heritage Interpretation Policy* (NSW Heritage Council, 2005).

The strategy would include measures to ensure a meaningful design response to Aboriginal heritage and cultural values. It would be developed in consultation with relevant stakeholders, including registered Aboriginal parties.

The design would include appropriate interpretation of Aboriginal heritage in accordance with the heritage interpretation strategy.

12 REFERENCES

AMBS Ecology & Heritage 2008, *Preliminary cultural heritage assessment: Rosehill recycled water scheme*. Prepared for Parsons Brinckerhoff Australia Pty Ltd on behalf of Alinta Asset Management Pty Ltd.

Arfanis, P 2015, *North Parramatta, the First Land Grants. Parramatta Heritage Services*. Accessed online 7 January 2019 http://arc.parracity.nsw.gov.au/blog/2015/08/05/north-parramatta-the-first-land-grants/

Artefact Heritage 2018, *Robin Thomas Reserve Masterplan Aboriginal Cultural Heritage Assessment Report (ACHAR)*, report to Transport for NSW.

Attenbrow, V 2012, *Archaeological evidence of Aboriginal life in Sydney, Dictionary of Sydney, http://dictionaryofsydney.org/entry/archaeological_evidence_of_aboriginal_life_in_Sydney*, viewed 12 Apr 2022.

Attenbrow, V 2010, *Sydney's Aboriginal past: investigating the archaeological and historical records*. UNSW Press.

Cultural Resources Management & Austral Archaeology Pty Ltd, 2009a, *150 Marsden Street Parramatta Archaeological Excavation Final Report* Volume 1, Executive Summary 2009

Cultural Resources Management & Austral Archaeology Pty Ltd, 2009b, *150 Marsden Street Parramatta Archaeological Excavation Final Report* Volume 2

Australia ICOMOS Charter for Places of Cultural Significance, The Burra Charter, 2013 (Burra Charter) Available at: https://australia.icomos.org/publications/charters/

Australia ICOMOS 2013, *Practice Notes for Interpretation.*

Bowler, JM, Johnston, H, Olley, J, Prescott, JR, Roberts, RG, Shawcross, W & Spooner, NA 2003, *New ages for human occupation and climatic change at Lake Mungo, Australia. Nature, 421 837-840.*

Brook, J & Kohen, J 1991, *The Parramatta Native Institute and the Blacktown: A History*. NSW University Press.

Chapman, GA, Murphy, CL, Tille, PJ, Atkinson, G, &Morse, RJ 2009, *Soil Landscapes of the Sydney 1:100,000 Sheet* map, Ed. 4, Department of Environment, Climate Change and Water, Sydney.

Chapman, GA, & Murphy, CL 1989. *Soil Landscapes of the Sydney 1:100,000 Sheet* report, Soil Conservation Service of NSW, Sydney.

City of Parramatta 2017a, *Aboriginal and Torres Strait Islanders*. Accessed online 7 January 2019 https://www.cityofparramatta.nsw.gov.au/living-community/aboriginal-and-torres-strait-islanders.

City of Parramatta 2017b, *History of Waterways.* Accessed online 20 December 2019 https://www.cityofparramatta.nsw.gov.au/recreation-environment/waterways/catchment-management/history-of-waterways

City Plan Services 2018, *Rydalmere Wharf Statement of Heritage Impact*, report to Roads and Maritime Services, April 2018.

Clark, NR, & Jones, DC 1991. *Penrith 1:100 000 Geological Sheet 9030, 1st edition. Geological Survey of New South Wales, Sydney*.

Clarkson, C, Jacobs, Z, Marwick, B, Fullagar, R, Wallis, L, Smith, M,Roberts, R, Hayes, E, Lowe, K, Carah, X, Florin, SA, McNeil, J Cox, D, Arnold, L, Hua, Q, Huntley, J, Brand, EA, , Manne, T, Fairbairn, A, &Pardoe, C2017, *Human occupation of northern Australia by 65,000 years ago. Nature. 547. 306-310. 10.1038/nature22968.*

Collett, D, & Pocock, C 2012, *Ask first: a guide to respecting indigenous heritage places and values: issues and gaps analysis*.

Collins, D 2003 (1802), *An Account of the English Colony in New South Wales From Its First Settlement, in January 1788, to August 1801*. London, T. Cadell Jun. and W. Davies.

Comber, J 2018, *Aboriginal Archaeological Test Excavation Report AHIP C0001588: Site 45-6-3195, Parramatta North Growth Centre*. Unpublished report to Urban Growth NSW.

Comber Consultants, 2010*, Preliminary Excavation Report, 140 Macquarie Street, Parramatta. Prepared for Integral Energy*

Comber Consultants, 2019, *Parramatta Square 2 (PS2), 160-182 Church St Parramatta, Aboriginal Archaeological Excavation Report*. Prepared for Parramatta City Council.

Comber Consultants, 2018, *Parramatta Square 3 (PS3): 153 Macquarie St Parramatta, Excavation Report, AHIP No. C0001379*. Prepared for Parramatta City Council.

Comber Consultants, 2019, *Parramatta Square 5 & 6 (PS5&6): 12-38 Darcy St Parramatta, Excavation Report, AHIP No. C0001379.* Prepared for Parramatta City Council.

Comber, J 2018, *Aboriginal Archaeological Test Excavation Report AHIP C0001588: Site 45-6-3195, Parramatta North Growth Centre*. Unpublished report to Urban Growth NSW.

Corkill, T 1999*, HERE AND THERE links between stone sources and Aboriginal archaeological sites in Sydney, Australia,* MA thesis, University of Sydney.

CT environmental 2016, *Parramatta River Catchment Ecological Health Project*. Prepared for Parramatta River Catchment Group.

Dallas Consulting 2014, *Parramatta Aboriginal Cultural Heritage Study Review.* Report to Parramatta City Council.

Dallas Consulting 2003, *Parramatta City Council Aboriginal Heritage Study*. Prepared for Parramatta City Council.

Dominic Steele Consulting Archaeology 2013, *Aboriginal Archaeological Assessment & Aboriginal Heritage Impact Permit Application AHIMS Site # 45-5-3068 184-188 George Street, Parramatta, NSW.* Report prepared for Wizcorp Pty Ltd.

Edward Higginbotham & Associates Pty Ltd, 2007, *Report on the archaeological excavations December 2011 to march 2017, V by Crown Group,134-140 Marsden Street & 45-47 Macquarie Street, Parramatta, N.S.W vol 2*

eSPADE 2018, Available at https://www.environment.nsw.gov.au/eSpade2Webapp

Etheridge, R 1918, *The Dendroglyphs: Or" carved Trees" of New South Wales (No. 3).* WA Gullick, government printer.

Extent Heritage 2019, *Robin Thomas Reserve- Masterplan Stage 1 Interim Aboriginal Test Excavation Report,* report to Transport for NSW.

GML Heritage, 2019, *Parramatta Park, George Street Gatehouse Geomorphology and Aboriginal Archaeology Report*. Unpublished Report to Parramatta Park Trust.

GML Heritage 2000, *Parramatta Historical Archaeological Landscape Management Study.* Prepared for the NSW Heritage Office

Greater Sydney Commission 2018, *Greater Sydney Region Plan A Metropolis of Three Citie*s, Sydney.

GroundTruth Consulting, 2008, *Nature and distribution of Parramatta Terrace Sand*. Unpublished Report to City of Parramatta Council.

GroundTruth Consulting, 2011, *Sand body auger hole testing in the Parramatta local government area*. Unpublished Report to NSW Department of Planning and Heritage Branch.

Greater Sydney Commission 2018, *Greater Sydney Region Plan A Metropolis of Three Citie*s, Sydney.

Herbert C 1983, Sydney 1:100 000 Geological Sheet 9130, 1st edition. Geological Survey of New South Wales, Sydney.

Heritage Office , Department of Planning 2005, Heritage Information Series: *Interpreting Heritage Places and Items – Guidelines,* NSW Government.

Herron, NF, McVicar, TR, Rohead-O'Brien, H, Rojas, R, Rachakonda, PK, Zhang, YQ, Dawes, WR, Macfarlane, C, Pritchard, J, Doody, T, Marvanek, SP & Li, LT 2018, *Context statement for the Sydney Basin bioregion. Product 1.1 from the Sydney Basin Bioregional Assessment. Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia,*
Australia. http://data.bioregionalassessments.gov.au/product/SSB/SSB/1.1

Hiscock, P 2008, *Archaeology of Ancient Australia. London, Routledge.*

Hoskins, I 2015, *River Cycles – A History of the Parramatta River*. Accessed online 9 January 2019 https://dictionaryofsydney.org/entry/river_cycles_a_history_of_the_parramatta_river

Irish, P 2006, Site Card AHIMS 45-6-2785, Aboriginal Sites Register of NSW Standard Site Recording Form.

Irish, P 2017, *Hidden in plain view: the Aboriginal people of coastal Sydney*, Sydney NSW, NewSouth Publishing.

Irish, P, & Goward, T 2012, *Where's the evidence? The archaeology of Sydney's Aboriginal history.* Archaeology in Oceania, 47, 60-68.

Jo McDonald Cultural Heritage Management, 2005, *Archaeological salvage excavation of site CG1 (#45-5-2648) at corner of Charles and George Streets, Parramatta, NSW*. Unpublished Report to Meriton Apartments Pty Ltd.

Karskens, G, Burnett, G, & Ross, S 2019, *"Traces in a Lost Landscape: Aboriginal archaeological sites, Dyarubbin/Nepean River and contiguous areas, NSW, Australia (Data Paper)".* Internet Archaeology, 52.

Kass, T 2008, *Parramatta*. Accessed online 8 April 2022 https://dictionaryofsydney.org/entry/parramatta

Kass, T, Liston, C, & John MC 1996, *Parramatta: A Past Revealed, Parramatta City Council,* Parramatta.

Kelleher Nightingale Consulting Pty Ltd (KNC) 2017, *Aboriginal Cultural Heritage Assessment Report (ACHAR) Environmental Impact Statement (EIS) Stage 1 Parramatta Light Rail. Report to WSP/ParsonsBrinckerhoff on behalf of Transport for New South Wales).*

Kelleher Nightingale Consulting Pty Ltd (KNC) 2018,. *Parramatta Light Rail Stage 2: Aboriginal Heritage Constraints Assessment.* Report to WSP.

Kohen, JL 1986, *Prehistoric Settlement in the Western Cumberland Plain: Resources, Environment And Technology*. Unpublished PhD thesis, Macquarie University

Macphail, M, 2012, *Pollen analysis of samples from 45·47 Macquarie Street [part of the historical archaeological site at 134-140 Marsden Street] Parramatta*

McClymont, J 2008, *Camellia*. Accessed online 31 May 2022 https://dictionaryofsydney.org/entry/camellia

McDonald, J 2008, *Rock art and cross cultural interaction in Sydney: How did each side perceive the other?.* In: Veth, P., Sutton, P. & Neale, M. (eds.) *Strangers on the Shore Early coastal contacts in Australia*. Canberra: National Museum of Australia Press.

Nash, D 2004, *Aboriginal Plant Use in south-eastern Australia. Australian Government. Australian National Botanic Gardens.* Available at https://parksaustralia.gov.au/botanic-gardens/pub/aboriginal-plantuse.pdf

NSW Government Education and Communities 2012, *Water Systems at Narawang Wetlands*.

Office of Environment and Heritage 2013, *Shell Middens*. Accessed online 21 December 2018 (not available online) https://www.environment.nsw.gov.au/nswcultureheritage/ShellMiddens.htm

Office of Environment and Heritage 2010, *Aboriginal objects.* Accessed online 6 May 2022 Available at https://www.heritage.nsw.gov.au/about-our-heritage/aboriginal-cultural-heritage/

Olympic Co-ordination Authority 1999, *History of Homebush Bay*. Accessed online 10 December 2018 viaCity of Canada Bay Heritage Society 2019 https://canadabayheritage.asn.au/history-of-homebush-bay/

Owen, T.D, Jones (Webb), J, Watson, L & C Norman, 2022 Parramatta, NSW: a deep time Aboriginal cultural landscape, *Journal of the Australian Association of Consulting Archaeologists*, 9, 10-29

Perrin, E 2008, *Homebush Bay*. Accessed online 10 January 2019 https://dictionaryofsydney.org/entry/homebush_bay

SGS 2017, *Connecting Sydney Olympic Park and GPOP with Greater Sydney- final technical report*. Prepared for Sydney Olympic Park Business Association, May 2017.

Tanner Kibble Denton (TKD Architects) 2017, *Parramatta North Historic Sites Consolidated Conservation Management Plan Part A—Overview Report.*

Taylor, K 1989, 'Conservation and interpretation study of the rural heritage landscape of the Lanyon-Lambrigg Area, ACT' *Historic Environment* Volume 7, No. 2, pp 16-23.

Timothy, D O, Jones, J, Watson, L, Norman, C 2022, Parramatta, NSW: a deep time Aboriginal cultural landscape, *Journal of the Australian Association of Consulting Archaeologists* vol. 9, pp 10-29.

Tilden, F 1977, *Interpreting our heritage* University of North Carolina PressChapel Hill

Thorp, W, 2007, 150 Marsden Street, Parramatta , NSW Permit Number: 2006/S1401027 Archaeological Open Area Excavation, interim report for Austral Archaeology Pty Ltd

Turbet, P 1989, *The Aborigines of the Sydney District Before 1788*. Kangaroo Press, Kenthurst, NSW.

Transport for NSW 2020, *Principles and Framework for Aboriginal Engagement*.

White, B, & McDonald, J 2010,. *Lithic Artefact Distribution in the Rouse Hill Development Area,Cumberland Plain, New South Wales*. Australian Archaeology, 70(1), 29-38.

WSP Australia Pty Ltd and Roads & Maritime Services (WSP Australia & RMS), 2018, *Rydalmere Wharf Interchange Upgrade Review of Environmental Factors*.

Williams, A. N., McDonald, J., Atkinson, F., Toms, P. S., Hobbs, A., Barry, L., Sapienza, T, Wood, JC, & Doelman, T 2021, Was Aboriginal population recovery delayed after the Last Glacial Maximum? A synthesis of a terminal Pleistocene deposit from the Sydney Basin, New South Wales, Australia. *Journal of Archaeological Science: Reports*, *40*, pp 1-12.

Appendix A
Consultation Log

This appendix contains culturally sensitive information that has been withheld – information available on request

Appendix B
AHIMS Extensive search results

This appendix contains culturally sensitive information that has been withheld – information available on request

Appendix C
Test Excavation Methodology

ABORIGINAL ARCHAEOLOGICAL TEST EXCAVATION METHODOLOGY – PARRAMATTA LIGHT RAIL STAGE 2

Introduction

Transport for NSW is preparing an environmental impact statement for the proposed construction and operation of the Parramatta Light Rail Stage 2 (the 'project'), which includes preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR) in accordance with the Secretary's Environmental Assessment Requirements (SEARs).

The study area for the project is located across the Parramatta and Ryde Local Government Areas (LGAs) and the Deerubbin and Metropolitan Local Aboriginal Land Council (LALC) boundaries and encompasses the preferred route and alternative options for connecting Parramatta Light Rail Stage 1 to Sydney Olympic Park (see Figure 0.1).

An Archaeological Survey Report (ASR) has been prepared for the project and identified eight potential archaeological deposits (PADs) in the study area. Seven of these PADs are within the project site boundary and would be potentially impacted by construction activities and so have been nominated for further investigation. The findings of these investigations will inform an updated ACHAR to be provided with the Response to Submissions along with design refinement and future management actions.

An additional two PADs (AHIMS 45-6-2977 and 45-6-4015) were also identified within the Parramatta CBD section of the project site. However, the Parramatta CBD section of the study area has previously been assessed for Parramatta Light Rail Stage 1. As such the information and assessment from the *Parramatta Light Rail Aboriginal Cultural Heritage Assessment Report* (KNC, 2017) and revised database searches will be utilised for the ACHAR. Further, it is known that two AHIMS sites are located within the Parramatta CBD section of the study area which encompasses the Parramatta Native Institute:

- **AHIMS 45-6-2977** is located on Macquarie Street, based on the site card map, between the intersections of Church Street and across to the intersection of O'Connell Street. The site was registered in 2011 by Comber Consultants as a PAD located in an area where the Parramatta Sand Body was identified with intact soil profiles. The Native Institution for Aboriginal Children which was located on a large area encircled by Macquarie, Marsden and Hunter Streets is adjacent to this AHIMS site.
- **AHIMS 45-6-4015** is located at 197-207 Church Street and 89 Marsden Street. The site includes a PAD within the Parramatta Sand Body which has potential for Aboriginal heritage and contact archaeology. The site was recorded by Biosis in 2022 as it may hold evidence associated with early 19th century feasts between Aboriginal and European people including the Native Institute for Aboriginal Children.

Both AHIMS sites (45-6-2977 and 45-6-4015) are located within the urbanised Parramatta CBD. The project would require saw cutting of the road asphalt and footpath paving, and mechanical excavations of fill material to establish a turnback facility on Macquarie Street.

Depending on the fill levels and construction methodology, excavation could extend to intact soil profiles and impact potential archaeological deposits. Given the constraints of the site as an operational road, it is not proposed to undertake testing, but it is recommended that the design and construction methodology are refined based on geotechnical investigations to avoid intact soil profiles, where possible. Where impacts are unavoidable, a combined testing/salvage of this area will be undertaken prior to physical works commencing and a site-specific methodology for combined testing and salvage will be prepared for the ACHAR.

Purpose

This site-specific methodology for the Camellia to Carter Street precinct section of the project has been prepared by RPS and details actions for

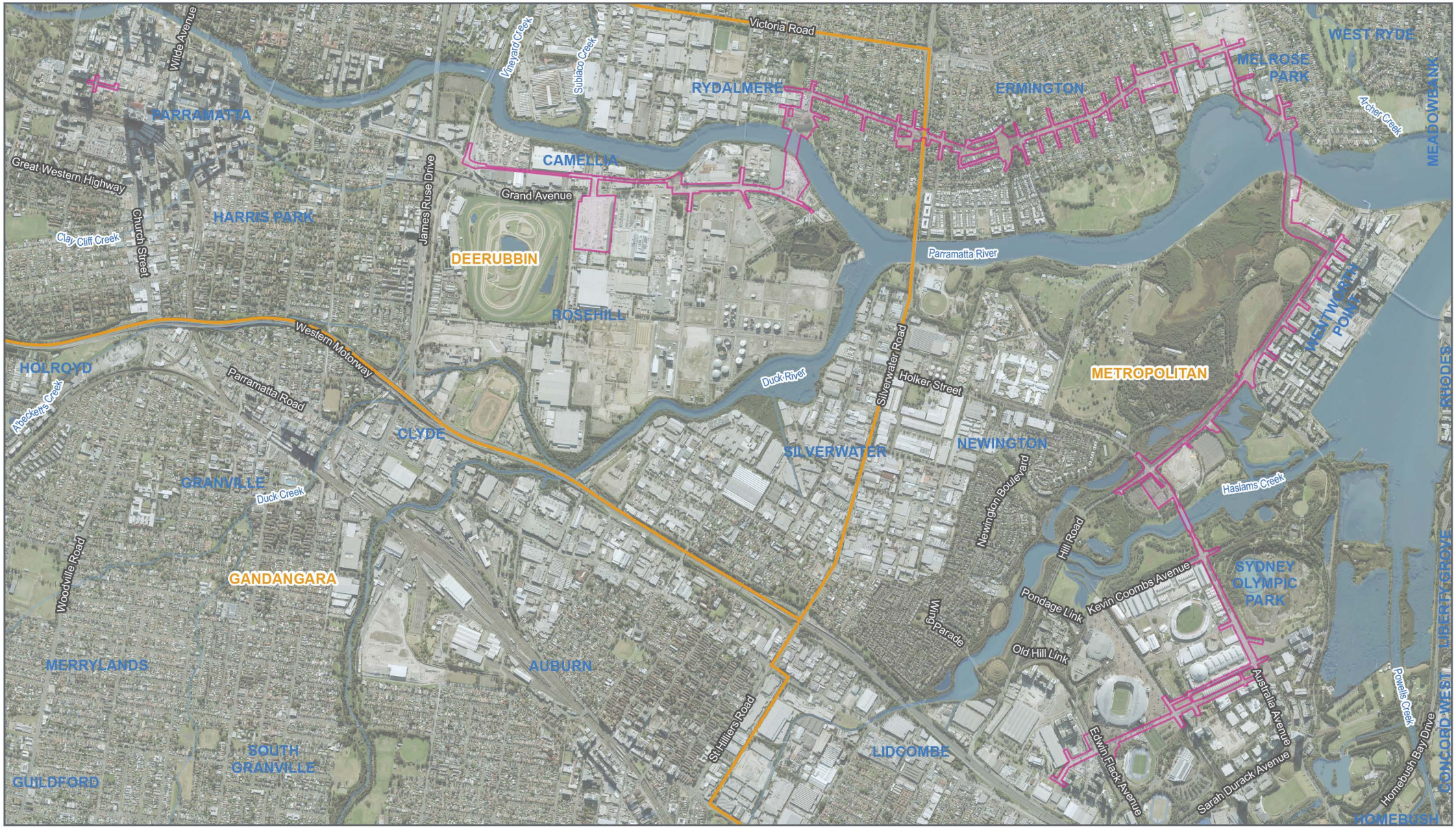
- a survey of previously inaccessible areas of Aboriginal archaeological sensitivity, should it be confirmed they could be impacted by the project and once property access can be arranged (see Figure 0.2),

- a test excavation program for the nominated project site (i.e. area that may be disturbed by construction) and an additional area outside the project site at PAD3 Rydalmere Wharf to accommodate an alternative Camellia foreshore to Rydalmere option that is being considered by Transport for NSW (refer Appendix D of the EIS).

Of note is that PLR2 PAD2 Melrose Park Public School Oval, which was identified during the survey, is outside the project site and would not be impacted and so no further investigation is recommended.

This methodology has been prepared with consideration of *The Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010) ('The Code') the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (Roads and Maritime Services, 2012) (PACHCI) and outcomes of Archaeological Survey Report. This site specific methodology was prepared in consideration of non-Aboriginal excavations as stated in SEARs to address the requirement for areas detailed in Requirement 14 of *The Code*; in areas of deep sand deposits; or in areas where historical archaeological excavations area also taking place.

The Archaeological Survey Report and a draft methodology was provided to Registered Aboriginal Parties (RAPs) to review and comment over a minimum 28 day period (between 8 July 2022 to 12 August 2022) in accordance with consultation requirements. Comments and feedback from the RAPs are outlined in Section 8.3.2 of the Preliminary ACHAR and responses have been incorporated into this Test Excavation Methodology which includes the modified approach to testing in response to RAP comments about the coverage of test pits in Broadoaks Park.



Legend

- Project site
- Local Aboriginal Land Council area

Paper Size ISO A4

0 0.5 1

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

rps MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Project site

Project No. **12557728**
Revision No. **2**
Date **22/08/2022**

FIGURE 0.1

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH011_TestEx_Locality
Print date: 22 Aug 2022 - 07:16

Data source: Study area - GHD2022; Precinct - DPIE2021; Suburb - NSWDFSI2022; Stations, Wharf - TINSW2018; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/08/2022. Created by: dschmidt

Legend

- Project site
- Archaeological senstivity areas not surveyed

Paper Size ISO A4

0 20 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Areas of Aboriginal archaeological sensitivity recommended for future survey

Project No. **12557728**
Revision No. **2**
Date **07/10/2022**

FIGURE 0.2

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH009_SensitivityAreasForSurvey
Print date: 07 Oct 2022 - 10:37

Data source: Study area - GHD2022; Wetland - DPIE2018; Watercourse - NSWSS2022; Wharf - TfNSW2018; Imagery - Metromap Tile Service: extracted 07/10/2022 .
Created by: dschmidt

Overview of test excavations and interface with non-Aboriginal archaeology

The aim of this test excavation is to identify Aboriginal occupation and understand the land use of the Aboriginal people within the project site. As a result of these methodological differences, a tailored Aboriginal heritage test excavation methodology has been designed and is outlined in this document.

A separate but integrated Archaeological Research and Excavation Framework (AREF) is being prepared to detail the methodology for non-Aboriginal archaeological test excavation.

The locations that require test excavation for non-Aboriginal archaeological resources overlap with those with potential for Aboriginal archaeology. Subsurface impacts have been limited in these areas which means that both the Aboriginal and non-Aboriginal archaeological resource may be relatively intact. Evidence from both periods of occupation may be present in the same stratigraphic units and an integrated approach needs to be taken to ensure an appropriate outcome that meets the requirements of both the *Heritage Act 1977* and the *National Parks and Wildlife Act 1974*.

Table 1 details locations where there is direct overlap between the Aboriginal and non-Aboriginal test excavation programs. Non-Aboriginal test excavation program will take place in three sites which include PAD1 – Ermington Boat Ramp, PAD5 – Broadoaks Park and PAD6 – Ken Newman Park following the Aboriginal test excavations. The indicative test trench locations for these three HAMUS compared to Aboriginal test squares are shown in Figure 0.3, Figure 0.4 and Figure 0.5.

The only location where historical test excavation may be undertaken but which would not have Aboriginal archaeological testing is in Camellia (Historical Archaeological Management Unit (HAMU) 03). This area is located in the eastern end of Grand Avenue (37 Grand Avenue) and likely to be highly contaminated and disturbed. The final decision on non-Aboriginal archaeological test excavation at HAMU 03 will be dependent on the results of geotechnical investigations. However, this area is assessed as having no Aboriginal archaeological potential in Section 7.3.4 of the Archaeological Survey Report.

Table 1 The three locations where both Aboriginal and non-Aboriginal archaeological test excavation will occur

Aboriginal archaeology test ex. location	Non-Aboriginal archaeology test ex. location	Potential	Description of historical significance	Indicative number of non-Aboriginal test trenches
PAD1 – Ermington Boat Ramp	HAMU 15 – Ermington Wharf & Archer Park HAMU 16 – East end of Wharf Road & Koonadan Reserve	• High potential for Aboriginal heritage • Medium potential for non-Aboriginal heritage	This land was granted to Edmund Lockyer in 1792 who farmed the land. Subdivision plans from the 1840s and 1850s indicate that numerous farming-related structures including cottages, barns, and paddocks in the area	3 test trenches of 15 x 1 metres 1 test trench of 10 x 1 metres 1 test trench of 25 x 2 metres
PAD5 – Broadoaks Park	HAMU 07 – Broadoaks Park	• Moderate potential for Aboriginal heritage • High potential for non-Aboriginal heritage.	This area was part of the Vineyard Estate, established by Philip Schafer in 1791 and later owned by Hannibal Macarthur which was used for farming in the late 18th and early 19th century.	2 test trenches of 20 x 2 metres
PAD6 – Ken Newman Park	HAMU 11 – Ken Newman Park	• Moderate potential for Aboriginal heritage • High potential for non-Aboriginal heritage.	This area is a part of land which granted to marines from the First Fleet from 1792 onwards. The area broadly was used for farming in the late 18th and early 19th century.	2 test trenches of 20 x 2 metres

An archaeologist experienced in Aboriginal excavation will be on site at all times during the non-Aboriginal archaeology test excavation program. If any Aboriginal artefacts are uncovered during the non-Aboriginal test excavation program they will be recorded, analysed, and reported in the ACHAR test excavation results.

The non-Aboriginal archaeological program will only commence following the completion of the Aboriginal archaeology test excavation program. This will allow the results of the Aboriginal test excavation program to directly feed into the methodology for non-Aboriginal archaeological test excavations with three likely scenarios:

1. **No Aboriginal objects are identified**

Test excavations for non-Aboriginal archaeology will continue as outlined in AREF following standard practice for non-Aboriginal archaeological test excavation.

2. **Some Aboriginal objects are identified (Low Density, < 5 artefacts per square metre)**

Test excavation for non-Aboriginal archaeology will continue if the amount of Aboriginal objects remains below this threshold. The threshold for the cessation of excavations is proposed to be set at five objects per spit (100 millimetre depth level) per square metre, or if any of the following features are encountered:

- burials or human remains
- middens
- hearths
- unusual raw material types
- rare artefact types.

3. **Numerous Aboriginal objects are identified (Medium- High Density, 5 or more artefacts per square metre)**

In this situation, non-Aboriginal archaeological test excavation will not be undertaken at the proposed location. Another location in the vicinity may be selected if the Aboriginal archaeology test pits in that area have a level of Aboriginal cultural heritage below the threshold outlined above.

Test excavation for Aboriginal archaeology will also be undertaken in multiple areas where there is unlikely to be a historical archaeological resource. These locations area detailed in Table 2. The test excavation program is focused on the project site (i.e. area to be disturbed during construction), with the exception of the western section of PLR2 PAD3 Rydalmere Wharf which is to accommodate an alternative Camellia foreshore to Rydalmere option that is being considered by Transport for NSW. This area of PAD3 has not yet been assessed for non-Aboriginal archaeological potential but would be in further detail should this option be progressed. In this location, excavations will be entirely undertaken according to the Aboriginal test excavation methodology. These trenches will also be examined by an archaeologist trained in recognising and recording historical archaeology and where evidence of historical occupation is found, it will be recorded in line with the methodology outlined in the AREF.

Table 2 Locations where only Aboriginal archaeological test excavation will occur compared to Historical Archaeological Management Units (below HAMUS will not be tested)

Aboriginal archaeology test ex. location	Historical Archaeological Management Unit
PAD3 – Rydalmere Wharf	HAMU 05 – Rydalmere Wharf and Park
PAD4 – Haslams Creek	HAMU 19 – Hill
PAD7 – Hill Road West	North of HAMU 19
PAD8 – Brickpit, Australia Avenue	East of HAMU 22

The non-Aboriginal test excavations proposed for the project will be undertaken initially with the use of a small (~5 tonne) mechanical excavator under the supervision of a suitably qualified and experienced archaeologist. If any relics (any deposit, artefact, object or material evidence that relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and is of State or local heritage significance) are encountered, then mechanical excavation will cease and hand excavation commence. The indicative number of trenches, expansion (if required) and anticipated historical archaeological resource are included in Table 1.

The non-Aboriginal test excavation methodology will include following:

- the Aboriginal test excavation program will commence prior to any mechanical excavations in these locations. An archaeologist from the historical archaeology team will be present to for the duration of these fieldworks to identify all heritage values uncovered and vice versa
- each test trench would be marked out clearly on the ground prior to excavation. If services are located within the intended excavation area consideration will be given to relocating the trench. The immediate local environment will also be examined with a preference to avoiding areas close to trees etc
- any surface material such as grass of gravel would be mechanically excavated
- if the surface material is hard-standing (e.g. concrete or asphalt) then this will be saw-cut first to minimise damage to the surrounding surfaces
- at all stages of mechanical excavation, a flat bladed bucket (mud bucket) is to be used. This process will involve strip excavation of 50-100 millimetre layers with close monitoring
- a suitable qualified and experienced archaeologist will monitor all mechanical excavation. After clearing the surface materials mechanical excavation will be utilised to remove any substantial fill deposits or other overburden that is not of archaeological significance
- if suspected archaeological deposits, structures, or features are encountered mechanical excavation will ceased
- once exposed, archaeological features will be examined with minor hand excavations. Each test trench will include a hand dug sondage, that will be excavated to archaeological sterile layers in order to characterise the entire soil profile
- after recording each trench will be covered with a layer of 140 gsm geofabric and backfilled. Mechanical compression of backfill may not be appropriate depending on the nature of the archaeology found.

The primary aim of the non-Aboriginal test excavation is to confirm the presence of non-Aboriginal archaeological evidence and clarify the extant soil profile. However, the Aboriginal archaeological test excavation will consist of entirely hand excavated 1x1 metre test excavation squares, dug in 100 millimetre spits. The squares will be combined as four 50x50 centimetre test excavation units into 1x1 metre test excavation square (as stated in Section 3.1, Requirement 16a-5, of *The Code*), to understand the site characteristics, and will be placed on a systematic grid in each site.

Aims of the Aboriginal test excavation program

The aims of the test excavation program are as follows:

- to determine if the project site contains subsurface Aboriginal archaeological deposits, including evidence for contact archaeology and positive evidence of sensitive landforms such as stone artefact assemblages and shell middens among intact soils profiles
- to understand the integrity of the deposits by assessing the degree of disturbance which is present
- to determine the extent of the sites where present and identify the boundaries
- to understand the Aboriginal land use and the utilisation of the resources within the project site.

Sampling strategy

The Code which requires that a sampling strategy must be developed for all test excavations. This site specific methodology is prepared in consideration of historical potential of the three sites listed in Table 1. For this project, a two phase sampling strategy is proposed to understand the characteristics and limits of the sites, where present, and has been designed to inform and assess the Aboriginal archaeological impacts.

The test excavation program will target the areas of the study area that are likely to be subject to disturbance as a result of construction works for the project, including temporary compounds and utility locations where compaction and ground disturbance likely cannot be avoided (referred to as the project site).

The number of the test squares provided in Table 5 are located within the project site/construction footprint and will be the focus for the test excavation program. The test squares are a number of 1 x 1 metre pits combined by 50 x 50 centimetres test pits divided into quadrants as shown in Table 3. The quadrants will be assigned clockwise in all test squares and they will be numbered first with their PAD number and then consecutively. For example, 1-05A is the first test pit of the fifth test square in PAD1 in Melrose Park. The test excavation program will take place across the areas designated as having subsurface impacts and will include both inside and outside of the PADs to clarify extent.

Table 3 Sample of a test square

A	**B**
D	**C**

The test excavation program will provide a good sample of the project site via spacing between 20 to 30 metres test squares which will allow prediction of densities across the site and an assessment of archaeological significance. Further, 10 metre spacing has been applied in PAD5 Broadoaks Park in response to RAP comments to allow a more detail sampling for this small grassland.

A summary of the two phase sampling strategy is detailed below.

Phase 1 -

a) Survey (on foot) of previously inaccessible areas of the study area, if design development and construction planning confirm these areas would be in the project site and could be impacted. These areas include privately owned houses in Melrose Park (refer Figure 0.2). The survey would be undertaken in consultation with LALCs, once property access can be arranged and prior to any physical works being undertaken. If impacts are identified by the project and cannot be avoided,

further physical investigation of the PAD will be undertaken to clarify its archaeological significance with RAP consultation to guide the approach to management.

b) AND Phase 1 test excavation program of PADs in high and moderate archaeological potential areas. Phase 1 test squares will be laid out on the boundaries of the PAD and will have between 40 to 60 metres spacing depending on the size of the PAD. The 1x1 metre test squares will be established along the transects for maximum coverage (42 test squares in total of six locations, and 11 additional 50x50 cm test pits in PAD5 Broadoaks Park). The PAD boundaries are based on the identified landform and the test excavation program will aim to clarify the site extent. Detailed information on the transect length and number of the pits in each location are listed in Table 4 . Indicative Phase 1 test square locations are shown on Figure 0.3, Figure 0.4, Figure 0.5, Figure 0.6, Figure 0.7 and Figure 0.8.

   Supplementary, 10 metre spacing via 50x50 centimetre test pits was suggested by RAPs for PAD5 Broadoaks Park, due to small size of the park. The spacing of test pits in this location has been revised to incorporate this suggestion (Figure 0.5). A total number of 11 50x50 centimetre Phase 1 test pits would be placed in between four 1x1 metre Phase 2 test squares to reduce the spacing to 10 metres in this location.

   Preliminary analysis of the results from the Phase 1 test excavations will aim to inform the Phase 2 test excavation program.

Phase 2 – in consultation with RAPs on site, and based on Phase 1 test excavation program results, two scenarios have been considered:

a) Phase 2 test excavation to understand the extent of the PADs. Additional 1x1 metre test squares would be excavated along the same transects reducing the spacing between pits to 20 or 30 metres for high and moderate archaeological potential respectively (in total 63 test pits of 1x1 metre is recommended). The detailed information on the transect length and number of the pits in each location is listed in Table 4.

OR

b) Expansion of a Phase 1 test square would aim to understand the limits of Aboriginal occupation (where there are highly significant Aboriginal heritage values found in the Phase 1 test square). The original test square, which is 1 square metre in total, can be expanded continuously by up to further 2x2 metres, where test excavation would not exceed total 0.5 per cent of the total PAD area. The expansion options through the thresholds would be employed to ensure the clear quantification of the significant area without removing it.

These thresholds are:

- high artefact densities, knapping floors, debitage, contact artefacts (e.g. hundreds of production waste for stone tools, namely conjoining debitage)
- a hearth or midden material indicating an Aboriginal occupation (to expose the feature not suggesting the excavation of the midden)
- rare or unusual artefact types (an imported tool e.g. tula adze)
- unusual raw material types, evidence of contact archaeology (e.g. flaked glass).

However, the program's preference is not to expand these areas, but to note their presence and to employ Phase 2 test excavation squares in between the Phase 1 test squares to ensure the PAD's archaeological potential of specific contexts (archaeological signature) is clearly understood, including extent to guide the design options and management of the project. Therefore, expansion of test pits is not recommended as an automatic step in this early design stage, this information should guide management of the sites with RAPs.

In order to understand the complete soil profile, one Phase 2 test square is located within the non-Aboriginal test trenches as shown in Figure 0.3, Figure 0.4 and Figure 0.5 in line with the Aboriginal test excavation program grid. The locations of the non-Aboriginal test trenches are indicative and will be subject to machine excavations of removing the fill and disturbance. These Phase 2 test squares will be hand excavated, following the completion of the non-Aboriginal test excavation program where no Aboriginal heritage was present to identify and record the complete soil profile in these areas.

Where artefacts, soil and charcoal samples are suitable for further analysis identified, all will be collected accordingly to prevent human contamination or destruction of residues. Charcoal samples from all cultural features with dateable charcoal will be collected for dating. The number of samples taken will depend on the nature and integrity of the archaeological deposits for optically stimulated luminescence (OSL) samples which will be undertaken by a suitably qualified geoarchaeologist. If flaked glass artefacts are uncovered with moderate or high probability, further use wear analysis may be conducted to verify evidence of contact archaeology. The total excavated area will not exceed 0.5 per cent of the total PAD area as per Requirement 16a of *The Code* (see Table 5). The number and location of the pits chosen to be expanded will be decided in consultation with RAPs on site and as limited by *The Code* requirements.

The test pits are also not located in any mapped coastal wetlands (shown in the figures below) thereby triggering additional approvals under the State Environmental Planning Policy (Resilience and Hazards) 2021 outside the EIS process.

Table 4 Summary of proposed test square locations in the project site

Excavation area	Suburb	Archaeological potential	Landform and distance to water	Potential scope of impact	Sampling strategy	Number of test squares	Spacing between test squares
PLR2 PAD1 Ermington Boat Ramp	Melrose Park	High	Flat – 60 m	Total / Direct	2 transects of 80 m and 180 m, 1x1m test squares	10 x Phase 1 13 x Phase 2	Phase 1 – 40 m Phase 2 – 20 m
PLR2 PAD3 Rydalmere Wharf	Rydalmere	High	Flat – 5 m	Partial / Direct	6 transects varying between 60 m to 150 m, 1x1 m test squares	16 x Phase 1 22 x Phase 2	Phase 1 – 60 m Phase 2 – 20 m
PLR2 PAD4 Haslams Creek	Sydney Olympic Park	High	Mid slope – 60 m	Partial / Direct	2 transects of 20 m, 1x1m test squares	3 x Phase 1 1 x Phase 2	Phase 1 – 20 m Phase 2 – 20 m
PLR2 PAD5 Broadoaks Park	Rydalmere	Moderate	Mid slope – 430 m	Total / Direct	3 transects of 60 m, 50x50 cm test pits and 1x1m test squares	11 x Phase 1 50x50 cm pits 4 x Phase 2 1x1 m test square	Phase 1 – 10 m Phase 2 – 10 m
PLR2 PAD6 Ken Newman Park	Ermington	Moderate	Mid and lower slope – 350 m	Partial / Direct	6 transects varying between 20 m to 150 m, 1x1 m test squares	11 x Phase 1 14 x Phase 2	Phase 1 – 60 m Phase 2 – 30 m
PLR2 PAD7 Hill Road West	Sydney Olympic Park	Moderate	Flat – 420 m	Partial / Direct	1 transect of 250 m, 1x1m test squares	5 x Phase 2	Phase 2 – 50 m
PLR2 PAD8 Brickpit, Australia Avenue	Sydney Olympic Park	Moderate	Flat – 260 m	Partial / Direct	1 transect of 280 m, 1x1m test squares	2 x Phase 1 4 x Phase 2	Phase 1 – 60 m Phase 2 – 30 m

Table 5 Number of test squares in relation to total PAD area (not exceeding 0.5%)

Excavation area	Suburb	PAD area (m^2)	0.5% of PAD (m^2)	Number of test squares for Phase 1	Number of test squares for Phase 2	Total number of test squares	Total excavation area (m^2)
PLR2 PAD1 Ermington Boat Ramp	Melrose Park	9,204	46.0	10	13	23	23
PLR2 PAD3 Rydalmere Wharf	Rydalmere	18,447	92.2	16	22	38	38
PLR2 PAD4 Haslams Creek	Sydney Olympic Park	3,650	18.3	3	1	4	4
PAD5 Broadoaks Park	Rydalmere	4,369	21.8	11 test pits (50x50cm)	4 test squares (1x1m)	15 (combination of test pits and squares)	6.75
PLR2 PAD6 Ken Newman Park	Ermington	32,191	161.0	11	14	25	25
PLR2 PAD7 Hill Road West	Sydney Olympic Park	21,495	107.5		5	5	5
PLR2 PAD8 Brickpit, Australia Avenue	Sydney Olympic Park	5,411	27.1	2	4	6	6

Legend

- Non-Aboriginal test trench
- Project site
- Coastal wetlands
- PAD 1 - Ermington Boat Ramp

Aboriginal Test Pit

- Phase 1
- Phase 2
- Phase 2

- Electricity
- Gas
- Sewer
- Water

Paper Size ISO A4

0 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Aboriginal Cultural Heritage

Indicative testing locations for Melrose Park

Project No. **12557728**
Revision No. **2**
Date **07/10/2022**

FIGURE 0.3

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH008a_TestingLocation_MelrosePark
Print date: 07 Oct 2022 - 10:42

Data source: Study area - GHD2022; Precinct - Mecone2021; Remediated land - SOPA2010; PAD, Test pit - RPS2022; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 07/10/2022 . Created by: dschmidt

Legend

- Non-Aboriginal test trench
- Project site
- PAD 6 - Ken Newman Park

Aboriginal Test Pit

- Phase 1
- Phase 2
- Phase 2

- Electricity
- Gas
- Sewer
- Water

Paper Size ISO A4

0 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Aboriginal Cultural Heritage

Indicative testing locations for Ermington

Project No. **12557728**
Revision No. **2**
Date **22/08/2022**

FIGURE 0.4

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH008b_TestingLocation_Ermington
Print date: 22 Aug 2022 - 07:17

Data source: Study area - GHD2022; Precinct - Mecone2021; Remediated land - SOPA2010; PAD, Test pit - RPS2022; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/08/2022 . Created by: dschmidt

Legend

- Non-Aboriginal test trench
- PAD 5 - Broadoaks Park

Aboriginal Test Pit

- Phase 1
- Phase 2
- Phase 2

- Electricity
- Gas
- Sewer
- Water

Paper Size ISO A4

0 20 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Indicative testing locations for Rydalmere

Project No. **12557728**
Revision No. **2**
Date **22/08/2022**

FIGURE 0.5

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH008c_TestingLocation_Rydalmere
Print date: 22 Aug 2022 - 07:17

Data source: Study area - GHD2022; Precinct - Mecone2021; Remediated land - SOPA2010; Test pit - RPS2022; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/08/2022 . Created by: dschmidt

Legend

- Project site
- Camellia foreshore to Rydalmere option
- Coastal wetlands
- PAD 3 - Rydalmere Wharf

Aboriginal Test Pit

- Phase 1
- Phase 2

- Electricity
- Gas
- Sewer
- Water

Paper Size ISO A4

0 20 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Aboriginal Cultural Heritage

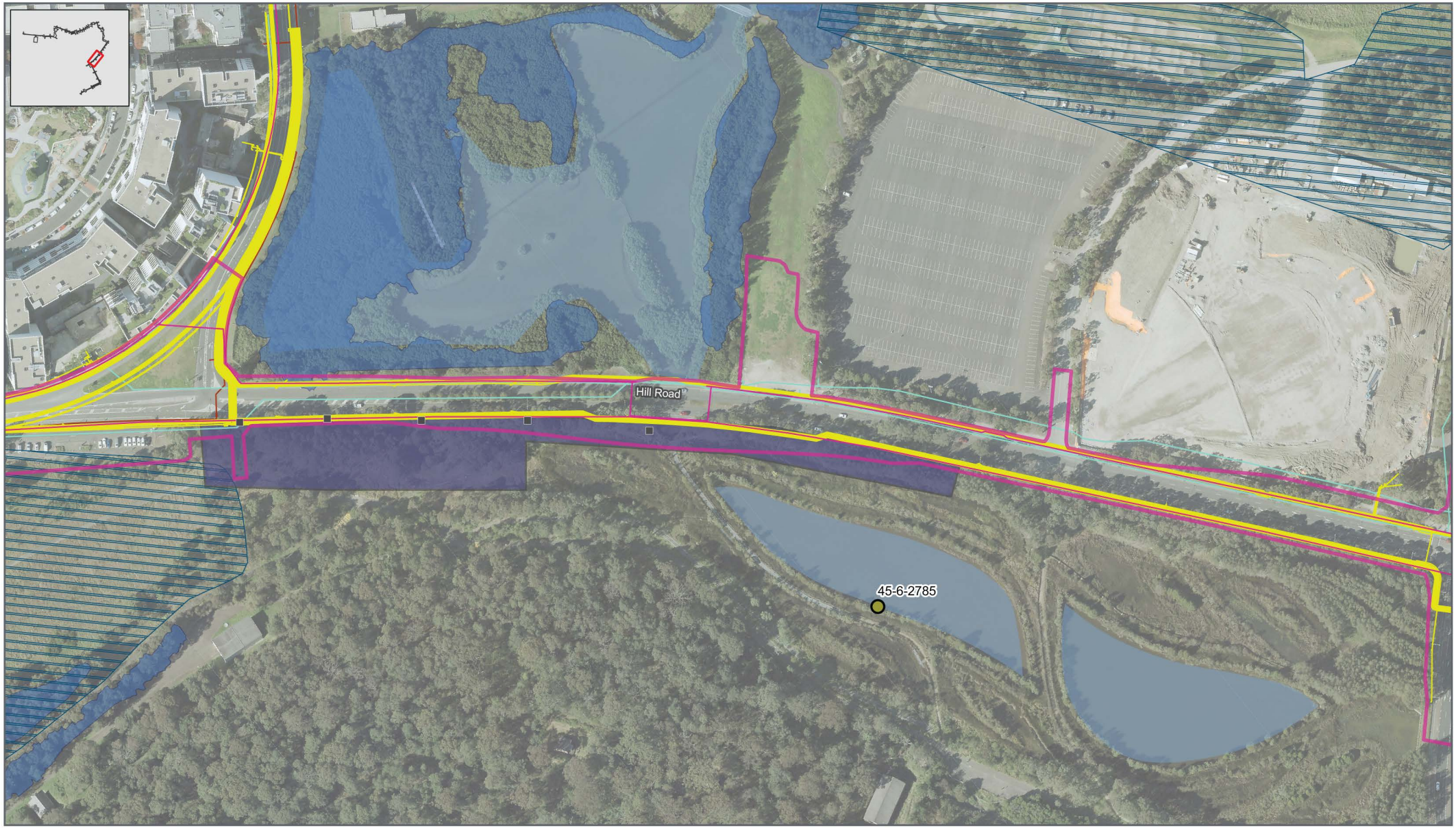
Indicative testing locations for Rydalmere

Project No. **12557728**
Revision No. **2**
Date **22/08/2022**

FIGURE 0.6

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH008f_TestingLocation_CamelliaRydalmere
Print date: 22 Aug 2022 - 11:18

Data source: Study area - GHD2022; Precinct - Mecone2021; Remediated land - SOPA2010; Test pit - RPS2022; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/08/2022 . Created by: dschmidt



Legend

- Project site
- Remediated land
- Coastal wetlands
- PAD 7 - Hill Road West
- AHIMS listed PAD
- Electricity
- Gas
- Sewer
- Water

Aboriginal Test Pit

- Phase 2

Paper Size ISO A4

0 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

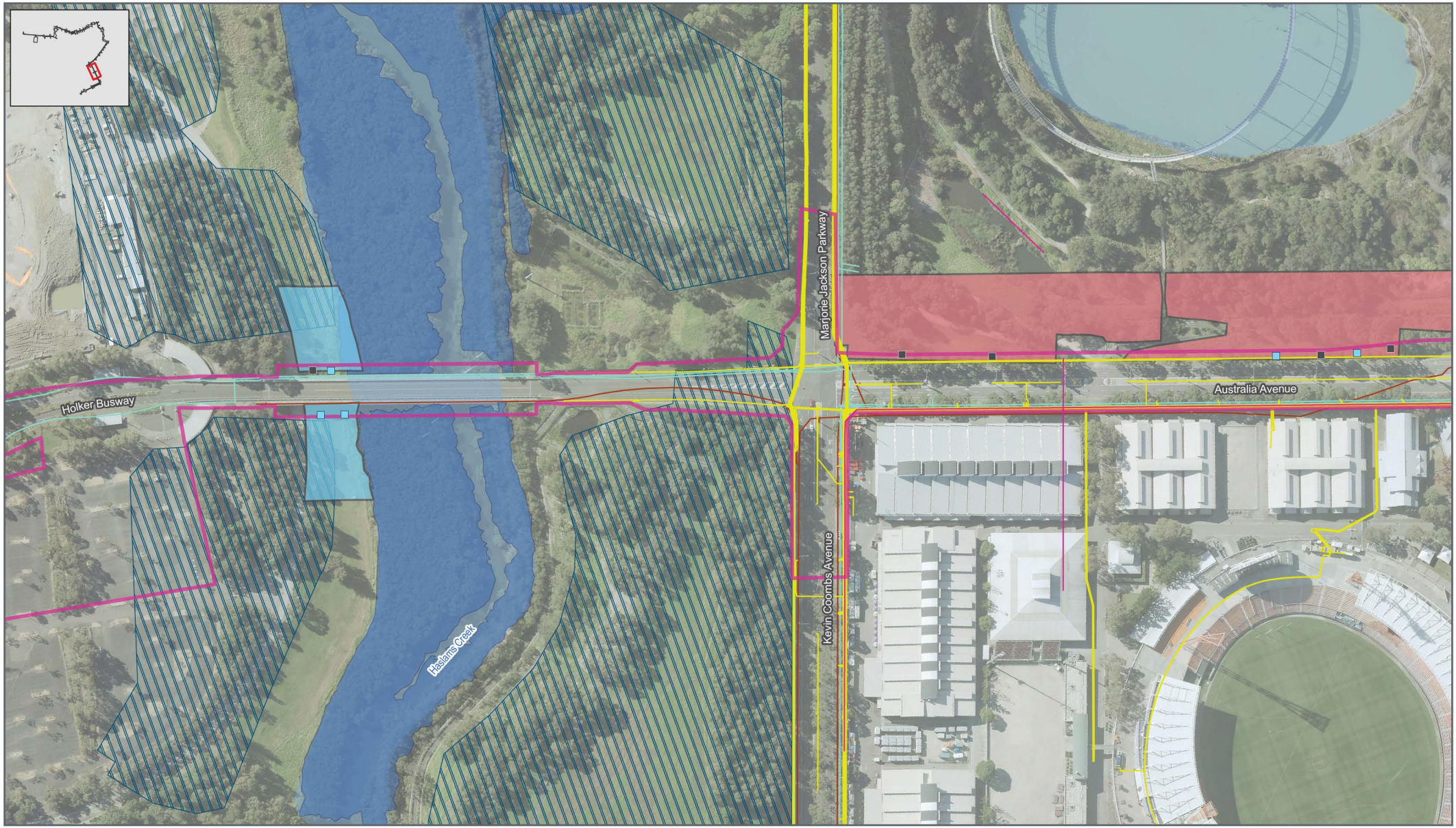
Indicative testing locations for Sydney Olympic Park

Project No. **12557728**
Revision No. **2**
Date **22/08/2022**

FIGURE 0.7

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH008d_TestingLocation_SOP_HillRd
Print date: 22 Aug 2022 - 07:16

Data source: Study area - GHD2022; Precinct - Mecone2021; Remediated land - SOPA2010; PAD, Test pit - RPS2022; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/08/2022 . Created by: dschmidt



Legend

- Project site
- Remediated land
- Coastal wetlands
- PAD 4 - Haslams Creek
- PAD 8 - Brickpit
- Electricity
- Gas
- Sewer
- Water

Aboriginal Test Pit

- Phase 1
- Phase 2

Paper Size ISO A4

0 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Aboriginal Cultural Heritage

Indicative testing locations for Sydney Olympic Park

Project No. **12557728**
Revision No. **2**
Date **22/08/2022**

FIGURE 0.8

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH008e_TestingLocation_SOP_AusAve
Print date: 22 Aug 2022 - 07:16

Data source: Study area - GHD2022; Precinct - Mecone2021; Remediated land - SOPA2010; PAD, Test pit - RPS2022; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/08/2022 . Created by: dschmidt

Research questions

Key research questions aimed to be answered by this test excavation program are detailed below.

1. Does the project site contain intact subsurface Aboriginal archaeological deposit across the alluvial and/or erosional soil profiles?
2. How much disturbance is present in PADs, in terms of the integrity of the Aboriginal heritage deposits?
3. Is there stratified deposit within the project site, is it possible to determine the occupation periods?
4. Which cultural activities are archaeologically identifiable within the project site by the evidence of assemblage characteristics and variations in the region?
5. How can the Aboriginal archaeological deposit (if recovered) be interpreted in a local and regional context?
6. What are the archaeological and cultural significance of the sites to contemporary Aboriginal people and cultural knowledge holders?
7. Can discrete occupational phases be identified within the deposits where possible by dating methods of optically stimulated luminescence (OSL) and/or radiocarbon (C14)?

Field methods

Following a review of *The Code,* the methods below will be employed for subsurface investigation in the form of an Aboriginal archaeological test excavation.

- Test excavation squares will be placed on grids in each area, following the landscape of the PADs as identified by in the Archaeological Survey Report (Appendix D of the Preliminary ACHAR) and described in Table 4 .
- The test square intervals will vary in each excavation area based on the high or moderate potential regularly spaced between 20 metres to 50 metres. They may be offset to avoid harming trees or underground services.
- The test pits will stretch across all PADs including the parts of no archaeological exposure or visibility.
- All test pits will be 1x1 metres in Phase 1.
- Phase 2 of the test excavation program may combine the original test square, which is 1 square metre in total, continuously by up to further 2x2 metres.
- Total area of the test excavation units will not exceed 0.5 per cent of the PAD or site.
- All test pits will be excavated by hand tools.
- The first excavation unit of a PAD/excavation area will be excavated and recorded in 50 millimetre spits at each area, the rest of the test squares will be excavated by 100 millimetre spits depending on sediment profile or stratigraphic sequence and will be excavated to the base of Aboriginal heritage containing soils (which will be decided in each excavation area). Excavations will be finalised when the bedrock is reached or will be excavated to archaeological sterile layers. Due to occupational health and safety concerns, hand excavation will cease at a depth of 1.5 metres or where the water table is reached or contaminated soils are encountered.
- If excavation is required to be deeper than 1.5 metres, benching (via a series of steps) may be required. The purpose of this method is to cover for excavation below 1.5 metres if they are anticipated, otherwise *The Code* is employed. (If benching is required, one 1x1 metre square will be excavated each side to a maximum of 1 metres which will allow the test pit to go deeper than 1.5 metres but so as not to exceed 0.5 per cent of the total PAD).
- On-site processing of excavated soils and artefact retrieval would be undertaken via a combination of dry and wet sieving appropriate to the soil landscape, through a nested five millimetre to three millimetre sieve. Artefacts will be collected from the sieves and placed in bags according to test square provenance.

- If the test excavations uncover knapping spaces (stone tool making areas), soil samples will be collected to be sieved in a flotation tank where the upper mesh size is 0.5 millimetres to collect all micro debitage.
- Detailed recording of all units would be undertaken, requiring the completion of a detailed excavation recording form (spit sheet) for each test square. The recording forms include following: site details, date, pit no, coordinates (Easting – Northing, datum), excavator (archaeologist), number of spits, soil description; inclusion, colour (Munsell) and pH of each spit, depth of each spit, section drawing and photo catalogue number.
- Preliminary stone artefact/lithic analysis will be undertaken on site to respond triggers mentioned above.
- Samples for scientific analysis will be collected during the excavations based on soil profiles. Optically stimulated luminescence (OSL) samples will be collected, if archaeologically significant soil profiles (such as Parramatta Sand Body) uncovered, by a qualified geoarchaeologist. The sampling strategy will be decided on case by case basis.
- Radiocarbon samples will be collected from shell middens and hearths as required to identify absolute chronologies. At least one sample will be collected from each feature, where identified.
- If any hearths are uncovered during test excavation, the limits of the hearth will be followed within the test square. If the hearth is partially in a test square the adjacent test square will be excavated (as phase 2- refer to page 9) to the same level to expose the complete feature. The hearth will be then excavated in half and all contents will be collected for flotation. Section drawings will be made prior to the completion of the excavation of the hearth.
- High resolution digital photographs will be taken of each test square and at least one section will be recorded as well as scale-drawn records of the stratigraphy/soil profile, features and informative Aboriginal objects.
- A qualified surveyor will be on site for recording geo-coordinates and conversions to GDA94. The location of each test square will be spatially recorded using either a Total Station or high-resolution GPS. The top and bottom RLs (reduced to AHD) of each test square will be recorded by either a Total Station or an automatic optical level (Dumpy level).
- If any burials or human remains are uncovered during test excavation, as a precautionary principle, the following must be applied to all physical remains suspected to be Aboriginal ancestral remains: No further disturbance or movement of these remains, and all work at the location will cease, as well as notifying NSW Police and the Environment Line.
- If any middens are uncovered during test excavation, attributes and features will be recorded without excavating the midden. The following precautionary measures will take place: no harm to the midden in any way, recording the full range of shells where possible, drawing and photography of any obvious changes in midden stratigraphy where middens are visible in the section.
- If any non-Aboriginal objects are found during the Aboriginal test excavation, they will be labelled appropriately and combined with non-Aboriginal testing program artefacts and analysed as detailed in the AREF.
- If non-Aboriginal archaeological features are encountered during Aboriginal testing, their significance will be assessed by one of the historical Excavation Directors nominated in the AREF. If they are found to be of significance, then excavations for the purposes of Aboriginal testing will cease in that square.
- The test squares will be backfilled following the excavations.

Recording

Each test square will be recorded with detailed descriptions of the landform, the soil profile, any evidence of disturbance and/or features, as well as depth of excavation, number of spits and the number of buckets required to remove the soil on a recording form. For each spit, plastic zip-lock bags labelled with site name, square number, spit number, and date should be retained for artefact retrieval.

At least one zip-lock bag will be retained for each spit, even if no artefacts were recovered, to ensure each excavation unit was accounted for and allow for spatial analysis.

Photographic recording will occur at the completion of each unit or when an archaeological feature is uncovered. A photographic record should be taken of at least one wall section in each test square. Together with a section drawing where required, the photographs will allow for a detailed record of the stratigraphic sequence present at the site.

Analysis

Any Aboriginal objects, including lithics, shell and bone will be explained in detail of their nature and scientific significance. Lithic artefacts are the most common artefact types in Aboriginal archaeological excavations. Therefore, an analysis for lithic artefacts has been outlined in this section. Where present, shell and bone artefacts will be analysed to understand the procurement strategies.

Further scientific analysis may be required during the test excavation program. Optical stimulated luminescence dating (OSL) and radiocarbon (C14) dating samples will be collected during the fieldwork where suitable samples are present (such as an *in situ* hearth for charcoal sample) and intact soil profiles that are significant to Aboriginal heritage (e.g. Parramatta Sand Body). Analysis of such samples will inform an absolute chronology of the sites and material heritage found and enable an interpretation of the sites in the wider landscape. Where relevant, archaeologically significant soil samples, dateable charcoal samples will be recovered and analysed for each site.

Both the Aboriginal and non-Aboriginal test excavation programs will adjust the final location of test pits in the field to avoid harming any trees. No trees will be removed, and the test pits will be offset from the transects where necessary, along with a note on the spit sheets (the distance and direction of the offset) and correct geocoordinates will be recorded by a surveyor.

Artefact analysis will include washing/cleaning, re-bagging and labelling and photographic recording of artefacts. All material culture unearthed during the excavations will be evaluated; stone tools, fish/animal bones and bone tools and shells will be subject to artefact analysis in order to provide the occupation levels across the site and time.

The artefact analysis will record key attributes of raw material, cortex, artefact type, flake/core type, platform type, and dimensions, as well as a photographic record of a representative sample of artefacts. All recorded information will be noted via Microsoft Excel in order to statistically analyse the results. Lithic artefact attributes will be recorded with a range of information including, but not limited to. the categories listed in Table 6 , in order to identify the assemblage characteristics and to investigate regional trends. Basic artefact analysis will be carried out on site for all artefacts, to record artefact numbers from each pit, type of a significant artefact where applicable, raw materials to allow assessments for the archaeological test excavation program. A tailored artefact analysis will be designed based on the assemblage of each site and attribute analysis will be undertaken. If flaked glass artefacts are uncovered, they will be analysed within the lithic assemblage.

Information gathered from detailed analysis would be used to inform the site formations within different landforms, preferences of the occupants in comparison to other sites within the landscape. The utilisation of the site can contribute to dating of the site and understanding the cultural values. The comparable dataset which will be created during the artefact analysis may help future investigations for the Aboriginal material culture in the broader region Post excavation analysis will be planned based on test excavation results, including a tailored comparative analysis and use-wear analysis.

The result of the analysis will inform the updated ACHAR to be provided with Response to Submissions. The test excavations will be undertaken to inform the possible impacts of the proposed works within Parramatta Light Rail Stage 2 construction. Following the completion of archaeological test excavation program within the project site, a post-excavation report detailing the results of the Aboriginal archaeological investigation works will be prepared.

Where Aboriginal consultation indicates salvage excavations of the selected sites is appropriate, an appropriate salvage excavation methodology and research design will be prepared in consultation with the RAPs with the following aims: a) to collect and salvage a representative sample where impacts cannot be avoided, b) to consider conservation, interpretive and educational outcomes. Where relevant the research design may need to address a combined approach to Aboriginal and non-Aboriginal salvage excavations or project interaction. Requirements for salvage will only take place once planning approval for the project has been obtained and in accordance with any conditions of the approval.

Table 6 Lithic artefact analysis categories

Attributes for each artefact					
Cortex %	Location Of Cortex	Artefact Type	Raw Material	Colour	Recording Date
Termination Type (Flake/Tools only)	Flake Form	Platform Type	Platform Width (Flake/Tools only)	Platform Thickness (Flake/Tools only)	Platform Surface (Flake/Tools only)
Nm of Flake Scars	Flake/Tool/Core Type	Retouch Type (Flake/Tools only)	Retouch Location (Flake/Tools only)	Shape of retouch (Flake/Tools only)	Artefact no.
Length	Width	Thickness	Weight	Site ID / Test square / Spit no	Test square / Spit no.

Management of Aboriginal artefacts

The long-term management options for any Aboriginal artefacts recovered from the project site test excavations will be decided in consultation with RAPs. Every artefact will be recorded with a unique artefact number and stored in zip-lock bags. All artefacts will contain an archival grade tag filled with permanent marker including information on excavation area, test pit number and spit number. During the test excavations and construction works the artefacts will be kept in a locked storage room in the RPS Sydney office.

Appendix D
Archaeological Survey Report (PACHCI Stage 2)

PARRAMATTA LIGHT RAIL STAGE 2

Archaeological Survey Report (PACHCI STAGE 2)

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Appendix B AHIMS Extensive Search Results
Appendix C PACHCI Stage 2 Survey Report – Deerubbin LALC
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GLOSSARY AND ABBREVIATIONS

Term/Acronym	Definition
Aboriginal artefact/object	Means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains.
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AMBS	Australian Museum Business Services
BP	Before Present
Burra Charter	The Australia ICOMOS Charter for Places of Cultural Significance, The Burra Charter, 2013
DCP	Development Control Plan
DECCW	Former NSW Department of Environment, Climate Change and Water
e.g.	for example
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2021
GPOP	Greater Parramatta and Olympic Park corridor
GPS	Global Positioning System
Grinding grooves	usually oval-shaped indentations in sandstone outcrops. These grooves were made when Aboriginal people shaped and sharpened stone axes by grinding them against the sandstone. As a fine-grained material, rubbing stone axes against sandstone provided a sharp edge that could be used for cutting.
Heritage Act	NSW *Heritage Act 1977*
HNSW	Heritage New South Wales
ICOMOS	International Council on Monuments and Sites
IHO	Interim Heritage Order
KNC	Kelleher Nightingale Consulting
Knapping	(or lithic/stone reduction) Knapping is shaping of a suitable stone material (hard, homogenous, elastic, brittle, isotropic raw materials) into a stone tool by removing piece or pieces. The reduction of the stone can be done striking or applying pressure via other stones or bone/antler as hammers.
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
Material culture	Physical objects made or modified by a human
NHL	National Heritage List
NNTT	National Native Title Tribunal
NPW Act	NSW *National Parks and Wildlife Act 1974*
NSW	New South Wales
NTA	Commonwealth *Native Title Act 1993*
OEH	Former NSW Office of Environment and Heritage
PACHCI	*Procedure for Aboriginal Cultural Heritage Consultation and Investigation*

Term/Acronym	Definition
	(Roads and Maritime Services, 2012)
PAD	A potential archaeological deposit is an area identified with potential for artefacts to occur below the ground surface. PADs occur as, over time, artefacts are covered by sediment such as dirt or sand or are moved by erosion to new areas which may then be covered by sediment. These artefacts remain under the ground surface and when excavated provide us with important spatial and temporal information about Aboriginal land use. As PADs are located below the ground, artefacts can only be recovered through archaeological excavation. This is always done in consultation with the local Aboriginal community.
PHALMS	Parramatta Historical Archaeological Landscape Management Study
Project	The project (for which Transport for NSW is seeking approval) is the construction and operation of Stage 2 of Parramatta Light Rail.
RAPs	Registered Aboriginal Parties
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
Shell middens	Shell middens are accumulation of the debris of shellfish. Shell middens often also include other material such as the bones of birds and fish, stone artefacts, and charcoal from campfires. Shell middens are usually found on the coast, but can also be found in inland lakes, swamps and along riverbanks and inlets. They can range from thin scatters of shells to deep layered deposits that have built up over a longer period of time.
SHI	State Heritage Inventory
SHR	State Heritage Register
Study area	The study area encompasses the preferred route and alternative options for connecting Parramatta Light Rail Stage 1 to Sydney Olympic Park (see Figure 1.2).
SU	Survey Unit
Transport for NSW	Transport for NSW is the lead agency of the NSW Transport cluster.

1 INTRODUCTION

1.1 Background

Parramatta Light Rail will deliver an integrated light rail service that supports population and employment growth expected throughout the Greater Parramatta to Olympic Peninsula (GPOP) area. It will integrate with existing and future modes of transport, including buses, trains, ferries and active transport (pedestrian and cycle networks), as well as Sydney Metro services and the existing road network.

Parramatta Light Rail will be delivered in stages to keep pace with development (see Figure 1.1)

Stage 1 will connect Westmead to Carlingford via the Parramatta central business district (CBD) and Camellia. The construction and operation of Parramatta Light Rail Stage 1 was approved by the NSW Minister for Planning in May 2018. Major construction is underway and Stage 1 is expected to start operating in 2023. Further information on Stage 1 is available at Parramatta Light Rail | Parramatta (nsw.gov.au).

- Transport for NSW is now proposing to construct and operate Stage 2 of Parramatta Light Rail ('the project'). Stage 2 would connect the Parramatta CBD and Stage 1 to Camellia, Rydalmere, Ermington, Melrose Park, Wentworth Point and Sydney Olympic Park.

In June 2021, the NSW Government committed $50 million over the next three years to continue planning and development works for Stage 2. This funding will go towards planning, utilities and geotechnical investigations, as well as progressing the development of the project's environmental impact statement (EIS).

The project has been declared State Significant Infrastructure and Secretary's Environmental Assessment Requirements (SEARs) for Aboriginal heritage have been issued (see Table 1.1).

Table 1.1: SEARs for Aboriginal heritage

Key Issue and Desired Performance Outcomes	Requirement	Current Guidelines
6. Heritage – Aboriginal The design, construction and operation of the proposal facilitates, to the greatest extent possible, the long-term protection, conservation and management of the heritage significance of Aboriginal objects and places. The design, construction and operation of the proposal avoids or minimises impacts, to the greatest extent possible, on the heritage significance of Aboriginal objects and places.	1. Direct and/or indirect impacts (including cumulative impacts) to the heritage significance of: (a) Aboriginal places, objects and cultural heritage values, as defined under the National Parks and Wildlife Act 1974 and in accordance with the principles and methods of assessment identified in the current guidelines; and (b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan. 2. Identify and describe the Aboriginal cultural values that exist across the whole area that will be affected by the proposal and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. 3. The identification of cultural *heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010) (the Code), and be guided by the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). 4. Consultation with Aboriginal people must be undertaken and documented in accordance with Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR. 5. Impacts on Aboriginal cultural heritage values must be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid	*Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010) AHIMS Aboriginal Site Recording Form AHIMS Aboriginal Site Impact Recording Form Care Agreement application form *Connecting with Country* (Government Architect NSW, 2020) The Australia ICOMOS Burra Charter

Key Issue and Desired Performance Outcomes	Requirement	Current Guidelines
	impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. 6. In situations where the test excavation methodology stipulated in Requirement 16 of the Code is not appropriate (e.g. in areas detailed in Requirement 14 of the Code; in areas of deep sand deposits; or in areas where historical archaeological excavations area also taking place), a site-specific test excavation methodology should be developed. 7. Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified archaeologist, in accordance with section 1.6 of the Code. 8. Any Aboriginal objects recorded as part of the assessment must be documented and notified to Heritage NSW by recording on the Aboriginal Heritage Information Management System. 9. The ACHAR must outline procedures to be followed if unexpected Aboriginal objects, burials or skeletal material are uncovered at any stage during the life of the proposal.	

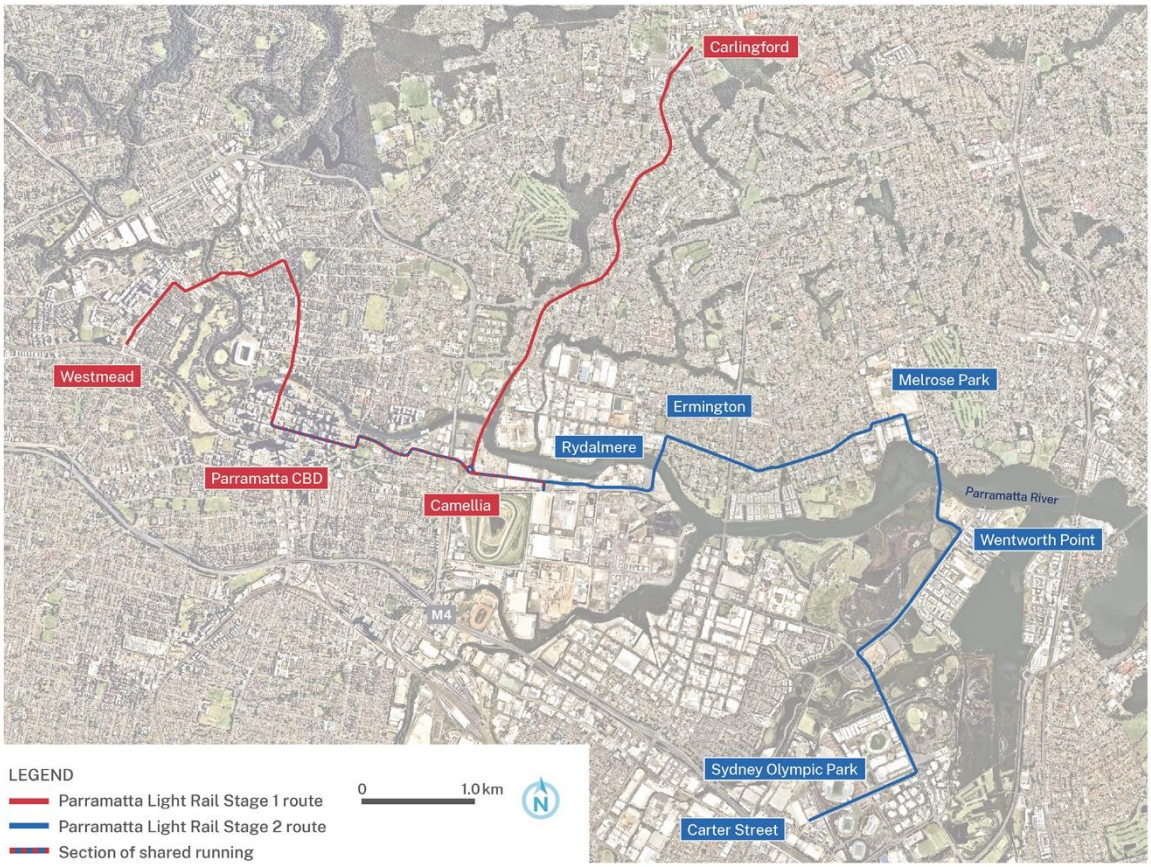


Figure 1.1 Parramatta Light Rail network

1.2 Purpose and scope of this report

Transport for NSW recognises that the development of its projects has the potential to impact Aboriginal cultural heritage and has developed the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Roads and Maritime Services, 2012). This procedure aligns with NSW regulatory processes for Aboriginal community consultation, as required by clause 60 of the National Parks and Wildlife Regulation 2019, and details a four-stage process for investigating potential impacts to Aboriginal heritage:

- Stage 1 is the completion of a desktop risk assessment
- Stage 2 comprises further assessment and a site survey with specific Aboriginal stakeholders and an archaeologist
- Stage 3 involves the preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR) (and may also involve testing)
- Stage 4 is the implementation of project mitigation measures (which may include salvage).

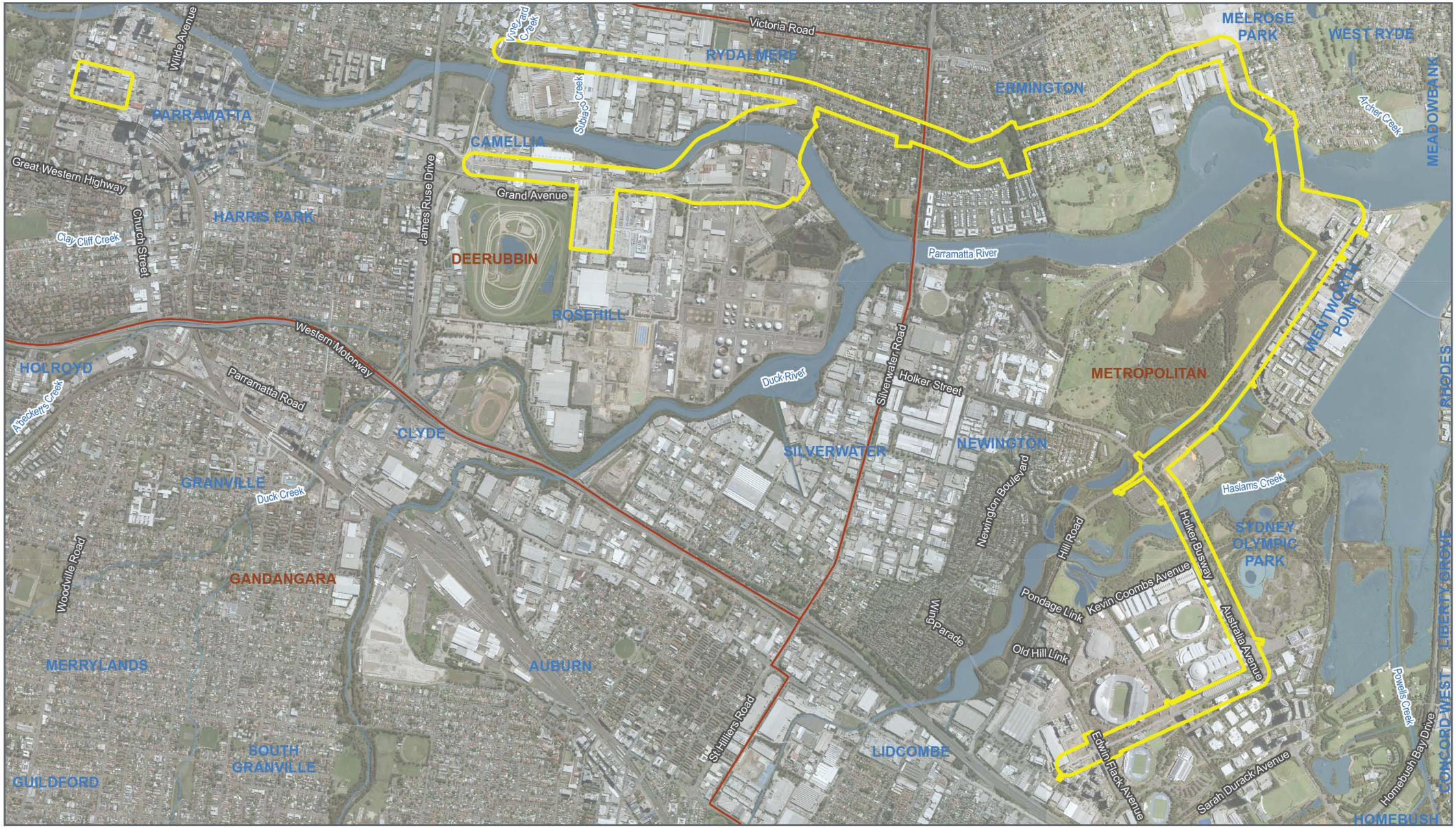
The *Parramatta Light Rail (Stage 2) Scoping Report* (Transport for NSW, 2019) was informed by an *Aboriginal Heritage Constraints Assessment* (Kelleher Nightingale Consulting (KNC), 2018) that identified potential areas of Aboriginal archaeological sensitivity that may be impacted by the construction of the project, Subsequently, an ACHAR is required to be prepared as part of the SEARs issued for the project (see Table 1.1).

However in order to engage with Aboriginal stakeholders early in the planning phase and to inform the preparation of the ACHAR, a PACHCI Stage 2 Archaeological Survey Report (this document) has been prepared by RPS on behalf of Transport for NSW.

The purpose of this Archaeological Survey Report is to:

- undertake a literary review of available data, including Aboriginal Heritage Information System (AHIMS) and State Heritage Inventory (SHI) searches and previous studies/investigations from the study area
- outline the results of the site survey
- provide an assessment of archaeological potential
- provide a preliminary significance assessment
- provide a methodology for test excavations for Aboriginal heritage (see Appendix A)
- identify recommendations for further investigations, such as test excavations.

The study area for the project is located across the Parramatta and Ryde Local Government Areas (LGAs) and the Dehubbing and Metropolitan Local Aboriginal Land Council (LALC) boundaries and encompasses the preferred route and alternative options for connecting Parramatta Light Rail Stage 1 to Sydney Olympic Park (see Figure 1.2).



Legend

- Study area
- Local Aboriginal Land Council area

Paper Size ISO A4

0 0.5 1

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

rps MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Study area

Project No. **12557728**
Revision No. **2**
Date **22/06/2022**

FIGURE 1.2

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH001_Locality
Print date: 22 Jun 2022 - 15:53

Data source: Study area - GHD2022; Precinct - DPIE2021; Suburb - NSWDFSI2022; Stations, Wharf - TfNSW2018; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/06/2022. Created by: lmanasan

1.3 Limitations

This report has been prepared in accordance with PACHCI Stage 2 and is not intended as an ACHAR in response to the SEARs. As such, the following limitations are noted below.

- **Consultation with cultural knowledge holders:** was undertaken with Dehubbing and Metropolitan Local Aboriginal Land Council (LALC) Site Officers in accordance with PACHCI Stage 2. Transport for NSW acknowledges that consultation in accordance with *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW) is required for the project and has begun this process.
- **Archaeological survey:**
  - A site survey was conducted with Deerubbin and Metropolitan LALC Site Officers on 24 January 2022 and 4 February 2022 which aimed to groundtruth areas of potential archaeological sensitivity identified in previous studies, and to assess the Aboriginal archaeological heritage potential within the study area.
  - The survey was constrained by site access and poor surface visibility. As such, a Comprehensive Archaeological Survey was not recommended by the archaeologists and this approach was supported by the LALC Site Officers.
  - The site survey with LALC Site Officers was limited to publicly accessible areas within the study area. As such some areas of potential archaeological sensitivity in Melrose Park (ten private properties and the Melrose Park Public School Oval) were not able to be surveyed at this time. However, Transport for NSW has committed to completing the survey of these areas once property access has been arranged, prior to any physical works progressing.
  - The section of the study area at Parramatta CBD was not surveyed with LALC Site Officers as it was assessed by the Stage 1 and those investigations have been relied upon.
- **Significance assessment:** the archaeological significance of Aboriginal heritage values is based on identified significance, advice and recommendations received from the Deerubbin and Metropolitan LALC Site Officers and previous studies. A comprehensive significance assessment will form part of the ACHAR being prepared in consultation with Registered Aboriginal Parties (RAPs) in response to the SEARs.

The information contained in this report is based on information provided by the client, as well as information obtained through the course of this assessment via site visits and previous field work.

1.4 Authorship

Heritage Consultant Dr Bengi Selvi-Lamb (PhD in Archaeology) prepared this report with assistance from Senior Heritage Consultant Sarah van der Linde (MA in Cultural Heritage) and Senior Heritage Consultant Dr Gary Marriner (PhD in Archaeology). Heritage Manager Susan Kennedy (BA in Anthropology/Archaeology and MA in Maritime Archaeology) has reviewed this report.

2 LEGISLATIVE CONTEXT

Aboriginal cultural heritage in NSW is protected by the *National Parks and Wildlife Act 1974* which is overseen by Heritage NSW. Aboriginal cultural heritage includes tangible and intangible cultural heritage values. Aboriginal cultural heritage may also be protected through listing under the *Heritage Act 1977*, also overseen by Heritage NSW. The *Environmental Planning and Assessment Act 1979* (EP&A Act) and other environmental planning instruments trigger the requirement for the investigation and assessment of Aboriginal cultural heritage as part of the development approval process. The EP&A Act includes the sustainable management of built and cultural heritage (including Aboriginal heritage) as one of its objectives.

2.1 National Parks & Wildlife Act 1974

2.1.1 Harm to Aboriginal objects and places

The NSW *National Parks and Wildlife Act 1974* (NPW Act) is the principal act providing protection for Aboriginal cultural heritage in NSW. The objectives of the NPW Act provides for the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including but not limited to (i) places, objects and features of significance to Aboriginal people...".

The NPW Act provides protection for Aboriginal objects irrespective of their significance (archaeological or cultural heritage significance) or land tenure. It also protects Aboriginal Places, which can include intangible cultural heritage values as well as Aboriginal objects. However, Aboriginal Places must be assessed and gazetted under the Act and are linked to a specific location.

Section 86 of the NPW Act states:

- *"A person must not harm or desecrate an object that the person knows is an Aboriginal object*
- *A person must not harm an Aboriginal object*
- *"A person must not harm or desecrate an Aboriginal place."*

Under the NPW Act, it is an offence to harm an Aboriginal object or place. Harm under the NPW Act is defined as any act that: *destroys defaces or damages the object; moves the object from the land on which it has been situated; causes or permits the object to be harmed.* However, it is a defence from prosecution if the proponent can demonstrate 1) that harm was authorised under Section 90 of the NPW Act, or 2) that the proponent exercised due diligence in respect to Aboriginal cultural heritage. The due diligence defence states that if a person or company has exercised due diligence, liability from prosecution under the NPW Act will be removed or mitigated if it later transpires that an Aboriginal object was harmed. If an Aboriginal object is identified during the proposed activity, all activity within that area must cease and Heritage NSW notified (DECCW, 2010c, p.13). The due diligence defence does not authorise continuing harm.

2.1.2 Notification of Aboriginal objects

Under Section 89A of the NPW Act, the proponent must report all Aboriginal objects and places to the Secretary of Department of Premier and Cabinet of Heritage NSW within a reasonable time, unless already recorded on the Aboriginal Heritage Information Management System (AHIMS).

2.2 National Parks & Wildlife Regulation 2019

The National Parks & Wildlife Regulation 2019 (NPW Regulation) provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage. The NPW Regulation 2019 outlines the recognised due diligence codes of practice, procedures for Aboriginal Heritage Impact Permit (AHIP) applications, and Aboriginal cultural heritage consultation requirements amongst other regulatory processes.

2.2.1 Investigating and assessing Aboriginal cultural heritage

There are a number of procedural guidelines supporting archaeological practice in NSW. The publications relevant to the investigation and assessment of Aboriginal cultural heritage include:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011)

- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a)
- *Code of Practice For Archaeological Investigation of Aboriginal Objects in NSW* (The Code) (DECCW, 2010b).

The *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a) codifies a process for consultation with Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal cultural heritage. The requirements are consistent with the NPW Regulation and seek to conserve Aboriginal objects and places of significance to Aboriginal people. Consultation is therefore a fundamental part of the Aboriginal cultural heritage assessment process.

2.3 Heritage Act 1977

The NSW *Heritage Act 1977* provides protection for environmental heritage including historic places, structures, relics, moveable objects and landscapes of significance. The *Heritage Act 1977* also affords protection to Aboriginal cultural heritage and Aboriginal archaeology of State heritage significance through listings on the State Heritage Register (SHR) or being the subject of an Interim Heritage Order (IHO).

No Aboriginal places included on the SHR or subject to an IHO are located within the study area. It is noted that the Newington Armament Depot and Nature Reserve (SHR No. 01850) includes discussion of Aboriginal archaeology within the *Conservation Management Plan* (Tanner Architects, 2013) however, it is not proposed to undertake works within the curtilage for SHR No. 01850. Additionally, Robin Thomas Reserve is listed for Aboriginal cultural heritage values, archaeology (Aboriginal and historical) and a Pleistocene sand body which extends through the Parramatta CBD, as *Ancient Aboriginal and Early Colonial Landscape* (SHR No. 01863) which is 700 metres west of the study area but would not be impacted from Stage 2 works.

2.4 Aboriginal Land Rights Act 1983

The purpose of this legislation is to provide land rights for Aboriginal people within NSW and to establish Local Aboriginal Land Councils (LALCs). The land able to be claimed by LALCs on behalf of Aboriginal people is certain Crown land that (under Section 36):

a. Is able to be lawfully sold, leased, reserved or dedicated.

b. Is not lawfully used or occupied.

c. Will not, or not likely, in the opinion of the Crown Lands minister, be needed for residential purposes.

d. Will not, or not likely, be needed for public purposes.

e. Does not comprise land under determination by a claim for Native Title.

f. Is not the subject of an approved determination under Native Title.

Claims for land are through application to the Office of the Registrar, *Aboriginal Land Rights Act 1983*. The study area is within the boundaries of the Deerubbin and Metropolitan LALCs and is not subject to any Aboriginal land claims.

2.5 Native Title Act 1993

The Commonwealth *Native Title Act 1993* establishes a structure for the protection and recognition of native title where:

- Aboriginal people have a native title interest to maintain traditional customs and laws
- Aboriginal people have sustained connection with the land or waters in question
- the native title rights and interests are recognised by the common law of Australia.

The *Native Title Act 1993* establishes processes to determine where native title exists, how activities affecting upon native title may be carried out, and to provide compensation where native title is impaired or extinguished. The *Native Title Act 1993* provides Aboriginal people who hold native title rights and interests, or who have made a native title claim, the right to be consulted and in some cases, to participate in decisions about activities proposed to be undertaken on the land.

A search of the Native Title Register was undertaken on 31 May 2022. There are no Native Title claims within the study area.

2.6 Aboriginal and Torres Strait Islander Heritage Protection Act (1984)

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* can protect areas and objects that are of particular significance to Aboriginal and Torres Strait Islander people. The ATSIHP Act allows the Environment Minister, on the application of an Aboriginal or Torres Strait Islander person or group of persons, to make a declaration to protect an area, object or class of objects from a threat of injury or desecration.

No places declared under the Act are located within the study area.

3 ABORIGINAL COMMUNITY CONSULTATION

3.1 Consultation undertaken to date

Transport for NSW has developed the PACHCI to provide a means of effective consultation with Aboriginal communities regarding activities which may impact on Aboriginal cultural heritage and to ensure a consistent assessment process for activities across NSW. The PACHCI aligns with NSW regulatory processes for Aboriginal community consultation as required by clause 60 of the National Parks and Wildlife Regulation 2019.

During earlier planning stages of the project, representatives from Transport for NSW met with Deerubbin LALC on 7 December 2018 to provide an introduction to the project including route options being considered.

Representatives from the Metropolitan LALC and the Deerubbin LALC then participated in an archaeological survey conducted on 24 January and 4 February 2022 respectively, in accordance with PACHCI Stage 2. The site officers provided input on cultural significance and identified the potential for impacts on Aboriginal heritage (see Appendix C for copy of Deerubbin LALC survey report). At the time of writing this report, Metropolitan LALC survey report has not been provided.

3.2 Planned consultation

Aboriginal community consultation will be undertaken to review this Archaeological Survey Report and Test Excavation Methodology and to develop the ACHAR for the project in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a). Consultation activities include:

- registering Aboriginal Parties for the project
- providing reports and test excavation methodology to Registered Aboriginal Parties to review (minimum 28 calendar days)
- inviting Registered Aboriginal Parties to attend Aboriginal Focus Group meetings. No site walk has been scheduled, but is available to RAPs if requested
- survey of previously inaccessible areas, once property access can be arranged, prior to any physical works commencing
- inviting applications for Site Officers to support test excavations
- involvement in the post approval stage (e.g. salvage).

4 ENVIRONMENTAL CONTEXT

Natural resources available to Aboriginal people and how they are used are critical in the study area in terms of environmental context to reflect daily life.

This chapter discusses the study area and wider region as necessary, in order to build an understanding of the subject landscape and patterns of land use. Site types are, to varying degrees, influenced by the local environment. For example, rock shelter and rock art sites are likely to occur where the necessary geology exists. Another important influence on site distribution is the location of current and former watercourses and the availability of water throughout the year. Over the thousands of years that humans have occupied Australia considerable environmental changes have occurred, impacting on how and where Aboriginal peoples lived.

Reconstructions of Aboriginal land use patterns in the Sydney region have been undertaken predominately based on early historical accounts and reconstructions of language groups. Ethno-historical accounts are inevitably subject to the writer's colonial bias; however, they do provide valuable observations of Aboriginal customs, life and continued presence during the early period of European occupation. In discussing the ethno-history of the local area, efforts have been made to adopt commonly accepted spellings. Research regarding language groups of eastern Australia is also subject to limitations, as Aboriginal populations of the Sydney basin were the first to be decimated by the disease and violence which followed European invasion. As such, even the earliest historical records and language research in the Sydney basin is based on observations of significantly reduced and displaced Aboriginal populations. The spread of smallpox, ongoing conflict with the European colonists and reduction of available resources are key causes of Aboriginal dislocation and depopulation in the area. By 1816 Aboriginal people who remained in the region were increasingly dependent on the Europeans for food, clothing and shelter (Kohen, 1986).

A discussion of European land use provides an understanding of the modifications and disturbances to Aboriginal cultural landscapes and potential archaeological deposits which have occurred since European occupation.

The existing archaeological record is limited to certain materials and objects that were able to withstand degradation and decay and is also affected by how often a site/s were visited. As a result, the most common type of Aboriginal objects remaining in the archaeological record of the Sydney region are stone artefacts. Artefact scatters are common indicators of activity in the landscape and may comprise evidence of previous campsites (which may have high densities of artefacts) or knapping events (where a stone material will be shaped into a stone tool) or hunting activities (which may have low densities of artefacts).

4.1 Geology

The underlying geology of a landscape may provide an indication of the variety and location of Aboriginal site types which may be present within that area. For example, rock shelters may be present in geological formations with rocky outcrops, grinding grooves may be present in sandstone formations and proximity to stone tool making resources (such as a silcrete) may indicate the potential for Aboriginal sites associated with raw material quarrying and tool preparation.

The geological context of the study area is shown in Figure 4.1. In some areas man- made fill is overlying deeper natural geological formations. Man-made fill includes 'dredged estuarine sand and mud, demolition rubble, industrial and household waste' (Herbert, 1983).The western portion of Grand Avenue and portions of the study area to the north of Parramatta River are located across quaternary deposits consisting of 'silty to peaty quartz sand, silt, and clay, ferruginous and humic cementation in places, common shell layers' (Qha) (Herbert, 1983). Man-made fill overlies a tertiary deposit of sand, clay and peat with variable levels of iron (Tm) in the eastern portion of Grand Avenue, towards Thackeray Street, Camellia.

The portion of the study area located to the north of Parramatta River consists of the Triassic aged Wianamatta Group Ashfield Shale (Rwa) which is a dark grey to black claystone-siltstone and fine sandstone-siltstone laminate (Clark and Jones, 1991). This geological formation would have provided few suitable raw stone materials for the manufacture of stone artefacts. Resources would be more likely to have been procured from elsewhere. The Triassic Hawkesbury Sandstone geological formation also occurs within the study area, consisting of medium to coarse grained quartz sandstone with minor shale and laminate lenses. The presence of sandstone in the surrounding areas would have been an important factor for Aboriginal occupation as sandstone was used for the maintenance and manufacture of stone artefacts such as axes, as a form of shelter (if rock shelters were present), and as a medium for rock art, including engraved and pigment art. Furthermore, stone raw materials that enable conchoidal fracture played an important role in manufacturing stone artefacts. Silcrete and quartz are predominant raw materials in Sydney's stone tool assemblages and are readily available

in the Cumberland Plain and around the study area. Quartz is widely available around the study area, on the sandstone plateau situated on the Cumberland Basin in Tertiary and Quaternary deposits near the Hawkesbury/Nepean River system (Corkill, 1999). Silcrete occurs in paleochannel deposits near to the coast in Newington and the former Olympic Village near the Parramatta River, along with the western part of the Cumberland Basin, Maroota on the Hornsby Plateau and Holsworthy Army Reserve on the Woronora Plateau in the south of Sydney (Corkill, 1999).

The eastern portion of the study area includes Quaternary fluvial deposits (Qha) associated the Parramatta River estuary, that consisting of silty to peaty quartz sand, silt and clay overlain by man-made fill, as well as sections of only man-made fill in the southern section (Herbert, 1983). Hawksbury Sandstone (Rh) located in Rydalmere area north of the Parramatta River also consists of organic mud, peat, clay, silt, marine sand and fluvial sand.

Resource distribution and availability is heavily influenced by the type and nature of soils present within a landscape, as different soils support a range of vegetation cover. Information regarding the depth of soils also contributes to an understanding of levels of historical disturbance. Where deep soil profiles or sand bodies exist, intact archaeological deposits may remain even where substantial earthworks and modification have impacted the upper deposits. As such, it is important to note that superficial disturbance, infill and urban development does not automatically negate archaeological heritage values.

4.2 Soil landscapes

Five soil landscapes are located across the study area, not including the ‘disturbed terrain’ classification (Chapman et al., 2009; Chapman and Murphy, 1989). The soil landscapes are shown in Figure 4.2.

Disturbed terrain is located across level plains to hummocky landscapes, and exhibits land extensively disturbed by human activity including complete disturbance, removal or burial of soil. Local relief is less than 10 metres, and slopes at less than 30 per cent. Landfill includes soil, rock, building, and waste materials. The original vegetation of disturbed terrain areas has been completely cleared and replaced with turf or grassland. Turfed fill areas are commonly capped with up to 40 centimetres of sandy loam or up to 60 centimetres of compacted clay over fill or waste materials. Disturbed terrain is located in areas that were previously swamps, estuaries and wetlands, and were noted along lower reaches of the Parramatta River foreshores. Land uses for areas classified as disturbed terrain includes commercial and business complexes, such as the Camellia portion of the study area. Soils within areas of disturbed terrain have been disturbed to a depth of at least 100 centimetres (Chapman et al. 2009; Chapman and Murphy, 1989).

The Lucas Heights soil landscape is located across the northern embankment of the Parramatta River, as well as Hope Street, Waratah Street and the eastern portion of Boronia Street. The soil landscape consists of gently undulating crests and ridges on plateau surfaces of the Mittagong formation. Local relief is up to 30 metres, and slopes at less than 10 per cent. Rock outcropping is absent. Soils are moderately deep (50 – 150 centimetres), hard setting yellow podzolic and yellow soloths, with yellow earths on outer edges (Chapman et al., 2009; Chapman and Murphy, 1989). The upper topsoil (Horizon A1) consists of up to 30 centimetres yellowish brown sandy loam, overlying 10-30 centimetres of bleached sandy clay loam as lower topsoil (Horizon A2). B Horizon is up to one metre of yellowish brown clay. These soil layers are usually clear and erosion is low.

The Blacktown soil landscape is located across most of Sydney Olympic Park, as well as part of the north-west corner of the study area where John Street and South Street intersect. The Blacktown soil landscape consists of gently undulating rises on Wianamatta Group shales and Hawkesbury shale. Local relief to 30 metres, slopes are usually less than five per cent. Broad rounded crests and ridges with gently inclined slopes. The Blacktown soil is shallow to moderately deep (less than 100 centimetres) red and brown podzolic soils on crests, upper slopes and well drained areas; deep (150-300 centimetres) yellow podzolic and soils and soloths on lower slopes and in areas of poor drainage (Chapman et al., 2009; Chapman and Murphy, 1989).

The Quaternary fluvial deposits are associated with a terrace formation known as the Parramatta Sand Body (Kelleher Nightingale Consulting (KNC), 2017). The river terrace extends from the relatively narrow floodplain along the banks of the river to the base of the adjoining shale slopes, wider on the southern side of the river channel. The sand body is mapped based on the predictive model and auger holes investigating the extent of this alluvial terrace (Williams et al., 2021; Groundtruth Consulting, 2008; 2011). The extent of the Parramatta Sand Body is well documented beneath much of modern Parramatta which includes the Parramatta turnback facility section of the study area. However, it has not been identified in the disturbed terrain at Camellia or the reminder of the study area. A portion of the sand body is listed on the NSW State Heritage Register (SHR No. 01863) and contains significant Aboriginal archaeology.

The alluvial sand body was first identified in 2003, during salvage excavations for a residential development at the corner of George and Charles Street in the Parramatta CBD. The AHIMS site 5-6-2648 (CG1) uncovered an approximate one metre deep archaeological layer which contained the sand (Jo McDonald, 2005). Geomorphological investigations identified the alluvial nature of this sand body and its characteristics which was divided into two main periods of use:

1. a lower assemblage (between 20-80 centimetres from the ground surface) broadly considered to be of terminal Pleistocene age (approximately 10,000 to 20,000 years old)
2. and an upper assemblage (less than 20 centimetres from the ground surface) identified to be dated to the last 3,000 years (GroundTruth Consulting, 2008; 2011; Williams et al., 2021).

The Parramatta Sand Body has a well-developed but varied soil profile. Topsoil materials are generally disturbed by European activities. Where the subsoils are intact, they typically consist of yellow orange or yellow brown sandy clay with an earthy (porous) fabric that becomes paler and slightly mottled with depth. The upper parts of the soil profile are usually heavily mixed. In places the sand is cut by deposits of mottled or gleyed clay that were probably deposited in swamps or waterholes on the terrace surface. The reasonably defined levee, 50 to 100 centimetres high, along the terrace edge between Charles and Alfred Streets, comprises cleaner and very slightly coarser sand than the sand found around the margins of the levee. The profile of the sand suggests that the main body of sand is of late Pleistocene age and recent thermoluminescence dates obtained from an excavation undertaken at 140 Macquarie Street (Comber Consultants, 2010), have shown that the top of the undisturbed sand (below the level of Aboriginal occupation) is between 50,000 to 58,000 years old. Deeper sand could be much older and may relate to a period of a higher sea level about 120,000 years ago.

Recent excavations at George Street, Parramatta presented dates between 43,000 to 49,000 years old, however, disturbance of a ceramic artefact in lower depths and bioturbation in upper levels raised questions about the intactness of the soil profiles (GML Heritage, 2019; Williams et al., 2021). Furthermore, excavations in Cumberland Hospital in north Parramatta uncovered similar Optically Stimulated Luminescence dates approximately 50,800 (± 3,600) years old.

The deepest sections of the Parramatta Sand Body found on the banks of the Parramatta River via these limited excavations, which has the potential to contain the complete stratigraphy of human occupation of the region (Williams et al., 2021). Indurated mudstone/tuff/chert stone artefacts in low densities (generally below 10 artefacts per square metre) were evaluated to reflect such deep-time occupation which were indicative of ephemeral or transient occupation. This earlier deposit becomes shallower with increasing distance from the river however, all sections of the Parramatta Sand Body contain extensive evidence from the mid-Holocene (7,000 to 5,000 years ago).

Two major phases of past use were identified by Williams et al. (2021):

1. initial and repeated visitation in the terminal Pleistocene and early Holocene, characterised by an indurated mudstone/tuff/chert artefacts, dominated assemblage of relatively expedient technologies
2. a more intense occupation of the river corridor in the mid-late Holocene, and characterised by a silcrete dominated assemblage with a variety of tool types and increasingly complex technologies (e.g. backed artefacts, heat treatment, ground axes).

Much of the original sand body is likely to have been destroyed by the construction of modern buildings but patches of the sand body are preserved beneath modern development and on vacant land. The level of disturbance (and hence Aboriginal archaeological potential) is closely related to the nature of excavation works associated with modern development – in many cases deep excavation and the introduction of fill for foundations and basements has severely impacted the sand body. In other cases, where fill material has been placed on the existing surface, the sand body (and any associated archaeology) may be preserved intact beneath the modern urban landscape. The sand deposit is approximately 69 hectares in size, mainly four to seven metres above the Parramatta River's surface area and extending around 2.5 kilometres along the river, up to 300 metres to inland (Figure 4.1) (Williams et al., 2021). It is documented that nearly 19 hectares of the deposit has been destroyed through urbanisation mainly in the eastern part of the Parramatta CBD.

The Glenorie soil landscape is located across most of South and Boronia Streets within the study area which is an erosional soil landscape and consists of undulating to rolling low hills on Wianamatta Group Shales. Local relief is 50-80 metres, slopes 5 – 20 per cent and includes narrow ridges, hillcrests and valleys. Glenorie soils are shallow to moderately deep (less than 100 centimetres) red podzolic soils on crests, moderately deep (70 – 150 centimetres) red and brown podzolic soils on upper slopes, deep (greater than 200 centimetres) yellow podzolic soils and greyed podzolic soils along drainage lines (Chapman et al., 2009; Chapman and Murphy, 1989). The topsoil (Horizon A1) usually consists of up to 15 centimetres of dark brown loam overlying up to 30

centimetres of brown clay loam as lower topsoil (Horizon A2). B Horizon occurs as reddish brown clay approximately one metre thick.

The Birrong soil landscape is located across the Sydney Olympic Park Wharf and Hill Road section of the study area and consists of level to gently undulating alluvial floodplain draining Wianamatta Group shales (Chapman et al., 2009; Chapman and Murphy, 1989.) The local relief is up to five metres, slopes are less than three per cent and includes broad valley flats. Soils are deep (greater than 250 centimetres) yellow podzolic soils and yellow solodic soils (indicates a contrast between the texture of the A and B horizons, mostly that the A horizons are acidic and the B horizons are alkaline) on older alluvial terraces, deep (greater than 250 centimetres) solodic soils and yellow solonetz on current floodplain.

The Ettalong soil landscape covers a small portion of the study area to the north of Sydney Olympic Park and consists of level to very gently undulating coastal swamps (Chapman et al., 2009; Chapman and Murphy, 1989). Local relief is less than 5 metres, slopes less than two per cent. The water table is at less than 100 centimetres below ground surface. Areas have hummocky surfaces, shallow lakes and very shallow water tables. Soils are deep (less than 150 centimetres) organic acid peats, peaty podzols, and humus podzols often overlying buried siliceous sands. Soil landscapes and landforms can be indicators favourable occupation sites. Previous archaeological studies in the region concluded that the Parramatta Sand Body and other alluvial soil landscapes are rich in archaeological deposits.

4.3 Topography and hydrology

The study area is situated on flat to undulating lowlands of the Cumberland Plain generally less than 80 metres in elevation (Attenbrow, 2010). Distance from water is an important factor affecting the Aboriginal occupation patterns and therefore site distribution. Availability of fresh drinking water is likely to have had an influence on the selection of areas Aboriginal peoples inhabited, either as a transitory visit or a prolonged campsite area. Saltwater sources may have offered a variety of edible fish, shellfish and other marine life, and within NSW shell middens have been recorded on headlands, beaches, estuaries, and along the banks or inland rivers, creeks and lakes (OEH, 2013). Intensive development and urbanisation of the Western Sydney region has had a considerable impact on the historical alignments of water courses and ephemeral drainage lines. The Parramatta River's riverine landscape was modified as early as 1791 (Hoskins, 2015). Prior to European colonisation the river was a shared food source, a way for transport and a territorial boundary for the Aboriginal people. The changes in the river landscape reshaped the ecology around the river and affected the natural resources which Aboriginal people could obtain.

White and McDonald (2010, p.22) considered Aboriginal land use and distance from water in relation to the stream order (stream order assigns a numeric order to links in a stream network, based on their number of tributaries). The stream order model relates the spatial distribution of Aboriginal sites and their distance from water. The model found the following:

> *In first order landscapes, there is no significant difference in artefact distribution with distance from water. In second order landscapes, artefact density is highest within 50 metres of water and decreases with increasing distance from water. In fourth order landscapes, artefact density is highest 51-100 metres from water, lower closer to water and declines with increasing distance more than 100 metres from water.*

The study area crosses the Parramatta River between Camellia and Rydalmere and between Melrose Park and Wentworth Point. The Parramatta River is a mangrove lined, tidal drowned valley estuary and provides both salt and freshwater resources. The river is a Strahler stream order 3 + (CT Environmental, 2016, p. 11). The Parramatta River originates at Toongabbie Creek and flows eastward, fed by numerous creeks from the north and south eventually becoming Port Jackson. Creeks in the area include Ponds Creek, Subiaco Creek, Clay Cliff Creek and Vineyard Creek. Haslams Creek (formerly Hackings Creek), a southern tributary of Parramatta River, flows through the study area at Sydney Olympic Park (see Figure 4.3). Haslams Creek joins the Parramatta River at Homebush Bay. Prior to the 2000 Sydney Olympic Games, Haslams Creek consisted of a concrete-lined stormwater channel. The creek was reconstructed in a natural shape prior to the Olympic Games. Haslams Creek is now an important estuarine ecosystem (Education and Communities, 2012).

The Parramatta River catchment is made up of 29 sub-catchments which is referred to as the Upper and Lower Parramatta River. A hydrology, flooding and water quality technical report being prepared for the environmental impact statement notes that the study area is located within the Upper Parramatta River section and are subject to mainstream and overland flooding. Mainstream flooding results from the Parramatta River and its tributaries, including Haslams Creek.

Haslams Creek is located in the south section of the study area and is a highly modified second order stream. The creek is estuarine which drains into the Parramatta River at Homebush Bay. The catchment of Haslams Creek is highly urbanised with the upper extents concrete lined opened channels and pipes. Nuwi Wetland is open to Haslams Creek which connects Narawang Wetland via a floodway under Hill Road. The floodway allows flood flows from Haslams Creek to enter Narawang Wetland. These hydrological systems encompassing the study area would have provided a variety of resources for Aboriginal people, however, the recent modifications and channelling of these waterways would have impacted most of the intact soil profiles.

4.4 Flora and fauna

The study area has been cleared of most native flora, particularly in areas identified as disturbed terrain or consisting of man-made fill. Prior to European occupation, low, eucalyptus open-forest and low eucalyptus woodland with a sclerophyll shrub understorey would have been present in the Lucas Heights soil landscape region. The Blacktown, Glenorie and Birrong soil landscapes have been almost completely cleared of eucalyptus woodland and tall open-forest (wet sclerophyll forests). The Ettalong soil landscape is located across swampy areas and vegetation is often arranged in concentric zones around the swamp. Species variation is dependent on local salinity levels and height above the water table (Chapman et al., 2009; Chapman and Murphy, 1989). Haslams Creek's associated wetland is the Narawang Wetlands which is an artificially constructed freshwater wetland at Sydney Olympic Park covering approximately 26 hectares. It extends along a 1.6 kilometre corridor and consists of an ornamental lake, three large stormwater collection ponds and 22 smaller habitat ponds. Remnants of the eucalyptus forest are preserved in the Newington Armory (Perrin, 2008).

Original vegetation communities would have provided habitats for a variety of animals, as well as potential food and raw material sources for Aboriginal people. Various banksia species were collected and used to manufacture needles for basket and mat weaving, while the fruit of the geebung (*Persoonia*) was eaten and string and fishing lines were soaked in a geebung bark infusion to prevent fraying (Nash, 2004, p. 2-4). Eucalyptus trees were a particularly important resource; leaves were crushed and soaked for medicinal purposes, bowls, dishes and canoes were made from bark, and spears, boomerangs and shields were crafted from the hard wood (Nash, 2004, p. 8). Canoes were likely to have been made from the bark of the Bangalay (*Eucalyptus botryoides*), Stringybark (*Eucalyptus agglomeratis*), She Oak *(Casuarina stricta*) and River Oak (*Casuarina cunninghamiana)* trees, which were present in the forests surrounding the Parramatta River (Dallas, 2003, p.33).

Typical animals which may have been hunted, trapped, smoked, speared, fired or clubbed by Aboriginal peoples include possums, flying foxes, goannas, wallabies and kangaroos (Dallas, 2003, p. 33). The hides, bones and teeth of some of the larger mammals may have been used for Aboriginal clothing, ornamentation, or other implements (Attenbrow, 2010, p. 70-76). Smaller animals and native fruits and berries were also important to the Parramatta Aboriginal economy. Ants and grubs were valuable protein and carbohydrate sources (Dallas, 2003, 34). The close proximity to the saltwater portion of the Parramatta River meant that fish, shellfish, eels and fishing also provided a varied diet (City of Parramatta, 2017a). Fresh water streams entering the river supported ducks, mullet, crayfish, shellfish and turtles (Dallas, 2003, p. 33).

4.5 Land use and disturbance

The environmental context of the study area indicates it would have been most suitable for utilising resources and for occupation by the Aboriginal communities of western Sydney prior to colonisation. The area would have been rich in natural resources, with the Parramatta River and freshwater creeks forming a focal point of cultural and economic activity.

Large parts of the study area, in particular the areas to the south of Parramatta River in Camellia and Sydney Olympic Park, were subject to extensive vegetation clearance, introduction of man-made fill and land remediation/reclamation from as early as 1810.

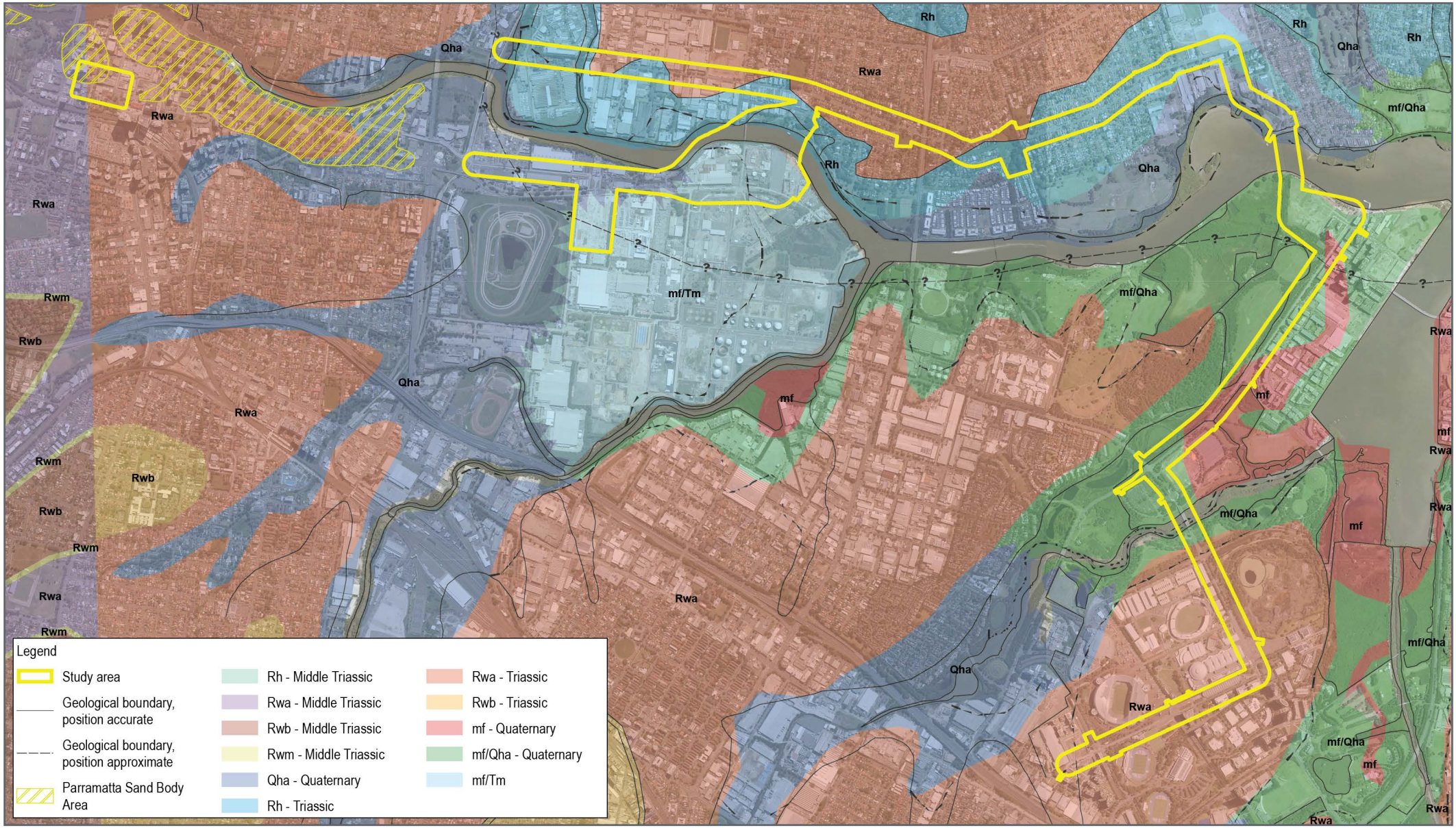
Soils within areas identified as disturbed terrain have been characterised up to a depth of 100 centimetres. However, it is possible that areas of potential archaeological deposits remain underneath areas of remediated land in Sydney Olympic Park as intact soils and geological formations may be effectively capped by overlying layers of disturbance and fill. The industrial area in Camellia is associated with land reclamation of up to 2.6 metres where intact soil profiles extend between 2.6 metres to 15.8 metres.

The study area is a rich cultural landscape whereby Aboriginal people maintained cultural practices prior to and following colonisation. Landscape markers surrounding the study area, such as Parramatta River are culturally

significant, and there is a growing body of archaeological evidence, Aboriginal memories and historical records that demonstrates the continuation of Aboriginal cultural practices into the colonial period. Soon after Governor Phillip's arrival with the First Fleet in 1788 and founding of a penal colony at Sydney Cove, Captain Arthur Phillip and others landed at the junction of the Parramatta River and Duck River and explored the upper reaches of the Parramatta River and surrounds (Kass et al., 1996). During the exploration, Phillip's party came across Aboriginal campsites, hunting traps and fireplaces (Kass et al., 1966 in Dallas, 2003, p. 36). Parramatta (originally known as Rose Hill) was developed as a farming settlement to feed the new English colony. Phillip chose the area as the soil was found to be more suitable for farming than the area surrounding the settlement of Port Jackson. This colonisation led to the immediate displacement of local Aboriginal communities from the land that they had inhabited for thousands of years (City of Parramatta, 2017b).

By 1790 fruit trees were planted, cattle introduced and crops including wheat, barley, maize and oats were being cultivated. Timber was rapidly exploited, and land was cleared for agricultural purposes, dramatically altering the landscape. One hundred convicts worked on the 'Experiment Farm' and the construction of Parramatta town. By 1789 James Ruse was occupying and cultivating land at Experiment Farm, which was later granted to him (Kass, 2008). In 1792, 30 acres of land was granted to Charles Smith on the site of what is now the North Parramatta Cumberland Hospital Precinct (Arfanis, 2015). Farming continued in the area under a succession of governors (City of Parramatta, 2017a). Tensions rose as the European colonists inexorably claimed land for their uses and depleted the resources available for local Aboriginal communities.

The traditional methods for food procurement were becoming increasingly difficult for Aboriginal people (TKDA Architects, 2017). Similarly, food-gathering patterns were disrupted by the lack of access to their traditional lands, due to farming by the new settlers. Limited opportunities were offered by the Europeans willing to barter spirits and tobacco, and even food, for fish. At the turn of the century, conflicts were recorded between the settlers and the Aboriginal communities in the Nepean and Hawkesbury districts. Records indicate the Parramatta region was relatively peaceable compared to the massacres of Aboriginal peoples in places such as Appin and Mulgoa (Dallas, 2003). However, it is important to note that the lack of records does not indicate that violence did not occur in a region, merely that it was not recorded, or records no longer exist.



Paper Size ISO A4

0 0.5 1

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Geology of the study area and surrounds

Project No. **12557728**
Revision No. **2**
Date **15/06/2022**

FIGURE 4.1

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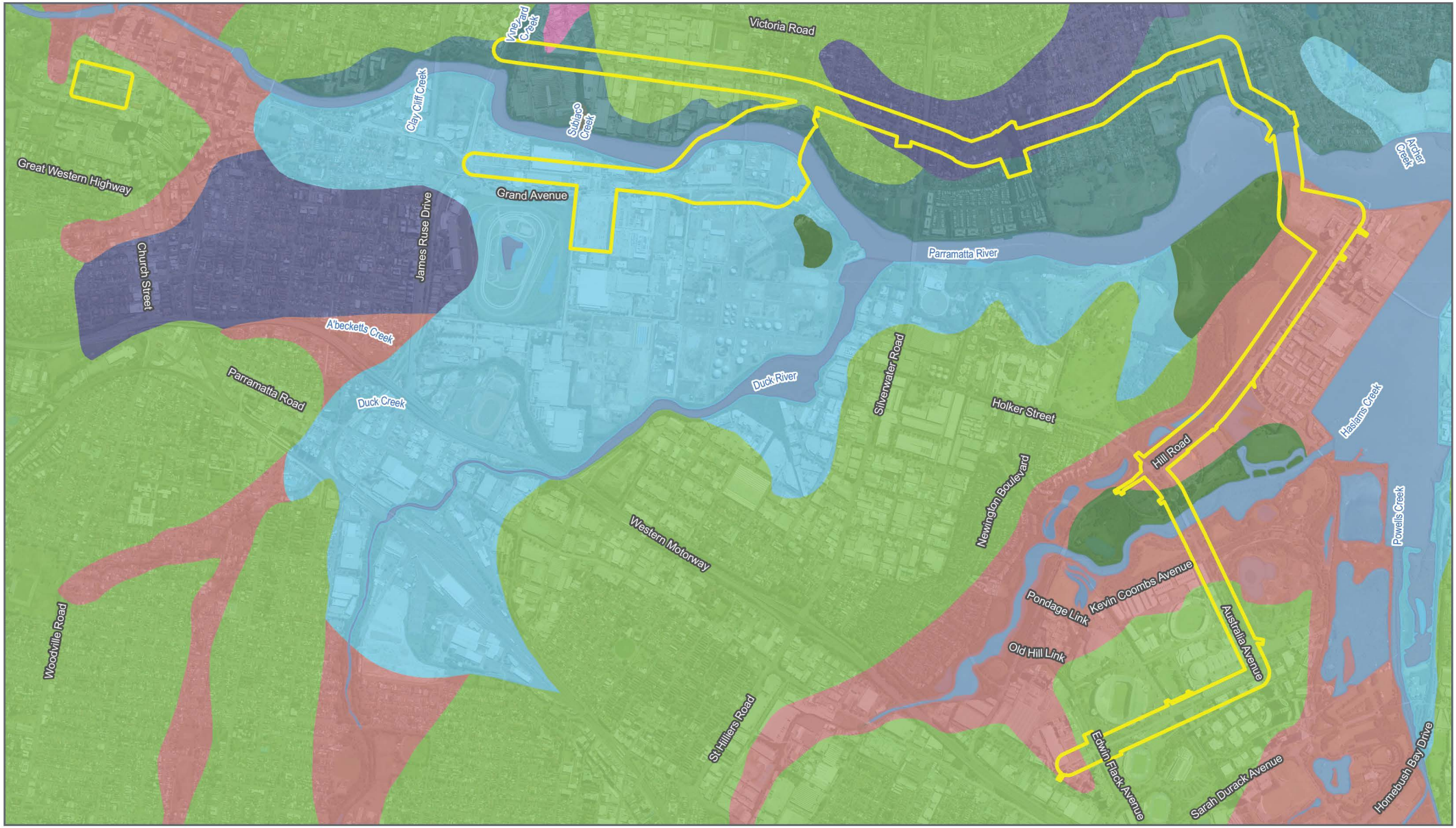
Data source: Study area - GHD2022; Geology - GSNSW2022; Imagery - Metromap Tile Service: extracted 15/06/2022 . Created by: Imanasan



Legend

- Study area
- Birrong
- Blacktown
- Disturbed Terrain
- Ettalong
- Glenorie
- Gymea
- Lucas Heights
- Waterbodies

Paper Size ISO A4

0 0.5 1

Kilometres

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Aboriginal Cultural Heritage

Soil Landscapes of the study area and surrounds

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FIGURE 4.2

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH003_SoilLandscape
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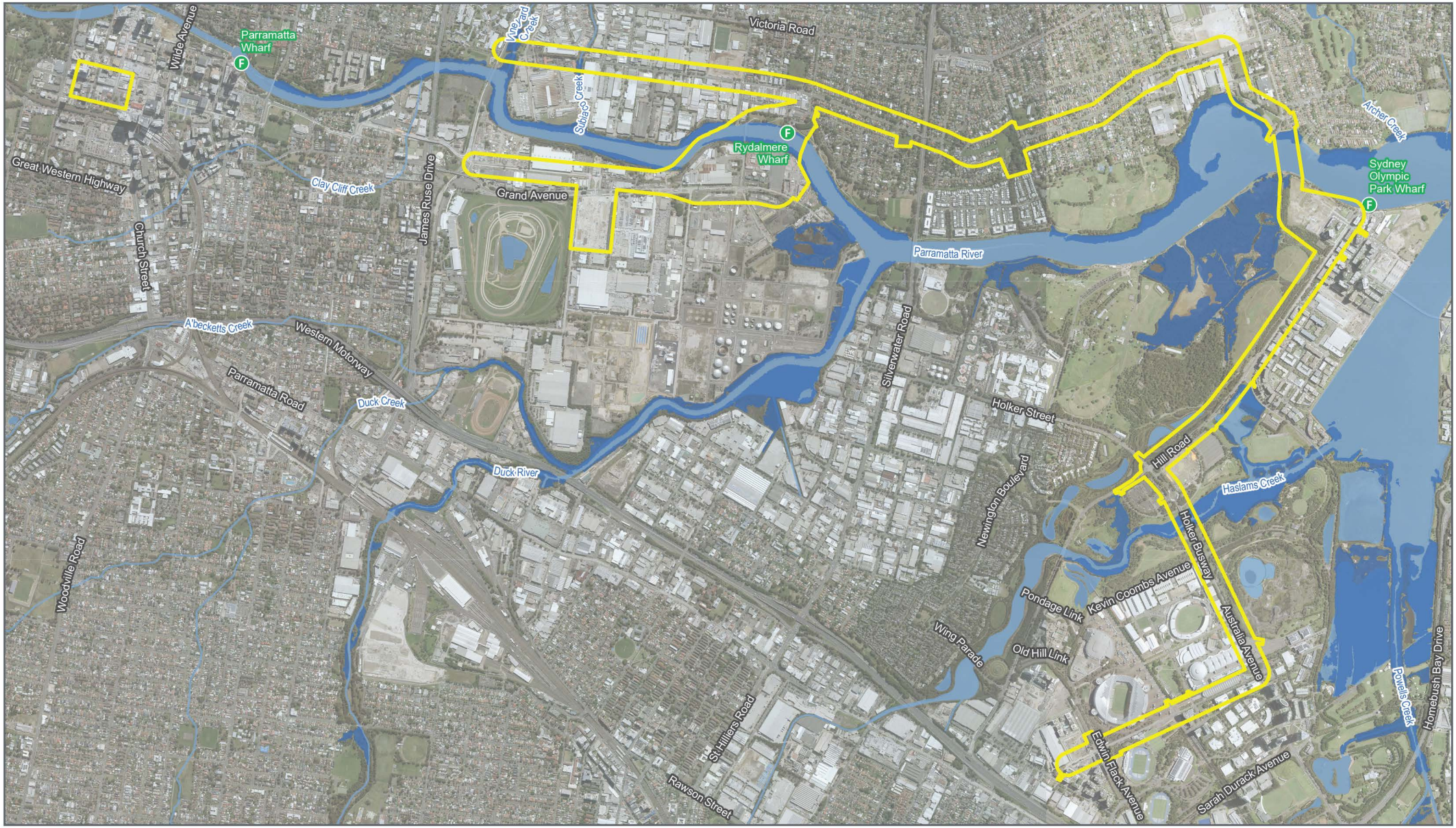
Data source: Study area - GHD2022; Soil landscape - ESS2018; Imagery - Metromap Tile Service: extracted 15/06/2022 . Created by: lmanasan



Legend

- Study area
- Coastal wetlands
- Waterbodies
- Watercourse
- Ferry Wharf

Paper Size ISO A4

0 0.5 1

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Hydrology of the study area and surrounds

Project No. **12557728**
Revision No. **2**
Date **15/06/2022**

FIGURE 4.3

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH004_Hydrology
Print date: 15 Jun 2022 - 17:12

Data source: Study area - GHD2022; Wetland - DPIE2018; Watercourse - NSWSS2022; Wharf - TfNSW2018; Imagery - Metromap Tile Service: extracted 15/06/2022 .
Created by: Imanasan

5 ARCHAEOLOGICAL CONTEXT

5.1 Aboriginal history in the area

The original inhabitants of the Parramatta region are the Burramattagal peoples, of the Darug people who first settled on the upper reaches of Parramatta River (City of Parramatta, 2017a). The term ‘Darug’ was only applied to a language group after 1870 (Attenbrow, 2010).

The Darug comprised a number of sub-groups often referred to as ‘clans’. The Burramattagal peoples are the western-most Eora clan, who are part of the harbour-side katungal ‘sea people’. Parramatta marks the border between the cultures of the sea people, and the inland paiendra or ‘tomahawk people’ (Flynn, 1995). The Wangal peoples are also a clan of the Eora and inhabited the southern shore of the Parramatta River. The Darug, or Dharruk, language was spoken across the Cumberland Plain region, which stretched from Appin in the south to the Hawkesbury River in the north, and west of the Georges River, Parramatta and Berowra Creek (Attenbrow, 2010, p. 34). The Burramattagal peoples are likely to have spoken a common dialect with other groups who lived on the lands between Sydney Cove and Parramatta, with local variances between people on the coast and those inland. The Burramattagal peoples appear to have belonged to smaller groups, consisting of multiple extended families. These groups ranged in size from 30 to 70 plus (Dominic Steele, 2013, p. 41). The Burramattagal and Wangal peoples rotated seasonally through campsites, depending on their needs (McClymont, 2008).

Parramatta was a resource rich zone which supported Aboriginal occupation and was at the centre of human activities. The Parramatta River banks and the mostly freshwater stream now known as Clay Cliff Creek (located to the west of James Ruse Drive) were vital sources of food and living resources. The boundary between Burramattagal country and their neighbours, the Wategora clan, seems to have been the Duck River (Kohen, 1993 in McClymont, 2008).

The bark canoes of Burramattagal peoples have been recorded as holding a ‘central small fire, built on a mound of soil, to cook up their fresh catch’ and 'fire-stick farming', employed to burn vegetation to facilitate hunting and to change the composition of plant and animal species in the area, was also practiced by the Burramattagal people.

Aboriginal site types recorded in the Parramatta region frequently include rock shelters with deposits, open campsites (artefact scatters) and open middens. Surface scatters are generally sparse and partially disturbed (Dallas, 2003, p. 29). Grinding grooves and shell middens have also been recorded and are generally located adjacent to watercourses. Burials can be associated with shell middens, and also can be found in coastal sand dunes (Attenbrow, 2012). Culturally modified trees (or scarred trees) have been recorded on suitable remnant old growth trees. Cultural modification may comprise evidence of bark removal for the purposes such as construction of bark containers canoes or shields and as such vary greatly in size (Dallas, 2003, p. 29).

The history of Aboriginal people after the arrival of the First Fleet and subsequent occupation of the land by British colonists is presently poorly understood. In part this is due to a tendency to study sites away from urban centres (Irish and Goward, 2012). Aboriginal people living around Parramatta tended to avoid the early exploratory parties but as the settlement at Parramatta was established and grew in size, interactions became more frequent with European colonists. Exchanges between local Aboriginal people and the military officers were recorded as indicators of good relations during the early years of the settlement. Collins (1798), described the exchanges of fresh fish for bread and salted meat: *“Since the establishment of that familiar intercourse which now subsisted between us and the natives, several of them had found it their interest to sell or exchange fish among the people of Parramatta; they being contented to receive a small quantity of either bread or salt meat in barter for mullet, bream and other fish. To the officers who resided there this proved a great convenience, and they encouraged the natives to visit them as often as they could bring them fish*”. Unfortunately, this trade was stopped following the destruction of a canoe by convicts, with the ensuing conflict effectively souring the previously friendly relations (KNC, 2017).

By the 1810s, a ‘Native Institution’ was suggested by William Shelley to teach Aboriginal children literacy as well as religious values, domestic and agricultural skills and planned to be opened in Parramatta (Brook and Kohen, 1991). The school was located on a large area (encircled by Macquarie, Marsden and Hunter Streets) near ‘the Church of Parramatta’. Governor Macquarie announced the first Aboriginal Annual Feast on 28 December 1814 to mark the opening of the institution at the marketplace encouraging Aboriginal families to send their children to the institution. The feast continued as an annual gathering and event in Parramatta from 1814-1835. Macquarie and subsequent governors used the event as an opportunity to diffuse tensions between Aboriginal people and

new settlers, to promote the Native Institution as well as to distribute clothes and blankets (Turbet, 1989). The site for the Native Institution lies within the study area at Parramatta CBD.

Historical records from the first years of the colony document the disastrous effect smallpox had on the Aboriginal people of the area (Collins, 1798, 496) which decimated the population and had an irrevocably damaging impact on social organisation (McDonald, 2008). Inevitably with increasing British settlements and land use from the late 18th century onwards, Aboriginal people became alienated from their land and marginalised within their own country. A recent shift in research focus has however begun to provide some indicators of the nature of continuing Aboriginal settlement in areas of the Sydney Basin after 1788 (Karskens, 2019).

This research suggests an enduring culture that adapted to change and integrated new material culture into existing practices. Art sites continued to be created in the area with new imagery such as axes and rifles being incorporated indicating a continuation of cultural practice (Irish, 2017). At least 70 historical Aboriginal settlements are known (Irish and Goward, 2012) across the Sydney basin dating to the late 18th and 19th centuries. These include sites where Aboriginal adaptation and tenacity are present as evidenced by the creation of new object types such as flaked glass and, in a few instances, knapped ceramic. Midden sites from the post-1788 period have also been found to contain introduced items such as metal and buttons however others from this period are known to be devoid of any introduced material. The adaptation of burial practices has also been documented with examples including the burial of a 30 year old woman in Rose Bay whose body was arranged in a traditional manner but with the inclusion of introduced items such as scissors and other metal objects (Donlon, 2003; 2008 in Irish and Goward, 2012).

It is important to note that sites of significance to Aboriginal peoples are not limited to physical objects, markers or landscapes. Intangible cultural heritage is a living tradition and continued expression of culture. The Parramatta region is located within a culturally significant landscape to Aboriginal peoples of the past, present and future.

5.2 Aboriginal Heritage Information Management System

5.2.1 Search parameters

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken on 5 April 2022 encompassing the study area with a buffer of around 500 metres. There are known limitations within the database as AHIMS data has been recorded over many years in various geographic recording systems. Due to errors in reprojection of data, the registered location of some sites can be in error of up to 200 metres which is why a buffer is usually applied when undertaking searches.

The following search parameters were used:

- Parramatta Light Rail Stage 2 Alignment

  Datum: GDA 94 MGA Zone 56

  Eastings: 316850 – 322860

  Northings: 6252200 – 6257530

  Sites: 16

- Parramatta CBD turnback facility

  Datum: GDA 94 MGA Zone 56

  Eastings: 314842 – 315370

  Northings:6256355 – 6256795

  Sites: 13

The extensive search results are included in Appendix B.

5.2.2 Summary of extensive search

The extensive search identified 29 Aboriginal sites (refer to Table 5.1 and Figure 5.1). Of the 29 sites, two are listed as 'not a site' (AHIMS 45-6-2636 and AHIMS 45-6-2682), therefore the total number of registered Aboriginal sites is 27. The most common site types in the search area are PADs (16 in total), followed by artefacts (six in total) in relation to the other site types (see Table 5.2). The status of the sites provided is based on the extensive search results and some of these site cards may not be up to date.

Table 5.1: Summary of AHIMS within the searched coordinates

AHIMS	Site name	Site type	Status
45-6-2312	Subiaco Ck 1	Open Camp Site	Valid
45-6-2313	Subiaco Ck 2	Open Camp Site	Valid
45-6-2559	Sydney Turf Club Carpark, STC Carpark	Open Camp Site	Valid
45-6-1961	Ermington 1	Midden	Valid
45-6-2636	Ermington PAD	Potential Archaeological Deposit (PAD)	Not a Site
45-6-2682	Wanngal Woodland Axe-Marked Tree	Modified Tree (Carved or Scarred)	Not a Site
45-6-2683	Wanngal Woodland IF1	Potential Archaeological Deposit (PAD)	Valid
45-6-2684	Wanngal Woodland IF2	Potential Archaeological Deposit (PAD)	Valid
45-6-2685	Wanngal Woodland IF3	Potential Archaeological Deposit (PAD)	Valid
45-6-2785	Wanngal Woodland PAD2	Potential Archaeological Deposit (PAD)	Valid
45-6-2786	Wanngal Woodland PAD1	Potential Archaeological Deposit (PAD)	Valid
45-6-2864	George Kendall Ermington	Shell	Valid
45-6-3108	42 Bridge Street Rydalmere PAD	Potential Archaeological Deposit (PAD)	Valid
45-6-3039	Meadowbank Park Tennis Courts RYDE 203	Grinding Groove	Valid
45-6-3151	UWS Rydalmere OS 1	Artefact	Valid
45-6-3827	Clyde PAD 01	Potential Archaeological Deposit (PAD)	Valid
45-6-2679	Parramatta Children's Court	Potential Archaeological Deposit (PAD)	Valid*
45-6-2978	41 Hunter Street PAD	Potential Archaeological Deposit (PAD)	Valid
45-6-1523	George St Parramatta Family Law Courts;	Artefact	Valid**
45-6-4015	Church St PAD-1	Potential Archaeological Deposit (PAD)	Valid
45-5-3630	Macquarie St PAD	Potential Archaeological Deposit (PAD)	Destroyed
45-6-2977	Macquarie St PAD 3	Potential Archaeological Deposit (PAD)	Valid
45-6-3818	St Johns Cathedral Background Artefact Scatter	Artefact	Valid
45-6-2795	150 Marsden Street Parramatta PAD	Potential Archaeological Deposit (PAD)	Valid
45-5-4097	O'Connell St PAD1	Potential Archaeological Deposit (PAD)	Valid
45-6-3767	85-97 Macquarie St	Potential Archaeological Deposit (PAD)	Valid
45-6-2751	Marsden St Carpark	Artefact and Potential Archaeological Deposit (PAD)	Valid**
45-6-3582	Macquarie Street PAD	Potential Archaeological Deposit (PAD)	Valid
45-6-2686	Civic Place PAD	Artefact and Potential Archaeological Deposit (PAD)	Partially Destroyed

* The site noted as destroyed on the site card, ** The site was subject to test excavations

Table 5.2: Summary of extensive AHIMS search results by site type

Site type	Frequency	Percentage
Artefact	6	22%
Potential Archaeological Deposit (PAD)*	16	59%
Midden	2	7.5%
Grinding Groove	1	4%
Artefact and Potential Archaeological Deposit (PAD)	2	7.5%
Total	**27**	**100%**

*Two sites from the search results have not been included as they are not considered a valid site.

5.2.3 AHIMS within study area and surrounds

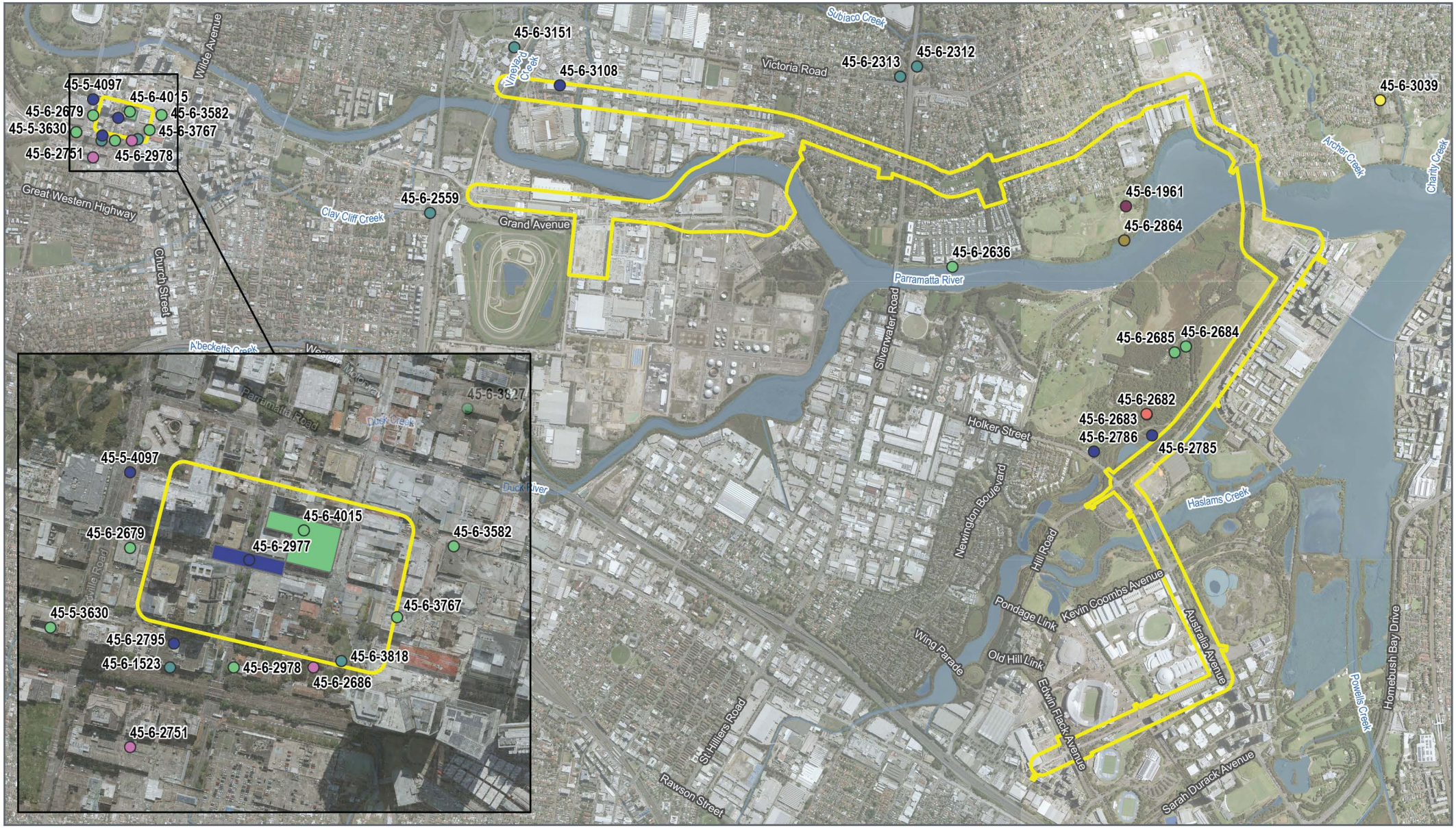
Two registered sites are located within the study area (see Figure 5.1).

- **AHIMS 45-6-2977** is located on Macquarie Street, based on the site card map, between the intersections of Church Street and across to the intersection of O'Connell Street. The site was registered in 2011 by Comber Consultants as a PAD located in an area where the Parramatta Sand Body was identified with intact soil profiles.
- **AHIMS 45-6-4015** is located at 197-207 Church Street and 89 Marsden Street. The site includes a PAD within the Parramatta Sand Body which has potential for Aboriginal heritage and contact archaeology. The site was recorded by Biosis in 2022 as it may hold evidence for early 19th century feasts between Aboriginal and European people including, the Native Institute for Aboriginal Children.

Thirteen registered sites are located within 200 metres of the study area (see Figure 5.1):

- AHIMS 45-6-2785
- AHIMS 45-6-2786
- AHIMS 45-6-2683
- AHIMS 45-6-2559
- AHIMS 45-6-3582
- AHIMS 45-6-3767
- AHIMS 45-6-3818
- AHIMS 45-6-2686
- AHIMS 45-6-1523
- AHIMS 45-6-2978
- AHIMS 45-6-2795
- AHIMS 45-6-2679
- AHIMS 45-6-4097.

Of these, AHIMS 45-6-2785, was identified in 2006 and has geocoordinates showing it being located 20 metres west of the study area along Hill Road in Sydney Olympic Park. It is in an area observed to have a thin amount of remnant soil with the potential to contain archaeological deposits. However, based on the description and site card map, the actual location of this PAD is around 50 metres west of the study area along Hill Road in the Millennium Parklands.



Legend

- Study area
- Artefact : -
- Artefact : -, Potential Archaeological Deposit (PAD) : -
- Grinding Groove : 3
- Modified Tree (Carved or Scarred) : -
- Potential Archaeological Deposit (PAD) : -
- Potential Archaeological Deposit (PAD) : 1
- Shell : -
- Shell : -, Artefact : -

Paper Size ISO A4

0 0.5 1

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

AHIMS within the study area and surrounds

Project No. **12557728**
Revision No. **2**
Date **20/06/2022**

FIGURE 5.1

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH005_AHIMS
Print date: 20 Jun 2022 - 22:38

Data source: Study area - GHD2022; Watercourse - NSWSS2022; Wharf - TfNSW2018; Imagery - Metromap Tile Service: extracted 20/06/2022 . Created by: lmanasan

5.3 Archaeological literature review

City of Parramatta Council Aboriginal Heritage Study, Dallas Consulting 2003

Dallas Consulting was commissioned by City of Parramatta Council to undertake an Aboriginal heritage study to inform future land planning development control processes and to ensure ongoing protection and management of Aboriginal heritage places. The study used the existing AHIMS site database and environmental context to inform a predictive model of Aboriginal heritage sensitivity to inform Council's strategic planning.

The predictive modelling also used council zonings for the Parramatta LGA to inform Aboriginal sensitivity. For example, areas within 200 metres of watercourses, or with undeveloped land, were considered to be of high sensitivity. The Dallas Consulting study included the Camellia, Rydalmere and Ermington parts of the project study area and most of this was defined as having low sensitivity. Undeveloped parts of the project study area, such as Ken Newman Park, were identified as high sensitivity.

The entire Camellia portion of the Dallas Consulting study area was identified as an area of 'Aboriginal Association', which are areas identified as having some significance to present day Aboriginal people through current social or historical connections. However in 2014, Dallas Consulting reviewed their study (which is summarised below) and noted that the 'Areas of Aboriginal Association' (places of historical or cultural significance that are not registered Aboriginal sites) component of the Aboriginal heritage sensitivity mapping was unclear and incomplete and suggested it be removed.

Aboriginal Archaeological Assessment Report, Newington Armoury Adaptive Re-use and Rail Extension Project, Sydney Olympic Park, Paul Irish 2004

Paul Irish was engaged by the Sydney Olympic Park Authority to prepare an Aboriginal archaeological assessment in Newington Armoury which is located around 200 metres west of the project study area. A survey was conducted within the woodland and nature reserve buffer zone of the Newington Armoury Precinct in 2003. This assessment established that the trees within the woodland were of insufficient age to contain scars of Aboriginal cultural origin and determined that the scarred trees identified in previous studies were not Aboriginal modified trees.

During the survey three isolated silcrete and chert artefacts and two PADs were identified with possible silcrete manuports (stone material thought to have been transported to the area by Aboriginal people) also identified. The assessment concluded that the lack of Aboriginal archaeological material is likely to be a reflection of the early urban development of the Parramatta River, before the preservation of sites and the necessity for archaeological assessments, rather than an indication of less intensive Aboriginal occupation of the area.

Preliminary cultural heritage assessment: Rosehill recycled water scheme, AMBS 2008

Australian Museum Business Services (AMBS) was commissioned by Parsons Brinckerhoff Australia Pty Ltd on behalf of Alinta Asset Management Pty Ltd (Alinta) to prepare a Preliminary Cultural Heritage Assessment in relation to the potential impacts of the Rosehill Recycled Water Scheme pipeline between Fairfield and Camellia, in western Sydney. The pipeline comprised an approximately 20 kilometre route and traversed a portion of the project study area in Camellia. The preliminary study found that areas with Aboriginal and historical archaeological potential were located within and adjacent to the pipeline corridor and were likely to be impacted by the proposal. The report recommended consultation with the Aboriginal community and continued archaeological investigations.

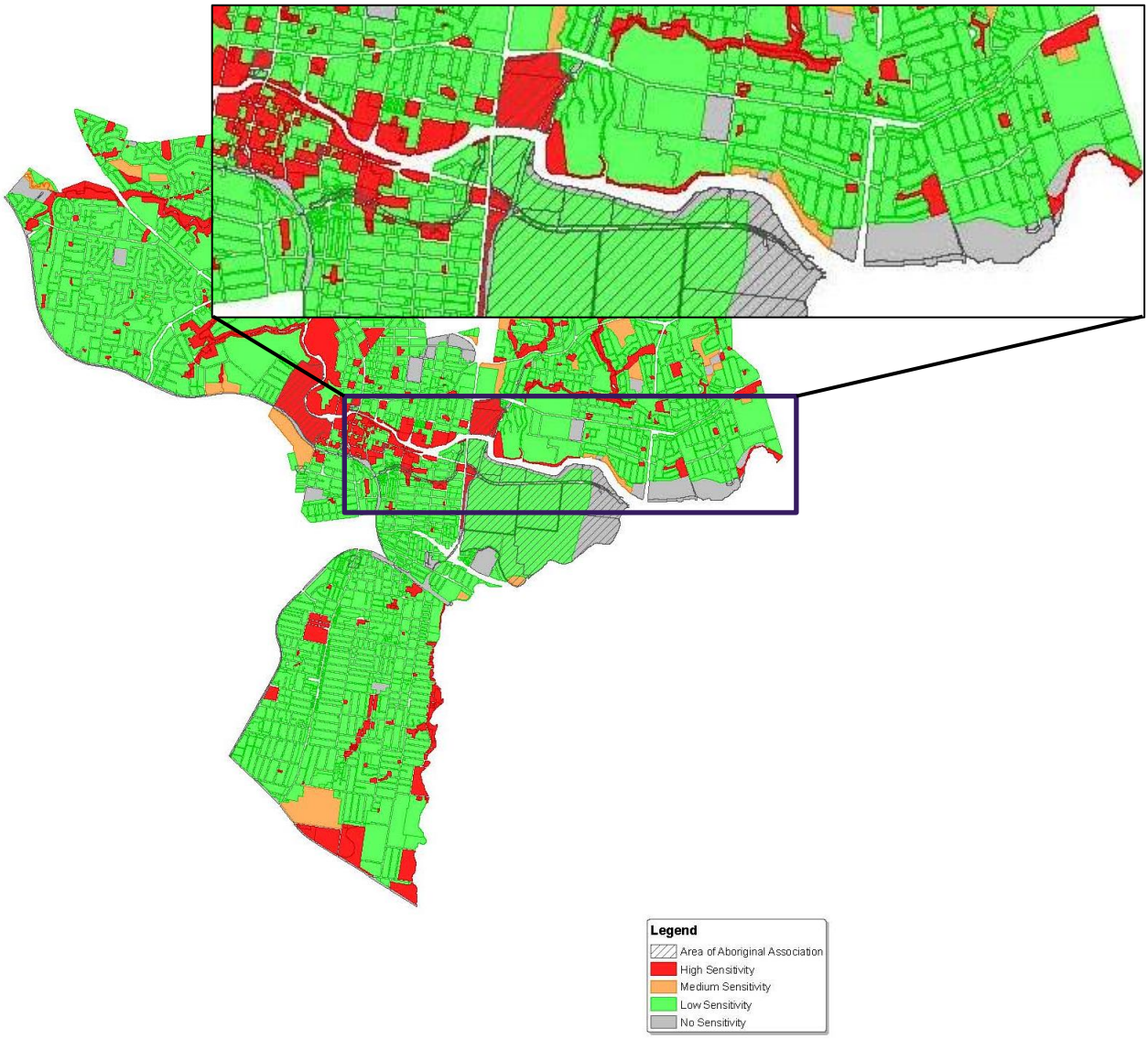
Parramatta Aboriginal Cultural Heritage Study Review, Dallas Consulting 2014

Dallas Consulting was commissioned by City of Parramatta Council to review the previous *City of Parramatta Council Aboriginal Heritage Study* (2003) and provide an updated predictive model. The review of the Aboriginal Sensitivity Map was considered necessary due to the following factors which had occurred since the 2003 study was published:

- a considerable number of Aboriginal heritage sites had been recorded that were not reflected in Council's mapping
- Council had revised its Local Environmental Plan (LEP) and Development Control Plan (DCP)
- NSW Aboriginal heritage legislation had been amended in 2010, in a way that affected the role of councils in Aboriginal heritage management
- a number of anomalies in the Aboriginal heritage sensitivity mapping had become apparent that required investigation and correction.

The revised sensitivity mapping (Plate 5.1) reassessed part of the study area in Camellia as low sensitivity, upgraded from nil (except for the mangroves along the southern embankment of Parramatta River at Camellia). Areas at Rydalmere Wharf and Ermington Boat Ramp were reassessed from medium sensitivity to high sensitivity. The area of Aboriginal Association that the 2003 study identified in Camellia was removed, as it did not include detailed or complete advice on these areas.

Plate 5.1 Revised Aboriginal Sensitivity Map (Parramatta Development Control Plan 2011)



Aboriginal heritage assessment Parramatta Light Rail Stage 1 EIS, KNC 2017

KNC was engaged by WSP/Parsons Brinckerhoff on behalf of Transport for New South Wales to prepare an ACHAR to inform the EIS for Stage 1 of the Parramatta Light Rail network.

Three previously recorded Aboriginal archaeological sites, namely Cumberland Hospital East (AHIMS 45-6-3195), Harris Street Footpath/ Robin Thomas Reserve (AHIMS 45-6-3157 and AHIMS 45-6-3158) and the Sydney Turf Club Carpark (AHIMS 45-6-2559) and the presence of the Parramatta Sand Body (a geological formation dating to Pleistocene associated with significant Aboriginal archaeology) were identified within the Stage 1 project boundary.

Site surveys identified seven PADs, along with the three previously recorded sites. Archaeological test excavation of the PADs was subsequently undertaken using a combination of hand excavated archaeological test squares and push-tubed core boreholes. Given the widespread disturbance across large portions of the

investigation area, testing aimed to determine whether the project area contained intact subsurface Aboriginal archaeological deposit associated with the Parramatta Sand Body or other intact subsurface soils.

The test excavation identified intact sands containing artefacts below modern and historical disturbance in several locations within the investigation area. The test excavation results also supported previous assessments regarding the variable depth, nature and disturbance levels of the sand body. Deep excavation/removal of upper levels and replacement with fill has impacted the archaeological potential of some areas, while introduced fill above less severe disturbance has preserved artefact-bearing layers of the sands in situ at other sites.

In total, the Stage 1 project area contained five identified Aboriginal archaeological sites. Significance assessments focussed on the intactness, representativeness and research potential of these sites within the landscape and determined that the sites displayed between low and moderate-high significance. Impact assessments determined that all five sites would be at least partially impacted by the Stage 1 project. It was recommended that mitigative salvage excavation would be required for the four archaeological sites exhibiting at least moderate significance prior to any impacts. These are Cumberland Hospital East (AHIMS 45-6-3195) in north Parramatta (1.5 kilometres north of Stage 2), Robin Thomas Reserve (AHIMS 45-6-3157-8) in Parramatta CBD (700 metres east of Stage 2), Sydney Turf Club Carpark (AHIMS 45-6-2559). The site known as PLR AFT 1 (AHIMS 45-6-3312) (exhibiting low levels of significance) required no mitigative action. A management strategy (heritage management plan) was outlined in the ACHAR which recommended a salvage excavation if the impact to AHIMS 45-6-2559 cannot be avoided.

The closest AHIMS site (45-6-2559) from Stage 1 is located around 100 metres west of the Stage 2 study area.

Robin Thomas Reserve Masterplan Aboriginal Cultural Heritage Assessment Report (ACHAR), Artefact 2018

Artefact Heritage was engaged by Transport for NSW to prepare an Aboriginal Archaeological Survey Report. The survey report identified one registered AHIMS site, Robin Thomas Reserve (AHIMS 45-6-3157/ 45-6-3158) which had the potential to provide information on contact archaeology and required a section 60 approval for testing to be conducted as the site is State heritage-listed (*Ancient Aboriginal and Early Colonial Landscape*, SHR No. 01863). Therefore, an ACHAR was prepared to support an AHIP application for test excavations. The study area is included within the mapped extent of the Parramatta Sand Body which has potential to contain stratified archaeological deposits.

Previous test excavations undertaken by KNC (2017) which uncovered nine silcrete artefacts below the disturbed layers. The area of Robin Thomas Reserve, as indicated by AHIMS ID 45-6-3157/AHIMS 45-6-3158, was reported as having a high archaeological significance and a rare opportunity to investigate the Parramatta Sand Body. During the Aboriginal consultation undertaken as part of the ACHAR, the RAPs identified that the wider landscape in Parramatta is of significant cultural heritage value to Aboriginal people. A test excavation methodology was prepared and endorsed by the RAPs which included 18 one metre by one metre test pits within the study area aiming to understand the presence of the Parramatta Sand Body.

Robin Thomas Reserve is listed on the State Heritage Register as the *Ancient Aboriginal and Early Colonial Landscape* (SHR No. 01863) and the NSW Department of Primary Industries section 170 Heritage and Conservation Register, as well as on the Parramatta Local Environment Plan (LEP) 2011 (A2) as an archaeological site. The significance of the Parramatta Sand Body and its values are listed on the SHR register as:

> *The geomorphic origin of the sand body is uncertain but the present interpretation is that the sand body was deposited by the Parramatta River on a terrace 4 to 6 metres above normal water level, on either side of the river between Charles and Alfred Streets and in the eastern margin of Parramatta Park. The sand body was deposited as a terrace (abandoned flood plain) over time during floods. The bulk of the sand body forms a levee located on the south side (right bank) of Parramatta River just above the 1:100 average recurrence interval flood level. The sand body has a well-developed, but varied, soil profile. Topsoil materials are generally disturbed by European activities. Where subsoils are intact they typically consist of yellow orange or yellow brown sandy clay with an earthy (porous) fabric that becomes paler and slightly mottled with depth. The upper parts of the soil profile are usually heavily mixed.*
>
> *The profile of the sand suggests that the main body of sand is of late Pleistocene age and recent thermoluminescence dates obtained from an excavation undertaken at 140 Macquarie Street by Comber Consultants in 2010, have shown that the top of the undisturbed sand (below the level of Aboriginal occupation) is between 50,000 to 58,000 years old.*
>
> *From a geomorphic perspective, the sand body has the potential to provide insight into patterns of river flow and flood events that could lead to a better understanding of the formation of the*

Parramatta River Valley. On a broader scale, the sand body may be able to provide valuable information about changing sea levels in the Pleistocene period with implications for possible future sea levels and coastal geography under a warming climate. In addition to the archaeological and geomorphic research value of the sand body, the Parramatta Sand Body also has the potential to provide valuable insight into the natural environment of Parramatta CBD in pre-colonial times. The fluvial sand terrace is evidence that Parramatta had a more diverse natural environment than might otherwise have been known from historical accounts, which provide few details about the natural vegetation of area. Pollen, which may be preserved within the sand body, could yield valuable information about the original vegetation of the Parramatta CBD area.

Robin Thomas Reserve- Masterplan Stage 1 Interim Aboriginal Test Excavation Report, Extent 2019

Extent Heritage was engaged by Transport for NSW to undertake a test excavation program and prepare an Aboriginal test excavation report following the AHIP application mentioned above. The Aboriginal archaeological test pit locations aimed to investigate the areas which would be impacted, reduce the impacts to the Parramatta Sand Body and to avoid the locations of potential historical archaeological features in this study area.

Seventeen test pits were excavated by hand tools and twenty-five Aboriginal artefacts were found in total, fifteen of which were recovered from test pit 1. Most of the artefacts were found at depths below 50 centimetres from the surface, underlying the modern fill layers. Indurated mudstone/tuff was the dominant raw material type in the assemblage (total of 17 equating to 68 per cent), followed by silcrete (total of six equating to 24 per cent). Most of the artefacts were flakes (total of 18) with three cores.

The preliminary results of the test excavation suggested that the assemblage presented a low density of artefacts, which is mostly reflective of random discards and isolated events. Test pit 1 had a higher density with 15 artefacts recovered (60 per cent) which may be evidence of knapping in this area. Based on the artefact typology and raw material procurement and use, occupation of this study area likely occurred in the late Pleistocene/early Holocene. The disturbance of the Parramatta Sand Body by historical activity has likely removed most evidence of mid-late Holocene occupation, which is supported by few silcrete artefacts and lack of backed artefacts. Artefacts typically occurred between 20 and 140 centimetres, with peak concentrations between 60-70 centimetres (total of eight equating to 32 per cent).

Parramatta Square 2 (PS2), 160-182 Church St Parramatta, Aboriginal Archaeological Excavation Report, AHIP No. C0001379, Comber Consultants 2019

Comber Consultants were engaged to undertake salvage excavations on behalf of the City of Parramatta Council for the redevelopment of Parramatta Square (previously Civic Place), a three hectare precinct located in the Parramatta CBD. The precinct is bound by Macquarie, Church, Darcy and Smith Streets. Within the precinct are six sites numbered Parramatta Square (PS) 1-6, which is located south eastern corner of the study area in Parramatta CBD.

PS2 (now known as 8PS) is located at 160-180 Church Street, Parramatta, opposite St John's Cathedral. It is on the corner of Church and Darcy Streets. Testing and salvage excavation was undertaken by AHIP (No. C0001968) due to the redevelopment of Parramatta Square. The site is historically sat on an alluvial terrace and water holes around the ephemeral creek line within the site possibly created a landscape rich in resources, such as fresh water, wetland plants and animals.

The lithic analysis of the assemblage of PS2 indicated a low density artefact scatter and similar to adjacent PS3 and PS5&6 sites was occupied repeatedly from at least around 7,000 Before Present (BP). The northern boundary of the site adjacent to the Town Hall (the location of the former Market Place and Aboriginal Annual Feasts) revealed the greatest concentration of artefacts. A trend was observed in this report in comparison with other sites throughout Parramatta, which indicated that the density of artefacts at PS2 is consistent with its distance from the Parramatta River. Seventy four flaked glass and two stone artefacts were subject to use-wear and residue analysis. A number of glass flaked artefacts showed use-wear from shaping wood/woody plants or for sawing or engraving bone or shell, and one glass piece was used as a core to produce microblades.

Across the Parramatta Square sites, a similar trend was observed, where lithic assemblage demonstrates a change over time in raw material with the deeper deposits indicating dominance of indurated mudstone/tuff/chert, while the upper deposits revealed silcrete artefacts. A silcrete knapping concentration is present along the northern boundary of the site which indicates production and/or discard of small numbers of artefacts.

Parramatta Square 3 (PS3): 153 Macquarie St Parramatta, Excavation Report, AHIP No. C0001379, Comber Consultants 2018

Aboriginal archaeological and cultural heritage assessment for the proposed redevelopment in PS3 (now known as 3PS) was undertaken by Comber Consultants. The site is the former Post Office site located at 153 Macquarie Street, Parramatta. The testing and salvage excavations uncovered an alluvial terrace across site at PS3, however, no evidence of the Parramatta Pleistocene Sand Body. The lithic analysis recorded 617 cultural lithics, including 369 artefacts. The assemblage indicates that the site was occupied repeatedly from about 10,000 years BP, in the terminal Pleistocene, through to the Holocene and contact periods.

Previous analysis across Parramatta Square contributed greatly to the knowledge of the Aboriginal occupation in the area. The artefact assemblage collected from PS3 shares similarities with the assemblages to some sites (such as 15 Macquarie Street and the RTA-G1), however they differ from those collected from other Parramatta sites (such as CG1, CG3, 101 George Street, 1 Smith Street). The results of the excavations at PS3 uncovered low artefact density (the average density across PS3 was 2.7 items per square metre) and indicate a similar trend, evidence for change over time in the use of raw materials. Generally, evidence for this change over raw material preference has only been identified on the Parramatta Terrace Sand previously, which is not present at PS3 or other Parramatta Square sites.

Parramatta Square 5 & 6 (PS5&6): 12-38 Darcy St Parramatta, Excavation Report, AHIP No. C0001379, Comber Consultants 2019

Comber Consultants were engaged to conduct testing and salvage of PS5 & 6 (now known as 4&6 PS) under the AHIP No. C0001413. The comprises the former Parramatta Library, Parramatta City Council building, several Victorian terraced shopfronts which is located at 12-38 Darcy Street, Parramatta CBD.

The excavations at PS5 & 6 uncovered an alluvial terrace of the Parramatta River like the other Parramatta Square sites. A similar trend to PS 2 and 3 in raw material preference which indicates a change over time with silcrete in the upper deposit and indurated mudstone/tuff/chert preferred in the lower deposit. This implies a long and ongoing Aboriginal occupation of Parramatta as a whole and Parramatta Square in particular. The excavations uncovered three hearths, and clay balls formed into a rough circle which indicates evidence of Aboriginal people cooking meat over small, leaf fuelled fires across the PS5 & 6 site. These features meet the criteria as a heat retainer hearth.

A total of 221 cultural lithics, including 126 artefacts, were recovered. The dating of the hearths and artefact analyses indicate that the site was initially occupied prior to 7,500 BP, continuing into around 1830. Four sets of conjoining artefacts recovered from adjacent spits provide evidence for specific cultural activities and some vertical integrity despite intensive modern land use.

The archaeology of Parramatta Square is exceptionally rare demonstrating evidence of ongoing occupation from 10,000 years ago through to the contact period well into the colonial period, when the Aboriginal Annual Feasts occurred in the market square in front of the Town Hall. The site as a whole has high significance to Aboriginal community.

Aboriginal Archaeological Test Excavation Report AHIP C0001588: Site 45-6-3195, Parramatta North Growth Centre, Comber Consultants 2018

Comber Consultants undertook Aboriginal archaeological test excavations for the Parramatta North Urban Transformation on behalf of Urban Growth NSW. The Cumberland Hospital East (AHIMS 45-6-3195) site, which is about 1.5 kilometres north of Parramatta CBD Stage 2 turnback facility, was excavated and uncovered around 1,800 Aboriginal artefacts, most of which were made from silcrete. Other raw material including glass had been knapped into stone tools, indicating archaeological evidence of contact between Aboriginal people and the new settlers and adaptation of new materials. It was suggested that these glass artefacts were likely to have been utilised for shaping, cutting and engraving of wood. The occupation density of the site was noted to be higher close to the Parramatta River, however, stretched across the site. It was suggested that the occupation in the western and southern sides of the site began more than 7,500 years ago, but as the river changed with sea level rises people appeared to move to the north and centre of the site.

There was a wetland within the centre of the site, at the location of the current oval which was occupied approximately 2,000 years ago. The location overlooked the Parramatta River and provided easy access to the resource-rich wetlands. The higher density of occupation was recorded along the riverbank and up to 150 metres from the river. Evidence of the Parramatta Sand Body was also found up to 150 metres from the river when the sea levels were rising and the landscape was changing dramatically, around 7500 years ago. It was noted that a site of with a long time span and with substantial numbers of artefacts and three phases of occupation is rare on the Cumberland Plain.

Desktop Aboriginal Due Diligence Rosehill Public School, RPS 2017

RPS was engaged by Conrad Gargett AMW to prepare a desktop Aboriginal due diligence report for the proposed upgrade of the Rosehill Public School in 2017. This study area is located around 570 metres to the south-west of the project study area. No registered Aboriginal sites were located within the Rosehill study area.

The *City of Parramatta Council Aboriginal Heritage Study* (Dallas Consulting, 2003) originally assessed the Rosehill study area as low Aboriginal sensitivity. However, the review of the heritage study (Dallas Consulting, 2014) upgraded the sensitivity of part of the school property to high. A contamination assessment (Douglas Partners, 2017) prepared for the site indicated that some of the school grounds, including parts of the playing field, may contain imported fill between 10 centimetres and 140 centimetres in depth.

As the study area contained an area of high sensitivity, relating to the playing field in the west of the school grounds, RPS recommended further assessment in the form of an archaeological survey report in accordance with The Code.

Parramatta Light Rail Stage 2: Aboriginal Heritage Constraints Assessment, KNC 2018

In 2018 KNC was engaged by WSP Australia Pty Limited (WSP) to prepare a preliminary Aboriginal heritage constraints assessment for Stage 2 of the Parramatta Light Rail network (this project). The purpose of the assessment was to inform the early designs of the project. The assessment included two alignment options, the first option was located along South Street, Rydalmere (the northern option, but which was not progressed), and a second option located along and adjacent to Grand Avenue, Camellia (the southern option).

The KNC constraints assessment identified five archaeological features: two AHIMS registered sites and three PADs. As the alignment has been refined since the KNC constraints assessment was undertaken, three archaeological features identified by KNC are relevant to the current study area.

- Two areas of PAD are located within the current study area:
  - Area 2: which is located south of the Parramatta River within Sydney Olympic Park in the alluvial flats and associated mudflats.
  - Area 3: which is located between River Road and Spur Street is situated within the low and mid slopes of a small ridgeline with limited previous ground disturbance.

Information on Areas 2 and 3 is provided below.

Area 2:

> *An area south of the Parramatta River within the Sydney Olympic Park is within the alluvial flats and associated mudflat. As such they provided abundance of resources for Aboriginal people in the past. Aboriginal heritage recorded within the nearby Millennium Park supports this location occupation model. However, the entire area has been through ground disturbances stemming from recent European occupation. The majority of the area was reclaimed in the 1880's that included dredging, placing of the fill material and modifications of the Haslams Creek alignment. The entire northern section of Newington and Wentworth Point are reclaimed estuary areas that have nil archaeological potential. The area south of Haslams Creek and to the immediate west of Homebush Bay was used for brickworks. These recent land use activities would have removed any Aboriginal archaeological material that would have been present within this area. Considering that natural soils consist of deep alluvial deposits, it is possible that remnant patches occur north and south of Haslams Creek under imported fill material. One of these potential remnant patches may be located at the proposed Haslams Creek crossing. Further soil assessment would be required in order to confirm the presence of natural soil layers that may contain Aboriginal cultural material. This area is mapped as having moderate to low archaeological potential.*

Area 3:

> *A section of the study area located between River Road and Spur Street is situated within the low and mid slopes of a small ridgeline with limited previous ground disturbance. Soils in this area consist of erosional clay loams that have the potential to contain archaeological deposits at shallow depths. Considering very limited and unknown levels of previous disturbance, there is a moderate to low potential for subsurface archaeological deposits to occur in this area.*

One registered site is located around 100 metres west of the current project study area – Sydney Turf Club Carpark: (AHIMS 45-6-2559).

20 Waterview Street, Putney, Curio Projects 2020

Curio Projects were engaged by Lilac Pty Ltd/Willow Frank to prepare an ACHAR for a Planning Proposal for enabling additional permitted uses including residential and retail. The site is located 2.5 kilometres east of the project study area.

The test excavation program completed as part of the ACHAR aimed to identify the extent of potential relics associated with occupation of the locale by notable emancipist James Squire and his nineteenth century brewing operation. James Squire (1754? -1822), arrived in New South Wales with the First Fleet in 1788, who was sentenced to seven years and was brewing beer for soldiers' private consumption during his time until his sentence expired in 1792.

In 1795, Squire was granted thirty acres of land in Parish of Hunters Hill and expanded his land by purchasing nearby allotments. Squire began to cultivate hops on his Kissing Point Farm, establishing a brewery and tavern

known as 'The Malting Shovel' in close proximity to the Parramatta River, accessible via Squire's private wharf. Squire was known to be sympathetic to the local Aboriginal people of the Wallumedegal people, Bennelong and Squire are known to have developed a friendship, with Bennelong eventually being buried within Squire's orchards. It was recently announced that location of Bennelong's burial place was located, using a combination of archival evidence and physical techniques (survey and ground-penetrating radar) (Sydney Morning Herald, 20 March 2011) which is believed to be located within the front garden of 25 Watson Street, Putney- approximately 120 metres north of the 20 Waterview Street.

One isolated artefact was identified during the testing program. The Aboriginal archaeological potential of the 20 Waterview Street, Putney is considered to be low, with the most likely site type to be present being isolated artefacts in a disturbed context, a site type which generally has little archaeological significance.

The historical (non-Aboriginal) test excavation program did not identify any archaeological resources associated with the Squire Brewery and Inn complex. Although, one isolated Aboriginal object was identified in Trench 3 within a highly disturbed context. The report recommended an exclusion zone be maintained around the Aboriginal object in Trench 3 was recommended if the artefact was to remain *in situ*, or preparation of an AHIP application to remove the Aboriginal object, if the object was required to be removed as part of the site's redevelopment. The excavation works ceased in that area and the artefact was protected in situ and an ACHAR was prepared following this unexpected find. Consecutively, a field survey was conducted in consultation with RAPs and no Aboriginal artefacts were recorded. Based on the results of the AHIMS search, the environmental context, predictive model and physical inspection of the landform of this project area, the most likely Aboriginal site types would be shell middens, isolated artefacts and open camp sites within the project area. Therefore, based on the comments provided by the RAPs and the distance to Parramatta River, further test excavations were recommended in this report.

6 ARCHAEOLOGICAL PREDICTIVE MODEL

6.1 Overview

The purpose of an archaeological predictive model is to provide an indication of the Aboriginal objects predicted to occur within the study area and the likelihood that these objects will occur within the study area. It draws on the review of the existing information from the regional and local archaeological context and from the landscape context. Another essential aspect to predicting the archaeological potential is previous land uses and the degree of disturbance across the study area. The predictive model should inform the approach to the archaeological survey and to the assessment of the archaeological sensitivity, potential, and significance. There are a number of factors that influence Aboriginal occupation of an area. These include essential subsistence resources such as food (flora and fauna) and fresh water, and secondary resources such as raw stone materials, wood and bark, animal skins and reeds for basket weaving, string, clothing and similar. Landscape features such as ridges, flat elevated areas, rock shelters and similar, may have also influenced Aboriginal occupation of an area. In addition, cultural activities may have also occurred at certain locations in the landscape; for example, corroborees and initiation sites.

6.2 Predictions for study area

The Cumberland Plain region provided abundant resources for Aboriginal subsistence, especially near permanent water and was conducive to Aboriginal occupation in the past. The Parramatta River runs through the study area, with multiple second and third order streams encircling the area. These creeks would have provided access to permanent water. These water sources would have provided the resource base for occupation, including habitats for freshwater fish, eel, and shellfish, along with larger marsupials and mammals typical of the inland area. Likewise, outcrops of silcrete nearby and formerly deposited river gravels associated with past fluvial activity would have provided the -stone raw materials for stone tool manufacture. Resources in the study area would have been ample to enable occupation, hunting, gathering, stone procurement, ceremonies, and other cultural activities to be conducted throughout the region. Burials are mostly found in coastal shell middens and no large burials sites has been reported in the Sydney region (Attenbrow, 2010). However, burials sites can be marked by carved trees in south-eastern Australia. Carved trees associated with burials are reported in south of Sydney near Narellan and Picton (Etheridge, 1918).

The Aboriginal material most visible in the archaeological record are stone artefacts. The most frequent archaeological objects are -stone artefacts in the Cumberland Plain. These objects are found as open scatters or isolated finds, and as finds and stratified deposits of flaked stone below the surface. Importantly, the presence of subsurface archaeological deposits cannot be accurately assessed based on the presence or absence of the surface archaeological record. Likewise, sub-surface archaeological deposits have been shown to be present in areas of past agricultural disturbance.

Both natural and anthropomorphic disturbance is widespread throughout Parramatta. The fluvial sand terraces of the Parramatta Sand Body have created a depositional context that is favourable to deep, stratified deposits of Aboriginal archaeology. Previous excavations have demonstrated that where these sands are intact beneath modern and historical development they can curate and contain highly significant deposits beneath the current urban landscape. Therefore, archaeological potential in the study area remains where suitable substrate exists intact below surface disturbance, or in other areas of low disturbance conducive to the preservation of archaeological deposit.

The test excavations of Parramatta Light Rail Stage 1 identified intact sands containing artefacts below modern and historical disturbance in several locations within its project area. These previous investigations have identified the Parramatta Sand Body aligns with the Parramatta CBD part of the Stage 2 study area (Figure 4.1), the Parramatta Light Rail Stage 1 heritage assessment of the Parramatta Sand Body has been relied upon for this part of the study area.

The test excavation results for Stage 1 also concurred with previous assessments regarding the variable depth, nature and disturbance levels of the sand body. Deep excavation/removal of upper levels and replacement with fill has impacted the archaeological potential of some areas, while introduced fill above less severe disturbance has preserved artefact-bearing layers of the sands in situ. Significant deposits are those where integrity and stability of the archaeological context is high, as this is what gives the objects meaning. High integrity also leads to increased confidence in interpretation, especially where depositional context has retained potentially stratified layers. The study area may contain undiscovered parts of the Parramatta Sand Body (Figure 4.1) which would contribute to this knowledge.

There are no known historical Aboriginal sites or Aboriginal missions within the study area. Post contact Aboriginal archaeology may be unearthed during the test excavation program especially in relation to the Parramatta Sand Body, if identified.

Scarred trees may occur, but only in areas of remnant native woodland, which are uncommon landscape in the heavily cleared wider Cumberland Plain as well as within the study area. Grinding grooves as well as stone quarries may be found on exposed bedrock in the wider region, though no evidence for either site type has been recorded within the study area since rock outcrops are mostly absent. Raw material sources around the study area may have not been found yet, however, it is more likely that many paleochannel deposits containing knappable rocks and sandstone outcrops are now buried beneath or have been destroyed by urban development (Corkill, 1999).

Most high-density archaeological sites have been associated with creek lines or other sources of permanent water. Stream order has been shown to be correlated with the size and complexity of archaeological deposits within certain distances from a waterway. Archaeological potential increases with stream order and more complex sites are often close to permanent water sources, with confluences being key locations for occupation sites. The highest artefact densities are likely to occur on terraces and lower slopes associated with second- or higher order streams, especially 50 to 100 metres from fourth order streams.

These observations indicated that landforms associated with streams of second- and higher order and areas that are undisturbed will have the highest archaeological sensitivity in the Cumberland Plains region.

The following predictions have been made based on the basis of the landscape context, available ethnographic observations of Aboriginal people in the region, comments and advice from the Metropolitan and Deerubbin LALC Site Officers and previous archaeological studies, in particular (White and McDonald, 2010).

- Most of the study area has been affected by past land clearance, development, landfill and landscaping.
- Parramatta Sand Body is mapped within the Parramatta CBD part of the study area which is considered to have high archaeological potential.
- Based on the previous research, the floodplains of the Parramatta River in the northern shoreline are considered to have high archaeological potential.
- The areas of relatively less disturbed parklands in the mid slope and lower slope landforms north of the Parramatta River are considered to have moderate archaeological potential, especially the areas around Ken Newman Park and Broadoaks Park.
- Based on the results of the AHIMS search, the environmental context and survey and consultation with LALC Site Officers, the most likely Aboriginal site types that have potential to be present in the study area would be shell middens, stone artefact scatters, isolated artefacts and subsurface archaeological deposits.

7 ARCHAEOLOGICAL SURVEY RESULTS

7.1 Approach

Representatives from the Metropolitan LALC and the Deerubbin LALC participated in an archaeological survey of the relevant sections of the study area on 24 January and 4 February 2022 respectively, to provide input on cultural significance in accordance with PACHCI Stage 2. The Deerubbin Local Aboriginal Land Council survey report was received on 26 April 2022 with a recommendation for further investigations due do the proximity of a major waterway (Appendix C).

The Parramatta CBD area of the study area was not surveyed, as it had previously been assessed for Parramatta Light Rail Stage 1 as such the information and assessment from the *Parramatta Light Rail Aboriginal Cultural Heritage Assessment Report* (KNC, 2017) has been relied upon for the Parramatta CBD area of the study area.

The Parramatta CBD area was assessed by KNC following a survey in December 2016. Based on the archaeological background and landform context, the survey inspected any areas of surface exposure for artefacts and evidence of intact soils and considered long term flood activity. The survey concluded that most of the Stage 1 study area contained little to no potential for subsurface archaeology due to disturbance from land use practices including the construction of buildings and roads, the installation of utilities, landscaping and bulk earthworks. Low lying areas along the banks of Parramatta River and major creeks are likely to have been heavily disturbed by high energy flooding events, which may washout subsurface deposits. Soils on adjacent slopes were often disturbed and eroding. The project notes that since the Parramatta Light Rail stage 1 project further research and investigation has taken place such as Williams et. al. 2021 which will be addressed in more detail in the ACHAR.

Aboriginal archaeological sites/PADs that identified by KNC's survey in Parramatta CBD is shown in Table 7.1 and Plate 7.1, Plate 7.2.

Table 7.1 Identified Aboriginal archaeological sites/PADs in each precinct following field survey (KNC, 2017)

Precinct name	Location	Identified Aboriginal sites/PADs
Parramatta CBD Precinct	Between Victoria Road and Purchase Street (inclusive of Robin Thomas Reserve)	Harris St Footpath/Robin Thomas Reserve
		PLR PAD 1
		PLR PAD 2
		PLR PAD 3

Plate 7.1 Identified Aboriginal archaeological sites/PADs in each precinct following field survey (KNC, 2017)

Figure 7. Aboriginal archaeological survey results – central west

Plate 7.2 Identified Aboriginal archaeological sites/PADs in each precinct following field survey (KNC, 2017)

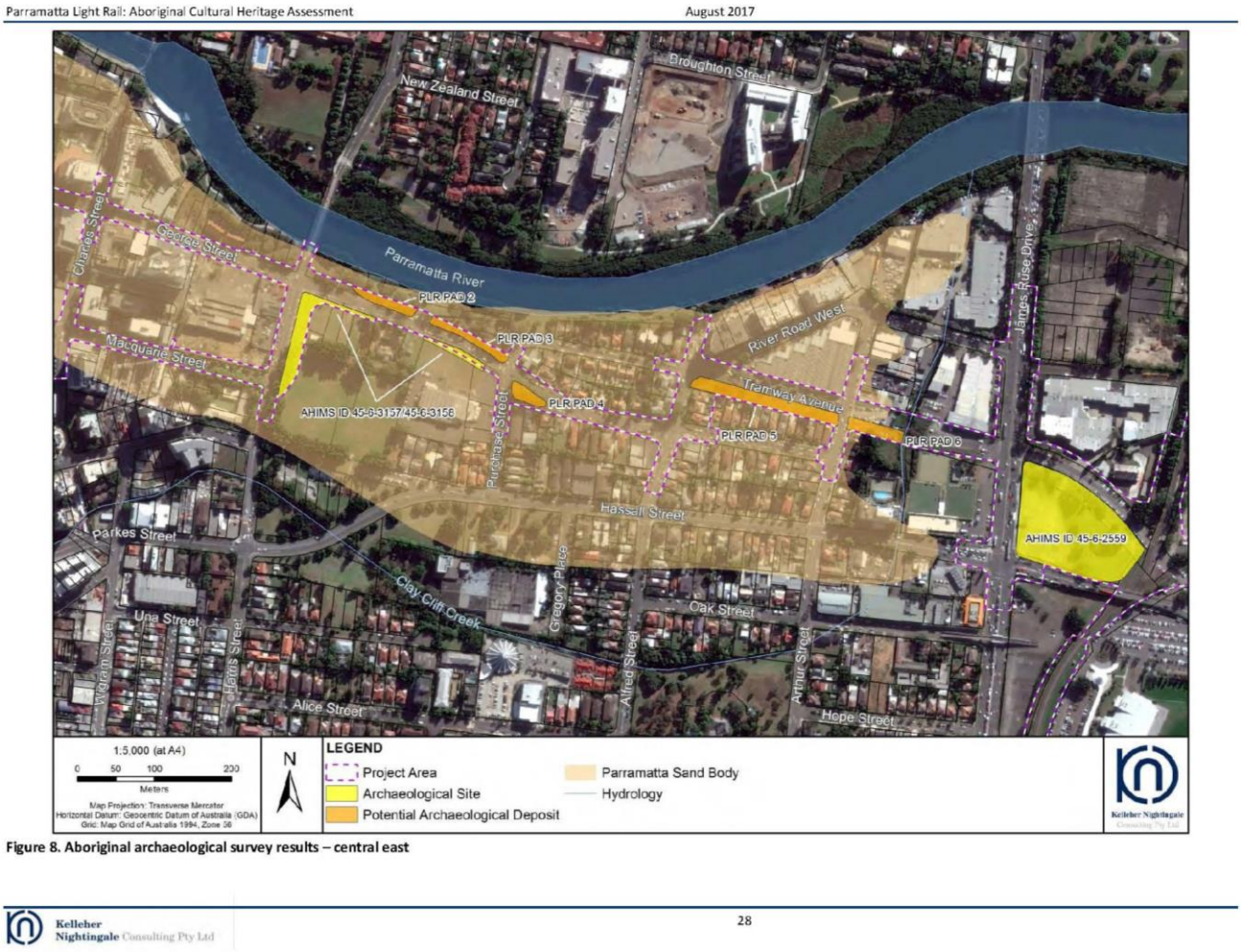


Figure 8. Aboriginal archaeological survey results – central east

7.2 Sampling strategy and field methods

The aim of the archaeological survey was to conduct a representative coverage of the study area (excluding the Parramatta CBD) on foot and to record any Aboriginal archaeological sites or potential archaeological deposits (PADs).

The survey objectives were the ground-truthing of existing Aboriginal sites, land disturbances visible based on historical aerial photographs and management plans and the assessment of the subsurface archaeological potential of landforms. The targeted areas were decided based on preliminary desktop review including the review of current and historical aerial photography.

The study area was divided into nine survey units (SUs) in six suburbs based on their physical location (i.e. landform and distance to water courses). The survey covered the accessible areas of survey units with ground surface visibility. The areas where no visible disturbance to ground surface was evident, and where intact subsurface artefacts could be present, were targeted for the survey. SUs were later recorded to Avenza Maps with their GPS coordinates based on their disturbance levels.

The following survey units were nominated for investigation.

- Melrose Park included two SUs where SU 1 encompassed Ermington Boat Ramp and the nature strip adjacent to power easements. SU2 was located on the northern road boundary of Waratah Street (see Figure 7.1).

- Ermington included two SUs where SU3 encompassed Ken Newman Park and the council land strip to the west. SU4 comprised Broadoaks Park and the council land strip on the northern side of South Street (see Figure 7.2)
- Rydalmere included one SU at Rydalmere Wharf (SU4) which extended from John Street in the north-east to the Sydney Water easement in the west within Eric Primrose Reserve (see Figure 7.3).
- Camellia included one SU where SU5 encompassed the wetlands (mangroves) on the western side of the Thackeray Street and the council strips on both sides of Thackeray Street (see Figure 7.3).
- Wentworth Point and Sydney Olympic Park comprised three SUs where SU6 extended from the riverside walk to the Sanctuary Wentworth Point development and an additional section along the western boundary of Hill Road (see Figure 7.4). SU7 was located north of the Haslams Creek on both sides of the Holker Busway and SU8 encompassed the grassed sidewalk area on the western side of Australia Avenue, adjacent to the Brickpit (see Figure 7.5).

Two key survey variables were assessed across the study area and within each landform: visibility and exposure. Exposure addresses the areas which erosion might have revealed archaeological deposits, and visibility determines the amount of ground surface that is not covered by any vegetation. Overall survey coverage and calculated survey effectiveness was recorded in Table 7.2.

Overall visibility during the survey was 10 to 15 per cent due to grass coverage with limited exposure. Effective coverage areas in all SUs were lower due to low visibility which indicates a lower effective coverage ratio. The areas of exposure in the study area were targeted for stone artefacts, shells and other evidence of Aboriginal occupation.

Table 7.2: Summary of survey coverage in the study area

Survey Unit (SU)	Landform	SU Area (m^2)	Visibility (%)	Exposure (%)	Effective Coverage Area (m^2)	Effective Coverage (%)
SU1	Flat (partially disturbed)	9,538	20	10	190.76	2
SU2	Flat (partially disturbed)	3,036	20	10	60.72	2
SU3	Mid and low slope	32,191	5	5	80.47	0.2
SU4	Mid slope	4,968	10	10	49.68	1
SU5	Flat (partially disturbed)	20,290	20	20	811.60	4
SU6	Flat (disturbed)	4,610	5	-	230.00	4
SU7	Flat (disturbed)	49,910	20	10	998.20	2
SU8	Side slope (partially disturbed)	9,513	5	10	47.56	0.5
SU9	Flat (partially disturbed)	13,084	10	10	130.84	1

The total surveyed areas varied between SUs (refer Table 7.3), and some areas of sensitivity were not able to be surveyed as property access could not be arranged (see Figure 7.6). However, Transport for NSW has committed to completing survey of the Melrose Park Public School Oval and ten residential properties in Melrose Park which are considered to have potential for Aboriginal archaeology once property access can be arranged and prior to commencement of any physical works (see Section 10). The wetlands on the eastern side of Thackery Street in SU7 was not accessible however the Deerubbin LALC Site Officer confirmed no additional survey would be required, as a result of the disturbed nature of this SU.

Table 7.3: Total survey area in each SU

SU	Surveyed area
SU1	70 per cent
SU2	35 per cent
SU3	35 per cent
SU4	50 per cent
SU5	35 per cent
SU6	12 per cent
SU7	30 per cent
SU8	5 per cent
SU9	15 per cent

Legend

- Study area
- SU1 Ermington Boat Ramp
- SU2 Waratah St
- SU7 Hill Road and River Walk

Paper Size ISO A4

0 100 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Survey Units in Melrose Park

Project No. **12557728**
Revision No. **2**
Date **16/06/2022**

FIGURE 7.1

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH006_SurveyUnits
Print date: 16 Jun 2022 - 00:04

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 16/06/2022 . Created by: lmanasan

Legend

- Study area
- SU3 Ken Newman Park
- SU4 Broadoaks Park

Paper Size ISO A4

0 100 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Survey Units in Ermington

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Revision No. **2**
Date **16/06/2022**

FIGURE 7.2

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Print date: 16 Jun 2022 - 00:04

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 16/06/2022 . Created by: lmanasan

Legend

- Study area
- SU4 Broadoaks Park
- SU5 Rydalmere Wharf
- SU6 Camellia

Paper Size ISO A4

0 100 200 Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Survey Units in Rydalmere and Camellia

Project No. **12557728**
Revision No. **2**
Date **16/06/2022**

FIGURE 7.3

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Print date: 16 Jun 2022 - 00:05

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 16/06/2022 . Created by: lmanasan

Legend

- Study area
- SU7 Hill Road and River Walk
- SU8 Haslams Creek

Paper Size ISO A4

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

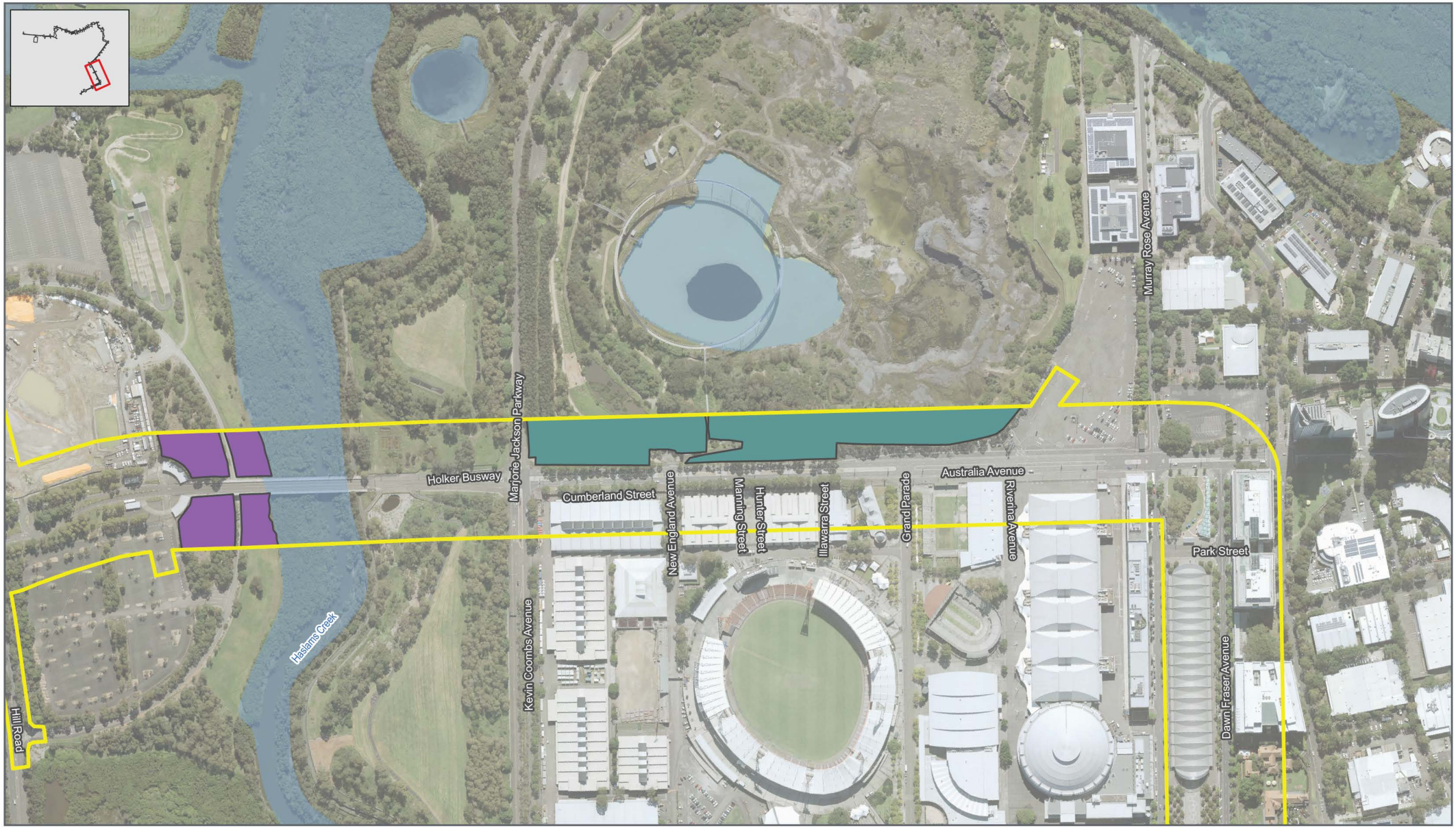
Survey Units in Wentworth Point

Project No. **12557728**
Revision No. **2**
Date **16/06/2022**

FIGURE 7.4

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH006_SurveyUnits
Print date: 16 Jun 2022 - 00:05

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 16/06/2022 . Created by: lmanasan



Legend

- Study area
- SU8 Haslams Creek
- SU9 Brickpit

Paper Size ISO A4

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Survey Units in Sydney Olympic Park

Project No. **12557728**
Revision No. **2**
Date **16/06/2022**

FIGURE 7.5

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH006_SurveyUnits
Print date: 16 Jun 2022 - 00:05

Data source: Study area - GHD2022; Survey unit - RPS2022; Precinct - Mecone2021; Wetland - DPIE2018; Road, Watercourse - NSWSS2022; Imagery - Metromap
Tile Service: extracted 16/06/2022 . Created by: lmanasan

Legend

- Study area
- Archaeological senstivity areas not surveyed

Paper Size ISO A4

0 20 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

MAKING COMPLEX EASY

Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

Areas of Aboriginal archaeological sensitivity recommended for future survey

Project No. **12557728**
Revision No. **2**
Date **20/06/2022**

FIGURE 7.6

N:\AU\Sydney\Projects\21\12557728\GIS\Maps\ACH_2.aprx\12557728_ACH009_SensitivityAreasForSurvey
Print date: 20 Jun 2022 - 22:52

Data source: Study area - GHD2022; Wetland - DPIE2018; Watercourse - NSWSS2022; Wharf - TfNSW2018; Imagery - Metromap Tile Service: extracted 20/06/2022 .
Created by: lmanasan

7.3 Results of the field survey

7.3.1 Melrose Park

Survey Unit 1 – Ermington Boat Ramp

SU1 is located on a flat landform, 100 metres from the Parramatta River. This was the first survey unit inspected on foot. The ground visibility was nil to very low due to dense grass coverage.

Disturbance was noticed in the wetlands adjacent to Wharf Road, Ermington Boat Ramp and car park. This disturbance was associated with the presence of bitumen, demolition material and sandstone retaining walls of the historic wharf (Plate 7.3 and Plate 7.4). Previous geotechnical investigations for the project also indicate a degree of disturbance. Previous studies from this location recorded the presence of fill material to a depth of 125 centimetres, consisting of sand and sandy clay and then alluvial silty clay to a depth of 185 centimetres with sandstone bedrock beneath.

The grassed flats in those areas were considered to be disturbed during the regeneration of mangroves. Further north-west of the car park area, the grasslands exhibited less disturbance except for the northern boundary, which has been disturbed by the Viva Gore Bay high pressure fuel line. The northern boundary of the car park area consists of possible intact deposits which were partially disturbed on south-eastern section via the overhead power infrastructure high voltage lines (see Plate 7.5 and Plate 7.6).

SU1 consists of 9,538 square metres of which 6,676 square metres was surveyed on foot. Two per cent of the area had surface exposure and was inspected. No Aboriginal artefacts were located during the survey. The Site Officer from the Metropolitan LALC noted that shell middens are the most common Aboriginal site type in this area due to the proximity to the river. Due to the proximity to known middens as well as the landform and disturbance context, the portion of the surveyed area shown on Figure 7.7 has been assessed as having high archaeological potential.

Plate 7.3 Looking south-east mangroves on Ermington Boat Ramp

Plate 7.4 Looking east retaining walls of shoreline

Plate 7.5 Looking north-east electrical easement in the parking area

Plate 7.6 Looking north intact parts of the parklands

Survey Unit 2 – Waratah Street

SU2 is located on the northern boundary of Waratah Street around 120 to 150 metres from the Parramatta River, which was previously assessed as having high Aboriginal heritage potential (Section 5.3), as shown on Figure 7.1. This SU was considered to have a high potential for Aboriginal heritage as intact residual soils were recorded from 40 centimetres below surface based on previous geotechnical investigations for the project. SU2 consists of 3,036 square metres of which 1,062 square metres was surveyed on foot. Two per cent of the area had surface exposure and was inspected. No Aboriginal artefacts were located during the survey. The ground visibility was around 20 per cent and mostly covered with gravels and clayey loam (see Plate 7.7 and Plate 7.8).

Plate 7.7 Looking north-west along Waratah Street

Plate 7.8 Looking north along Waratah Street

7.3.2 Ermington

Survey Unit 3 – Ken Newman Park

KNC previously reported SU3 as having potential for archaeological deposits located at shallow depths (KNC, 2018). Previous geotechnical studies undertaken as part of the project unearthed an intact clay rich residual soil profile at greater than 30 centimetres depth.

Ken Newman Park is located in mid and low slopes which have been disturbed through the installation of the Sydney Water potable water pipelines in one third in the northern section of the park (see Figure 7.2) (see Plate 7.9 and Plate 7.10). SU3 consists of 32,191 square metres of which 11,266 square metres was surveyed on foot. Ground surface visibility was 0.2 per cent, which was the area inspected and no Aboriginal artefacts were located during the survey.

The disturbed corridor to Hilder Road was excluded from the survey, except for the eastern part of the council strip on Hilder Road which has not been disturbed (see Plate 7.11). The small area of spoil shown in Plate 7.12 is comprised of silty sand and is located on the disturbed section of part by the Sydney Water potable water pipelines, therefore, does not contain intact soil profile. The ground visibility was nil except for this spoil exposure due to the thick grass. The current tree line implies a water course could extend through the park, however, no earlier water course was identified in historical imagery.

The park lies in a north-south direction and is located around 300 to 600 metres from the Parramatta River in the south and north respectively. Even though the distance to the river is greater than the archaeological predictive model proposed distance (less than 200 metres to a watercourse), this mid slope may have been preferred as campgrounds or other activities during high tides or floods as Parramatta River is subject to flooding. This assumption was supported by the Metropolitan LALC Site Officer.

Plate 7.9 Looking north to Ken Newman Park

Plate 7.10 Looking west to the Sydney Water assets corridor

Plate 7.11 Looking north towards Hilder Road

Plate 7.12 Looking west disturbed soil in Ken Newman Park

Survey Unit 4 – Broadoaks Park and surrounds

The dominant portion of SU4 is located at Broadoaks Park which is located between Primrose Avenue and Fallon Street in east-west direction. The park is located in mid and low slopes, with disturbance areas in one third of the north section due to topsoil erosion (see Figure 7.2, Plate 7.13 and Plate 7.14). The remainder of SU4 is located on the northern section of South Street, however as this council strip was observed to be disturbed by the Sydney Water potable water pipelines, it was not considered to have archaeological potential.

In total, SU4 consists of 4,968 square metres of which 1,046 square metres was surveyed on foot. One per cent of the area had surface exposure and was inspected and no Aboriginal artefacts were located during the survey.

The Deerubbin LALC Site Officer noted that the northern half of the Broadoaks Park was subject to topsoil erosion of the A horizon with insect nests exposing the soil which consisted of clayey silt with iron stone and pebble inclusions. The remainder of the park had no ground visibility due to high grass.

Plate 7.13 Looking north-west in Broadoaks Park

Plate 7.14 Looking south to soil exposure

7.3.3 Rydalmere

Survey Unit 5 – Rydalmere Wharf

SU5 has been subject to levels of disturbance from various activities including landscaping, construction of walking paths, bicycle paths and car parks as well as Sydney Water utilities. However, based on the Aboriginal heritage sensitivity map of Parramatta LGA (see Plate 5.1). the parklands of the wharf have been recorded as high archaeological sensitivity (see Figure 7.3).

Rydalmere Wharf is situated on a flat landform on the north shore the Parramatta River with landscaped gardens and young trees (see Plate 7.15 and Plate 7.16). The foreshores of the wharf have been disturbed by the retaining wall and a footpath (see Plate 7.17 and Plate 7.18). Parklands around the wharf extend from the Sydney Water potable water pipelines in the west to John Street in the east. The northern extent of the wharf is bordered by the car park (see Plate 7.19 and Plate 7.20). The parklands are slightly elevated to the northern areas which may indicate soil integrity.

During the wharf upgrade a desktop Aboriginal heritage assessment was undertaken as a part of the Statement of Heritage Impact (City Plan Services, 2018). This report suggested that Aboriginal people have a long and enduring connection with the Rydalmere area. However, the PACHCI Stage 1 Assessment determined that it was unlikely that the proposed wharf upgrade works would impact Aboriginal cultural heritage (WSP Australia & Roads and Maritime Services, 2018). Previous geotechnical studies in 2019 recorded intact soil matrices from beneath 120 centimetres depth, therefore, Aboriginal archaeological potential may be present under the modern disturbed layers.

SU5 consists of 20,290 square metres of which 7,245 square metres was investigated during the survey. Four per cent of effective coverage was recorded on foot via an unsystematic walk because of the low visibility. The ground visibility during the survey was very low to nil during the survey except for the tree line in the northern

boundary of the parkland. One quartz piece with no diagnostic features was recorded from the surface exposure under a tree around 50 metres from the river during the survey. This quartz could have been redeposited by disturbance or tumbling in the river (see Plate 7.20 and Plate 7.21). This SU has been recorded as high archaeological potential based on the distance to the river and the Aboriginal heritage sensitivity map (Section 5.3).

Plate 7.15 Looking north-west in parklands

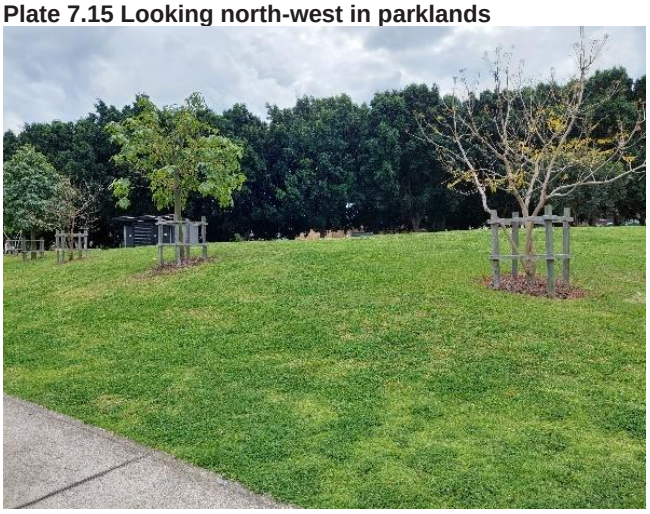


Plate 7.16 Looking south at Rydalmere Wharf

Plate 7.17 Looking west to retaining walls of the wharf

Plate 7.18 Looking south-west to the wharf parklands

Plate 7.19 Looking north to the car park

Plate 7.20 General location of quartz piece

Plate 7.21 Quartz piece found near the wharf

7.3.4 Camellia

Survey Unit 6 – Camellia - Thackery Street and mangroves

Camellia precinct is highly industrialised and disturbed. Therefore, within the study area SU6 is limited to the nature strips on Thackeray Street and the mangroves on Parramatta River (see Figure 7.3). Previous geotechnical investigations for the project recorded ground conditions at the south bank of the Parramatta River comprising up to 2.6 metres of fill generally associated with land reclamation overlying very soft silty clay and sandy clay. Holocene Alluvium was reached from 2.6 metres to 15.8 metres depth.

SU6 consists of 4,610 square metres however the grassland had no visibility and the elevated street line suggested that this area has high levels of ground disturbance (see Plate 7.22 and Plate 7.23). A total of 230 square metres of this SU was surveyed on foot and no Aboriginal artefacts were found during this survey.

Plate 7.22 Mangroves in Camellia

Plate 7.23 Looking south on Thackeray Street

7.3.5 Wentworth Point and Sydney Olympic Park

Survey Unit 7 – Hill Road and river walk

Previous landfill and chemical contamination in Wentworth Point has affected the archaeological potential in the area. Therefore, SU7 was divided into two separate parts avoiding the remediated landfill areas containing compacted waste material in Woo-la-ra (see Figure 7.4). In total, SU7 consists of 49,910 square metres and 13,463 square metres was surveyed on foot.

The northern part of SU7 is located along the river walk, adjacent to Parramatta River (see Plate 7.24 and Plate 7.25). This part of the survey unit was previously considered to be less impacted by previous disturbance except for the footpath construction and electrical easement. However, at Wentworth Point and Sydney Olympic Park (north of Haslams Creek), the study area is situated on manmade fill with a thickness of more than two metres over the Quaternary estuarine and alluvial deposits, to allow industrial development. The adjacent 'Sanctuary' development in Wentworth Point also recorded the presence of highly disturbed and contaminated soil samples based on geotechnical results (Roads and Maritime Services, 2013). This section of SU7 is located on a flat landform with very low surface exposure (five per cent) due to vegetation and grass. No Aboriginal artefacts were found during the survey and based on the results from previous geotechnical studies no further investigation is required in the river walk.

The second section of SU7 is located on the western side of Hill Road where AHIMS 45-6-2785 was recorded by GPS coordinates. AHIMS 45-6-2785 was previously recorded as a PAD within the Newington Nature Reserve and is mapped around 50 metres outside of the study area based on the site card map and description. This area was subject to landscaping of the wetlands and located on a flat landform (see Plate 7.26 and Plate 7.27). The surface visibility was low to nil due to shrubs and leaves. No Aboriginal artefacts were identified during the survey.

Plate 7.24 Looking north to Parramatta River

Plate 7.25 Looking south-west on river walk

Plate 7.26 Looking south to Millennium Parklands

Plate 7.27 Looking south to Millennium Parklands

Survey Unit 8 – Haslams Creek

SU8 consists of Haslams Creek, mangroves and the banks of the creek (see Figure 7.5). While the broad area has been remediated due to previous landfilling activities and now contains waste material which has been compacted and capped. The creek's riverbed has also been subject to change via concrete channelling. However, KNC previously identified the slopes on each side of the Holker Busway bridge, north of Haslams Creek, as having low to moderate potential (KNC, 2018).

The alluvial flats in the area would have provided many resources to the Aboriginal people (see Plate 7.28 and Plate 7.29). Therefore, the presence of the intact soil profile may have archaeological potential due to the close distance to the watercourse. SU8 consists of 9,513 square metres of which 0.5 per cent was survey for effective coverage. In total, 470 square metres were surveyed on foot. The ground surface visibility was nil due to grassland and no Aboriginal artefacts were identified during the survey.

Plate 7.28 Looking north-east to Holker Busway

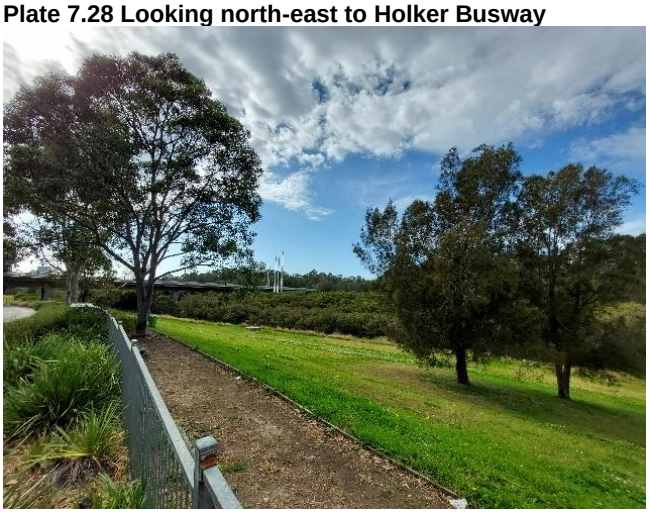
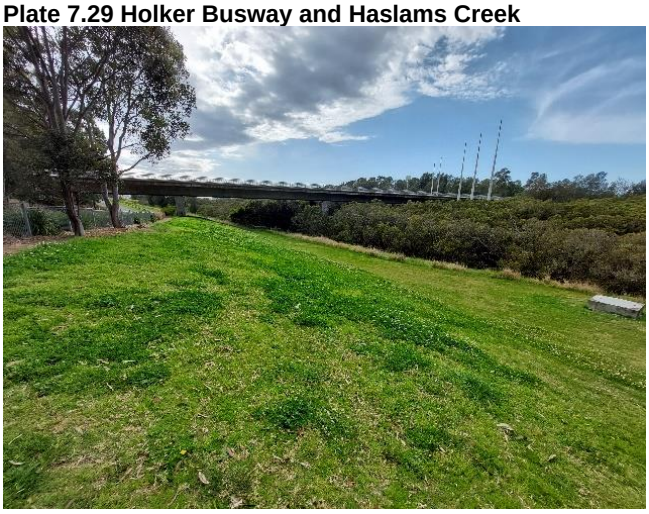


Plate 7.29 Holker Busway and Haslams Creek



Survey Unit 9 – Brickpit

SU9 consists of the nature strip on the eastern side of Australia Avenue, adjacent to the Brickpit at Sydney Olympic Park (see Figure 7.5). The area is within a flat landform with extensive grass coverage and disturbance from a footpath/cycling lane and may present an intact soil profile.

SU9 consists of 13,084 square metres of which 1,962 square metres was surveyed on foot. Ground surface exposure was around one per cent of the area. The ground surface visibility was low (10 per cent) during the survey due to the grass. The area was subject to an unsystematic visual inspection as a result of this low visibility (see Plate 7.30 and Plate 7.31). Dark brown silty loam was exposed on the ground surface and additional disturbance was visible from an old stormwater pipe on the eastern end of the nature strip towards the Brickpit. No Aboriginal artefacts were found identified the survey.

Plate 7.30 Looking north-west to Brickpit

Plate 7.31 Looking east towards to Brickpit

7.3.6 Areas not surveyed

As noted in Section 7.2, some areas identified as having Aboriginal archaeological sensitivity were not able to be surveyed.

Melrose Park Public School (oval), is located partially within the study area on a flat landform with likely minimal disturbance 200 metres from the Parramatta River and as such is considered to have high Aboriginal heritage potential (see Figure 7.6). During the survey, the oval was observed from the nearby footpath and the ground exposure seemed to be very low due to high grass. It was also noted that the path in the middle of the oval was being resurfaced exposing some topsoil in the process (see Plate 7.32 and Plate 7.33). No Aboriginal artefacts were observed from the footpath.

Ten residential properties, adjacent to Wharf Road, are located within the study area (see Figure 7.6). Any undisturbed gardens and backyards of these properties may hold Aboriginal heritage potential based on their distance to the Parramatta River and PAD1.

Additionally, the mangroves along Camellia were not accessible to survey, however, as a result of the disturbed nature the Deerrubin LALC Site Officer confirmed that no further investigations are necessary in Camellia.

Transport for NSW has committed to completing a survey of the areas in Melrose Park, should it be confirmed they could be impacted by the project and once property access can be arranged in consultation with the LALC Site Officers (see also Section 10).

Plate 7.32 Looking south to Melrose Park Public School oval

Plate 7.33 Looking east, the construction works in the school oval

7.4 Summary of archaeological survey

The survey was undertaken in accordance with the recording requirements stipulated in The Code and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW, 2011*).* This included identifying landforms and landscapes including visibility and exposure for each survey unit. The effective coverage data (around 13 per cent) for the survey indicated that generally there were poor ground surface visibility across the study area which significantly reduced the possibility of identifying surface evidence of past-Aboriginal occupation.

Where Aboriginal sites are present in the study area, these are likely to be within pockets of undisturbed parklands, nature strips adjacent to watercourses and within 200 metres of the river with limited previous ground disturbance. A total of eight PADs were identified within the study area, as a result of the archaeological field survey and in consultation with LALC Site Officers. Four PADs were identified with high archaeological potential (as they were in close proximity to a known site or landform such as a river or creek) and an additional four PADs were identified as having moderate archaeological potential (which despite their distance to watercourses being greater than 200 metres, it was considered that these areas could be routes to inland).

No Aboriginal artefacts were identified during the survey.

The survey also included general discussion with the LALCs with respect to the Aboriginal cultural heritage values of the study area and surrounds. Both Site Officers emphasised the important role of the Parramatta River for the Aboriginal communities as a food source, as well as gathering and ceremonial places along the river. Eel traps and shell middens associated with the river are considered highly significant for the Aboriginal people.

7.4.1 PADs identified with high archaeological potential

PLR2 PAD1 Ermington Boat Ramp, Melrose Park (9,204 m^2)

The Ermington Boat Ramp area has been previously identified as an area of high archaeological potential (Dallas Consulting 2014), and the less disturbed parts of this area have been recorded as an area of potential archaeological deposit following the survey. The less disturbed areas include (see Figure 7.7):

- the nature strip north-west of the overhead power infrastructure high voltage lines
- the northern boundary of Waratah Street.

PAD1 is located in the Lucas Heights Soil Landscape, which was formed *in situ* by weathering material, namely residual soil. This soil type is favourable for artefact durability except for organic material, which may result as an accumulation of artefacts from the different occupation levels. The survey indicated that the area had been modified by landscaping, the Viva Energy fuel pipeline and the high voltage power easement, however, archaeological investigations at sites in the region have uncovered intact archaeological deposits beneath modern disturbance. The area has been assessed as having the potential for subsurface Aboriginal archaeological deposits due to the proximity to the Parramatta River and the shell midden (AHIMS 45-6-1961) which is 300 metres west of the study area, on the west coast of the unnamed bay in Ermington.

PLR2 PAD2 Melrose Park Public School Oval (7,972 m^2)

Melrose Park Public School Oval has been identified as an area of potential archaeological deposit based on landform features and distance to Parramatta River and noting the likely minimal disturbance of the oval which indicates potential for sub-surface archaeological deposits (see Figure 7.7). The location was observed from the footpath with the Metropolitan LALC Site Officer, although not directly surveyed. The elevation of this area associated with the Parramatta River would have been less impacted by flooding and so the disturbance from historic and modern land use has been limited.

PLR2 PAD3 Rydalmere Wharf (18,447 m^2)

Rydalmere Wharf and the parklands around the wharf have been identified as an area of potential archaeological deposit on the flat, gently sloping area to the north (see Figure 7.8). While previous construction of amenities, car parks and vegetation removal has been undertaken in the area, the landform remains largely intact. Although bicycle paths and landscaping have partially disturbed the area, the wharf has been assessed as having high potential for subsurface archaeological deposits below the modern disturbance due to the proximity to the resources of the Parramatta River.

PLR2 PAD4 Haslams Creek, Sydney Olympic Park (3,650 m^2)

The grassland adjacent to Holker Busway is an area of potential archaeological deposit which was previously identified based on the likelihood for natural soils comprising deep alluvial deposits along the riverbanks of Haslams Creek being located under imported material (see Figure 7.9). Therefore, due to the proximity to the watercourse this area has been assessed as having high potential for Aboriginal occupation deposits.

7.4.2 PADs identified with moderate archaeological potential

PLR2 PAD5 Broadoaks Park, Ermington (4,369 m^2)

Broadoaks Park is located on a mid slope with very limited and unknown levels of previous disturbance (see Figure 7.8) The topsoil (A horizon - brown clay loam) was observed during the survey to be eroded in the central areas of the park but intact in the south. These erosional soils are associated with poor preservation of archaeological material but is still likely to occur at shallow depths.

Broadoaks Park was initially assessed as having high archaeological potential in the Aboriginal Sensitivity Map (Dallas, 2014) but based on the distance to the water was revised as moderate archaeological potential. This significance assessment is subject to change following archaeological testing which would aim to clarify archaeological significance. Due to the elevation of the parkland and undisturbed condition in the south of this area was assessed to have a moderate level of archaeological potential.

PLR2 PAD6 Ken Newman Park, Ermington (32,191 m^2)

Ken Newman Park is situated on the low and mid slopes of a small ridgeline (see Figure 7.8). The park is located on the intersection of two soil landscapes; Lucas Heights and Glenorie. Residual and erosional loams in this area have the potential to contain archaeological deposits at shallow depths. Ken Newman Park was initially assessed as high archaeological potential in the Aboriginal Sensitivity Map (Dallas, 2014) but based on the distance to the water has been revised as moderate archaeological potential. This significance assessment is subject to change following archaeological testing which would aim to clarify archaeological significance. Considering the very limited previous disturbance, except for the Sydney Water potable water pipelines extending across the park, this area has been assessed as having moderate archaeological potential, especially noting the limited impact the site would expect to have seen from flooding due to its elevation.

PLR2 PAD7 Hill Road West, Sydney Olympic Park (adjacent to AHIMS 45-6-2785) (21,495 m^2)

The PAD (see Figure 7.9) associated with AHIMS 45-6-2785 was recorded in 2006 within Sydney Olympic Park (Irish, 2006) (also see Figure 5.1). It contained a thin level of remnant soil with the potential to contain archaeological deposits. No surface cultural material was identified within PAD in 2006. The PAD is around 50 metres west of the study area.

However, due to the close proximity of the AHIMS site and analysis by this predictive model, an adjacent area to the west of Hill Road has been nominated as a PAD and to be included in the test excavation program to test this prediction. AHIMS 45-6-2785 was not visited during the field survey for the current study as it is located within a fenced off area of woodland in Newington Armoury.

PLR2 PAD8 Brickpit, Sydney Olympic Park (5,411 m^2)

A small area of a nature strip adjacent to the Brickpit has been recorded as having moderate to low potential for archaeological deposits (see Figure 7.9). The broad area is disturbed by development and brick works. However, this flat nature strip may have subsurface Aboriginal cultural material due to its proximity to Haslams Creek.

Legend

- Study area
- PAD 1 - Ermington Boat Ramp
- PAD 2 - Melrose Public School Oval

Paper Size ISO A4

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

PADs identified in Melrose Park

Project No. **12557728**
Revision No. **2**
Date **22/06/2022**

FIGURE 7.7

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Data source: Study area - GHD2022; PAD - RPS2022, Precinct - Mecone2021; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/06/2022 . Created by: lmanasan

Legend

- Study area
- PAD 3 - Rydalmere Wharf
- PAD 5 - Broadoaks Park
- PAD 6 - Ken Newman Park

Paper Size ISO A4

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

PADs identified in Rydalmere and Ermington

Project No. **12557728**
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Date **22/06/2022**

FIGURE 7.8

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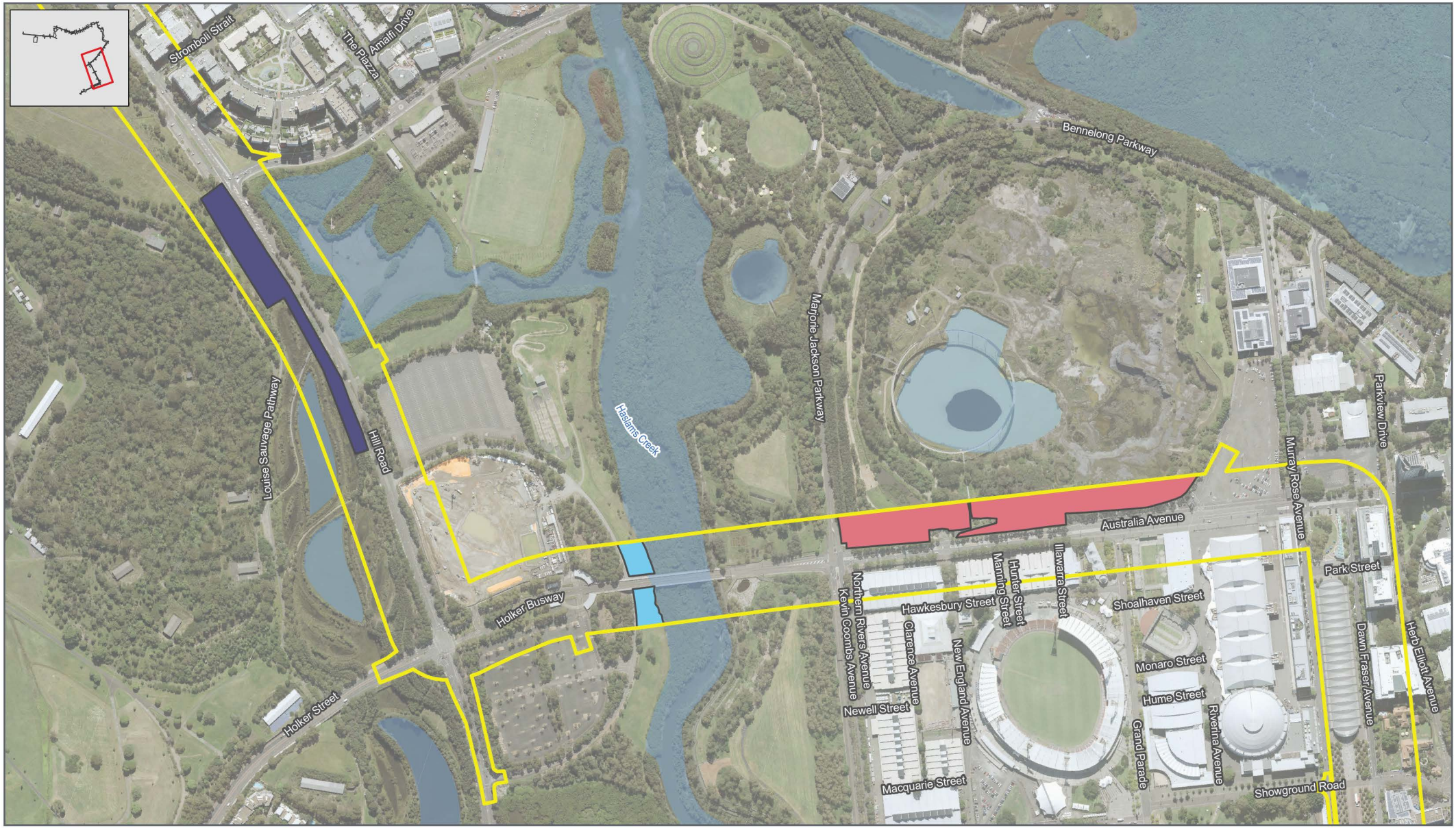

Legend

- Study area
- PAD 4 - Haslams Creek
- PAD 7 - Hill Road West
- PAD 8 - Brickpit

Paper Size ISO A4

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Transport for NSW
Parramatta Light Rail Stage 2 EIS
Aboriginal Cultural Heritage

PADs identified in Sydney Olympic Park

Project No. **12557728**
Revision No. **2**
Date **22/06/2022**

FIGURE 7.9

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Data source: Study area - GHD2022; PAD - RPS2022; Precinct - Mecone2021; Road, Watercourse - NSWSS2022; Imagery - Metromap Tile Service: extracted 22/06/2022 . Created by: lmanasan

8 PRELIMINARY STATEMENT OF SIGNIFICANCE

In accordance with The Code and the *Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS, 2013) (the Burra Charter), this section provides a preliminary assessment of the archaeological significance of the study area. Assessment of significance can only occur in consultation with RAPs.

Scientific (archaeological) value refers to the importance of a landscape, area, place or object because of its rarity, representativeness and the extent to which it may contribute to further understanding and information. Scientific value is assessed using criteria such as research potential, representativeness, rarity and education potential which are listed below.

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

The degree to which an area meets the criteria is assessed as low, moderate, high or major as shown in Table 8.1 which is based on the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage* (OEH, 2011) under Part 6 of the NPW Act.

Table 8.1 Aboriginal Cultural Heritage Significance Assessment Matrix

Significance Assessment Matrix				
Significance	Potential to provide further archaeological information			
		Low	**Moderate**	**High**
	Low	Low	Low	Moderate
	Moderate	Low	Moderate	High
	High	Moderate	High	Major

8.1 Scientific significance assessment

Archaeological value refers to the importance of a landscape, area, place or object based on its rarity, representativeness, and the extent to which it may contribute to further understanding and information about past Aboriginal occupation (OEH, 2011:9).

The assessment of scientific or archaeological value (and subsequently, significance) is used to develop appropriate management and mitigation recommendations. Criteria for archaeological significance have been developed in accordance with the principles of The Code and best practice assessment processes as set out in the Burra Charter. The following archaeological significance criteria have been used: rarity, representativeness, research potential and education potential which are defined in Table 8.2.

Table 8.2: Archaeological significance criteria (*Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011)

Criteria	Description
Rarity	What are the unique and distinctive features of a site, how many are left? Is this a good example of its type? What characteristics might demonstrate this? Is the subject area important in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practiced? Is it in danger of being lost or of exceptional interest?
Representativeness	How much variability (outside and / or inside the subject area) exists, what is already conserved, how much connectivity is there?

Research potential	What is the potential of a site to shed a light into past human behaviour and to contribute on intra-regional relationships? Is the subject area important in demonstrating a distinctive way of life, custom, process, land-use function or design no longer practised? Is it in danger of being lost or of exceptional interest? Can Aboriginal objects from a site, provide information about changes in the cultural practices of Aboriginal people through time including post contact archaeology? Are there post contact questions that could be investigated here? Where do historical and Aboriginal occupation areas coincide and may require combined investigation as part of this project including Parramatta Sand Body?
Education potential	Does the subject area contain teaching sites or sites that may have teaching potential?

8.2 Preliminary significance assessment of Aboriginal sites

To assess the significance of Aboriginal heritage values, consultation with relevant Aboriginal stakeholders must be undertaken as per the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW). Aboriginal people are recognised as the determinants of their own heritage. As such, consultation is the way in which an assessment of Aboriginal cultural heritage values is informed. As per the Commonwealth *Ask First* guide (Collet and Pocock, 2012), cultural significance is determined in accordance with relevant Aboriginal cultural groups before decisions can be made regarding the management of places and heritage values.

The archaeological significance of Aboriginal sites is further assessed through scientific means such as excavation, survey and analysis of artefactual material.

Two registered Aboriginal sites (AHIMS 45-6-2977, AHIMS 45-6-4015) are located on Macquarie Street within the Parramatta CBD section of the study area. A preliminary assessment of the archaeological significance of the AHIMS sites and PADs in the study area is summarised in Table 8.3.

Table 8.3: Preliminary assessment of the archaeological significance of the AHIMS sites and PADs in the study area

PAD/AHIMS	Suburb	Rarity	Represent-ativeness	Research potential	Education potential
PLR2 PAD1 Ermington Boat Ramp	Melrose Park	High	High	High	High
PLR2 PAD2 Melrose Park Public School	Melrose Park	High	High	High	High
PLR2 PAD3 Rydalmere Wharf	Rydalmere	High	High	High	High
PLR2 PAD4 Haslams Creek	Sydney Olympic Park	High	High	High	High
PLR2 PAD5 Broadoaks Park	Ermington	Moderate	Moderate	Moderate	Moderate
PLR2 PAD6 Ken Newman Park	Ermington	Moderate	Moderate	Moderate	Moderate
PLR2 PAD7 Hill Road West	Sydney Olympic Park	Moderate	Moderate	Moderate	Moderate
PLR2 PAD8 Brickpit	Sydney Olympic Park	Moderate	Moderate	Moderate	Moderate
AHIMS 45-6-2977 (Macquarie St PAD 3)	Parramatta CBD	High/Moderate	High/Moderate	High/Moderate	High/Moderate
AHIMS 45-6-4015 (Church St PAD 1)	Parramatta CBD	Moderate	Moderate	Moderate	Moderate

Comprehensive archaeological significance assessments, and any assessment of cultural significance are key knowledge gaps which will be addressed in the ACHAR and cultural values assessment to be prepared for the Parramatta Light Rail Stage 2 EIS.

The project also seeks to identify social and cultural values of the study area to the local Aboriginal community, in order to address appropriate and respectful mitigation strategies for any identified impacts to Aboriginal heritage presented by the project.

8.3 Aboriginal stakeholder comments

During the survey, Deerubbin LALC and Metropolitan LALC Site Officers did not report any previously unidentified cultural material within the study area. Both Deerubbin LALC and Metropolitan LALC Site Officers provided their support for completing the survey of the inaccessible areas in Melrose Park once property access can be arranged and prior to any physical works commencing along with testing in areas of archaeological potential. They both recommended further investigation is undertaken to inform the ACHAR and project design.

The Metropolitan LALC Site Officer also emphasised the high cultural significance of the Parramatta River and its surrounds, and the importance of incorporating this significance into heritage interpretation and the design elements of the project.

9 PRELIMINARY IMPACT ASSESSMENT

The study area for Stage 2 is located across the Parramatta and Ryde LGAs and the Deerubbin and Metropolitan LALC boundaries (see Figure 1.2).

The preferred southern option extending along Grand Avenue, Camellia avoided one registered Aboriginal site (AHIMS 45-6-3108) and one PAD (Area 1, in KNC, 2017) in Rydalmere. Additionally, thirteen registered AHIMS sites (AHIMS 45-6-2785, AHIMS 45-6-2786, AHIMS 45-6-2683 and AHIMS 45-6-2559, AHIMS 45-6-3582, AHIMS 45-6-3767, AHIMS 45-6-3818, AHIMS 45-6-2686, AHIMS 45-6-1523, AHIMS 45-6-2978, AHIMS 45-6-2795, AHIMS 45-6-2679 and AHIMS 45-6-4097) are located within 200 metres of the study area and are unlikely to be impacted by construction or operation of the project.

Two AHIMS sites (AHIMS 45-6-2977 and AHIMS 45-6-4015) in the Parramatta CBD and eight PADs (potential archaeological deposits with moderate to high archaeological potential) identified during the survey in Rydalmere, Melrose Park and Sydney Olympic Park could potentially be impacted by the construction of the project.

An impact assessment requires a footprint of the construction and design in detail to determine the impacts on Aboriginal heritage values which would be addressed in the ACHAR and through the test excavation program. However, in summary, the proposed works include:

- 15 stops over a 10-kilometre two-way track
- Infrastructure to connect to three transport interchanges on the Stage 1 alignment; future Sydney Metro West and heavy rail in Parramatta and Sydney Olympic Park; and ferry services at Rydalmere and Sydney Olympic Park
- 8.5-kilometre walking and bike-riding path running parallel to the light rail corridor and linking to the existing network
- a shared light rail and pedestrian zone along Dawn Fraser Avenue in Sydney Olympic Park between Australia Avenue and Olympic Boulevard
- new light rail and active transport bridges, including connections over the Parramatta River from Camellia to Rydalmere and Melrose Park to Wentworth Point.

A high level identification of potential impacts associated with the project is outlined below, based on categories of potential impacts drawn from comparable projects. Identifying potential impacts at this stage of the project links into the overall adoption of precaution taken across the technical assessments.

The categories are:

- construction phase impacts: surface. For example – vehicle and plant movement, compaction impacts from vehicle movements and temporary containers and sheds, impacts to sites, places and Aboriginal cultural landscapes
- construction phase impacts: subsurface. For example – any ground breaking activities i.e. excavation, heavy plant movement, installation of fence posts, geotechnical or contamination investigations which may impact Aboriginal archaeological deposits
- construction phase impacts: indirect / visual. For example – impact to significant views and vistas of heritage items, impact to visual connections between heritage items and landscape features, impacts to Aboriginal cultural landscapes
- operational phase impacts that comprise the individual and cumulative impacts associated with the operation and life of the project. These may include impacts to visual connections between heritage items and landscape features and impacts to Aboriginal cultural landscapes. The operational phase may also include positive impacts for heritage values, such as improved public access to heritage areas and heritage interpretation.

The key potential impacts to sites within the study area include possible destruction and/or movement during the installation of infrastructure. Additional impact, specifically the construction of two Parramatta River bridge crossings, are likely to damage areas of high Aboriginal archaeological potential. However, it is noted design development is currently progressing and seeks to minimise construction impacts. For example, impact to mangroves may be mitigated through the use of temporary work platforms that could extend over the environmentally sensitive areas. Similarly, there may be opportunities to avoid ground disturbing works

including impacts of compaction at nominated compound areas like Broadoaks Park. The potential underwater Aboriginal heritage will be discussed in ACHAR.

However, further investigation is required in order to determine the presence, extent, and significance of areas of identified archaeological sensitivity. This investigation would consist of archaeological test excavation, which will inform the comprehensive impact assessment and appropriate design responses. See Appendix A for the Test Excavation Methodology.

10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

This report has considered the landscape and archaeological context of the study area, the archaeological potential and significance of the study area, and the potential impacts of the proposed works on the archaeological resources.

The study area contains several landforms classified as being highly archaeologically sensitive based on previous studies across Parramatta, the distribution of registered AHIMS sites in the vicinity of the study area, and a site survey. If present, the Parramatta Sand Body and associated terrace and lower slope features are landscape features that are particularly archaeologically sensitive. These landforms would have provided access to permanent water and would have been abundant in resources necessary for pre-contact Aboriginal lifeways.

Based on contextual research and the presence of suitable landforms, several areas have been identified as highly archaeologically sensitive with high potential to contain Aboriginal objects.

10.2 Recommendations

Recommendation 1: Further investigation

1a) Survey of inaccessible areas

Additional survey of those parts of the study area that were not previously surveyed in Melrose Park Public School and Wharf Road assessed as archaeologically sensitive must be surveyed prior to any physical works commencing, in consultation with the LALCs, so that potential can be confirmed along with next steps (i.e. testing).

1b) Test excavation

The identified Aboriginal heritage values in this report are likely to be impacted by the project, and further Aboriginal cultural heritage assessment is required. Transport for NSW is proposing to undertake a program of test excavations to investigate the nature and extent of Aboriginal archaeological deposits and mitigate potential impacts. Test excavation will be required to inform an assessment of archaeological significance. A test excavation methodology has been prepared for the study area and is presented in Appendix A.

If the test excavations and cultural consultation show that the area has low archaeological or cultural significance, there would be no constraints on impacts. If the PAD was shown to have a moderate archaeological or cultural significance, further mitigation measures such as salvage excavation and further mitigation measures may be recommended before impacts were to occur. If the PAD was shown to have high archaeological significance, this would inform the decisions made during project design regarding future management of that area. This includes consultation with Registered Aboriginal Parties as outlined in Recommendation 2 below. The Aboriginal cultural heritage assessment would assess the significance of Aboriginal sites/places and assess the impacts associated with the project following the test excavation program.

Recommendation 2: Aboriginal community consultation

Aboriginal community consultation must be undertaken for the project, in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW). The consultative strategy should be transparent and consistent. Further consultation steps should be followed to address the knowledge gap on Aboriginal Heritage values within the study area. The best practice standards of early consultation and reduce risk to the project by identifying key cultural values early. Consultation should be ongoing for the life of the project.

Recommendation 3: Finalisation of Aboriginal Cultural Heritage Assessment Report

In accordance with the SEARs, an Aboriginal Cultural Heritage Assessment Report is required. This must be finalised on completion of the proposed archaeological test excavations (Recommendation 1) which will inform the assessment of Aboriginal cultural heritage and project impacts. Transport for NSW has also committed to undertaking cultural interviews with knowledge holders to inform the assessment of cultural values.

11 REFERENCES

AMBS Ecology & Heritage 2008, *Preliminary cultural heritage assessment: Rosehill recycled water scheme*. Prepared for Parsons Brinckerhoff Australia Pty Ltd on behalf of Alinta Asset Management Pty Ltd.

Arfanis, P 2015, *North Parramatta, the First Land Grants. Parramatta Heritage Services*. Accessed online 7 January 2019 http://arc.parracity.nsw.gov.au/blog/2015/08/05/north-parramatta-the-first-land-grants/

Artefact Heritage 2018, *Robin Thomas Reserve Masterplan Aboriginal Cultural Heritage Assessment Report (ACHAR)*, report to Transport for NSW.

Attenbrow, V 2012, *Archaeological evidence of Aboriginal life in Sydney, Dictionary of Sydney, http://dictionaryofsydney.org/entry/archaeological_evidence_of_aboriginal_life_in_Sydney*, viewed 12 Apr 2022.

Attenbrow, V 2010, *Sydney's Aboriginal past: investigating the archaeological and historical records*. UNSW Press.

Australia ICOMOS Charter for Places of Cultural Significance, The Burra Charter, 2013 (Burra Charter) Available at: https://australia.icomos.org/publications/charters/

Australia ICOMOS 2013, *Practice Notes for Interpretation.*

Bowler, JM, Johnston, H, Olley, J, Prescott, JR, Roberts, RG, Shawcross, W & Spooner, NA 2003, *New ages for human occupation and climatic change at Lake Mungo, Australia. Nature, 421 837-840.*

Brook, J & Kohen, J 1991, *The Parramatta Native Institute and the Blacktown: A History*. NSW University Press.

Chapman, GA, Murphy, CL, Tille, PJ, Atkinson, G, &Morse, RJ 2009, *Soil Landscapes of the Sydney 1:100,000 Sheet* map, Ed. 4, Department of Environment, Climate Change and Water, Sydney.

Chapman, GA, & Murphy, CL 1989. *Soil Landscapes of the Sydney 1:100,000 Sheet* report, Soil Conservation Service of NSW, Sydney.

City of Parramatta 2017a, *Aboriginal and Torres Strait Islanders*. Accessed online 7 January 2019 https://www.cityofparramatta.nsw.gov.au/living-community/aboriginal-and-torres-strait-islanders.

City of Parramatta 2017b, *History of Waterways.* Accessed online 20 December 2019 https://www.cityofparramatta.nsw.gov.au/recreation-environment/waterways/catchment-management/history-of-waterways

City Plan Services 2018, *Rydalmere Wharf Statement of Heritage Impact*, report to Roads and Maritime Services, April 2018.

Clark, NR, & Jones, DC 1991. *Penrith 1:100 000 Geological Sheet 9030, 1st edition. Geological Survey of New South Wales, Sydney*.

Clarkson, C, Jacobs, Z, Marwick, B, Fullagar, R, Wallis, L, Smith, M,Roberts, R, Hayes, E, Lowe, K, Carah, X, Florin, SA, McNeil, J Cox, D, Arnold, L, Hua, Q, Huntley, J, Brand, EA, , Manne, T, Fairbairn, A, &Pardoe, C2017, *Human occupation of northern Australia by 65,000 years ago. Nature. 547. 306-310. 10.1038/nature22968.*

Collett, D, & Pocock, C 2012, *Ask first: a guide to respecting indigenous heritage places and values: issues and gaps analysis*.

Collins, D 1798*, An Account of the English Colony in New South Wales [Volume 1].* T. Cadell Jun. and W. Davies, London.

Collins, D 2003 (1802), *An Account of the English Colony in New South Wales From Its First Settlement, in January 1788, to August 1801*. London, T. Cadell Jun. and W. Davies.

Comber Consultants, 2010, *Preliminary Excavation Report, 140 Macquarie Street, Parramatta*. Prepared for Integral Energy.

Comber Consultants, 2019, *Parramatta Square 2 (PS2), 160-182 Church St Parramatta, Aboriginal Archaeological Excavation Report*. Prepared for Parramatta City Council.

Comber Consultants, 2018, *Parramatta Square 3 (PS3): 153 Macquarie St Parramatta, Excavation Report, AHIP No. C0001379*. Prepared for Parramatta City Council.

Comber Consultants, 2019, *Parramatta Square 5 & 6 (PS5&6): 12-38 Darcy St Parramatta, Excavation Report, AHIP No. C0001379.* Prepared for Parramatta City Council.

Comber, J 2018, *Aboriginal Archaeological Test Excavation Report AHIP C0001588: Site 45-6-3195, Parramatta North Growth Centre*. Unpublished report to Urban Growth NSW.

Corkill, T 1999*, HERE AND THERE links between stone sources and Aboriginal archaeological sites in Sydney, Australia,* MA thesis, University of Sydney.

CT environmental 2016, *Parramatta River Catchment Ecological Health Project*. Prepared for Parramatta River Catchment Group.

Dallas Consulting 2014, *Parramatta Aboriginal Cultural Heritage Study Review.* Report to Parramatta City Council.

Dallas Consulting 2003, *Parramatta City Council Aboriginal Heritage Study*. Prepared for Parramatta City Council.

Dominic Steele Consulting Archaeology 2013, *Aboriginal Archaeological Assessment & Aboriginal Heritage Impact Permit Application AHIMS Site # 45-5-3068 184-188 George Street, Parramatta, NSW.* Report prepared for Wizcorp Pty Ltd.

eSPADE 2018, Available at https://www.environment.nsw.gov.au/eSpade2Webapp

Etheridge, R 1918, *The Dendroglyphs: Or" carved Trees" of New South Wales (No. 3).* WA Gullick, government printer.

Extent Heritage 2019, *Robin Thomas Reserve- Masterplan Stage 1 Interim Aboriginal Test Excavation Report*, report to Transport for NSW.

GML Heritage, 2019, *Parramatta Park, George Street Gatehouse Geomorphology and Aboriginal Archaeology Report*. Unpublished Report to Parramatta Park Trust.

Greater Sydney Commission 2018, *Greater Sydney Region Plan A Metropolis of Three Cities*, Sydney.

GroundTruth Consulting, 2008, *Nature and distribution of Parramatta Terrace Sand*. Unpublished Report to City of Parramatta Council.

GroundTruth Consulting, 2011, *Sand body auger hole testing in the Parramatta local government area*. Unpublished Report to NSW Department of Planning and Heritage Branch.

Herbert C 1983, Sydney 1:100 000 Geological Sheet 9130, 1st edition. Geological Survey of New South Wales, Sydney

Heritage Office, Department of Planning 2005, *Heritage Interpretation Policy,* NSW Government.

Heritage Office , Department of Planning 2005, Heritage Information Series: *Interpreting Heritage Places and Items – Guidelines,* NSW Government.

Herron, NF, McVicar, TR, Rohead-O'Brien, H, Rojas, R, Rachakonda, PK, Zhang, YQ, Dawes, WR, Macfarlane, C, Pritchard, J, Doody, T, Marvanek, SP & Li, LT 2018, *Context statement for the Sydney Basin bioregion. Product 1.1 from the Sydney Basin Bioregional Assessment. Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia,*
Australia. http://data.bioregionalassessments.gov.au/product/SSB/SSB/1.1

Hiscock, P 2008, *Archaeology of Ancient Australia. London, Routledge.*

Hoskins, I 2015, *River Cycles – A History of the Parramatta River*. Accessed online 9 January 2019 https://dictionaryofsydney.org/entry/river_cycles_a_history_of_the_parramatta_river

Irish, P 2006, Site Card AHIMS 45-6-2785, Aboriginal Sites Register of NSW Standard Site Recording Form.

Irish, P 2017, *Hidden in plain view: the Aboriginal people of coastal Sydney*, Sydney NSW, NewSouth Publishing.

Irish, P, & Goward, T 2012, *Where's the evidence? The archaeology of Sydney's Aboriginal history.* Archaeology in Oceania, 47, 60-68.

Jo McDonald Cultural Heritage Management, 2005, *Archaeological salvage excavation of site CG1 (#45-5-2648) at corner of Charles and George Streets, Parramatta, NSW*. Unpublished Report to Meriton Apartments Pty Ltd.

Karskens, G, Burnett, G, & Ross, S 2019, *"Traces in a Lost Landscape: Aboriginal archaeological sites, Dyarubbin/Nepean River and contiguous areas, NSW, Australia (Data Paper)".* Internet Archaeology, 52.

Kass, T 2008, *Parramatta*. Accessed online 8 April 2022 https://dictionaryofsydney.org/entry/parramatta

Kass, T, Liston, C, & John MC 1996, *Parramatta: A Past Revealed, Parramatta City Council,* Parramatta.

Kelleher Nightingale Consulting Pty Ltd (KNC) 2017, *Aboriginal Cultural Heritage Assessment Report (ACHAR) Environmental Impact Statement (EIS) Stage 1 Parramatta Light Rail. Report to WSP/ParsonsBrinckerhoff on behalf of Transport for New South Wales).*

Kelleher Nightingale Consulting Pty Ltd (KNC) 2018,. *Parramatta Light Rail Stage 2: Aboriginal Heritage Constraints Assessment.* Report to WSP.

Kohen, JL 1986, *Prehistoric Settlement in the Western Cumberland Plain: Resources, Environment And Technology*. Unpublished PhD thesis, Macquarie University

McClymont, J 2008, *Camellia*. Accessed online 31 May 2022 https://dictionaryofsydney.org/entry/camellia

McDonald, J 2008, *Rock art and cross cultural interaction in Sydney: How did each side perceive the other?.* In: Veth, P., Sutton, P. & Neale, M. (eds.) *Strangers on the Shore Early coastal contacts in Australia*. Canberra: National Museum of Australia Press.

Nash, D 2004, *Aboriginal Plant Use in south-eastern Australia. Australian Government. Australian National Botanic Gardens.* Available at https://parksaustralia.gov.au/botanic-gardens/pub/aboriginal-plantuse.pdf

NSW Government Education and Communities 2012, *Water Systems at Narawang Wetlands*.

Office of Environment and Heritage 2013, *Shell Middens*. Accessed online 21 December 2018, https://www.environment.nsw.gov.au/nswcultureheritage/ShellMiddens.htm

Office of Environment and Heritage 2010, *Aboriginal objects.* Accessed online 6 May 2022 Available at https://www.heritage.nsw.gov.au/about-our-heritage/aboriginal-cultural-heritage/

Olympic Co-ordination Authority 1999, *History of Homebush Bay*. Accessed online 10 December 2018 viaCity of Canada Bay Heritage Society 2019 https://canadabayheritage.asn.au/history-of-homebush-bay/

Perrin, E 2008, *Homebush Bay*. Accessed online 10 January 2019 https://dictionaryofsydney.org/entry/homebush_bay

SGS 2017, *Connecting Sydney Olympic Park and GPOP with Greater Sydney- final technical report*. Prepared for Sydney Olympic Park Business Association, May 2017.

Tanner Kibble Denton (TKD Architects) 2017, *Parramatta North Historic Sites Consolidated Conservation Management Plan Part A—Overview Report.*

Taylor, K 1989, 'Conservation and interpretation study of the rural heritage landscape of the Lanyon-Lambrigg Area, ACT' *Historic Environment* Volume 7, No. 2, pp 16-23.

Tilden, F 1977, *Interpreting our heritage* University of North Carolina PressChapel Hill

Turbet, P 1989, *The Aborigines of the Sydney District Before 1788*. Kangaroo Press, Kenthurst, NSW.

Transport for NSW 2020, *Principles and Framework for Aboriginal Engagement*.

White, B, & McDonald, J 2010,. *Lithic Artefact Distribution in the Rouse Hill Development Area,Cumberland Plain, New South Wales*. Australian Archaeology, 70(1), 29-38.

Williams, A. N., McDonald, J., Atkinson, F., Toms, P. S., Hobbs, A., Barry, L., Sapienza, T, Wood, JC, & Doelman, T 2021, Was Aboriginal population recovery delayed after the Last Glacial Maximum? A synthesis of a terminal Pleistocene deposit from the Sydney Basin, New South Wales, Australia. *Journal of Archaeological Science: Reports*, *40*, pp 1-12.

Appendix A
Aboriginal Test Excavation Methodology

A copy of the final Test Excavation Methodology is provided in Appendix C of the Preliminary Aboriginal Cultural Heritage Assessment Report (ACHAR).

Appendix B
AHIMS Extensive Search Results

This appendix contains culturally sensitive information that has been withheld for this version – more information available on request.

Appendix C
PACHCI Stage 2 Survey Report – Deerubbin LALC

A copy of the Deerubbin LALC Survey Report is provided in Appendix E of the Preliminary Aboriginal Cultural Heritage Assessment Report (ACHAR).

Appendix D
A guide for archaeological test excavation

HERITAGE NSW

2022.2

INFORMATION SHEET

Relics of local heritage significance:

a guide for archaeological test excavation

Archaeological test excavation in Parramatta. (Photography by F. Barry, Heritage NSW)

Introduction

This guideline sets out the requirements for undertaking test excavation of relics of local heritage significance, relying on exception 2(d) made under section 139(4) of the *Heritage Act 1977* (exception 2(d)), published in the NSW Gazette on 18 February 2022 (the order).

Under the *Heritage Act 1977*, a '**relic**' means any deposit, artefact, object or material evidence that:

- relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and

- is of State or local heritage significance.

Relics are protected under *the Heritage Act 1977*. Excavation and disturbance of land may require an excavation permit under section 140 or otherwise fall within an exception under section 139(4).

Exception 2(d) provides an exception from the requirement to hold an excavation permit for:

> "Any disturbance or excavation of land for archaeological test excavation of relics of local heritage significance completed in accordance with the guideline **'Relics of local heritage significance: a guide for archaeological test excavation'** published by Heritage NSW

Archaeological test excavation under the section 139(4) exception 2(d) must be in accordance with this guideline. The works must also meet the general conditions prescribed for the exceptions. See the order published in the NSW Gazette for full details.

This guideline sets out the test excavation requirements, including:

1. what test excavation is,
2. how to conduct test excavation under an exception, and
3. how to ensure the work is of an appropriate standard and the results are clearly documented.

These exceptions **DO NOT** apply to relics of State heritage significance. See the s140 application information on the Heritage NSW website if relics of State heritage significance are predicted.

Archaeological relics may also be listed on the State Heritage Register. These exceptions **DO NOT** apply to any relic that is State Heritage Register listed or subject to an interim heritage order. See the s60 application information on the Heritage NSW website for further information.

There are penalties under the *Heritage Act 1977* for failing to obtain an approval, excavation permit or comply with a relevant exception, such as a fine of up to $1.1 million, or in serious cases, imprisonment for up to 6 months. It is therefore important to ensure you understand the requirements that apply.

If Aboriginal objects are suspected to be present on the site, management under the *National Parks and Wildlife Act 1974* is required. Visit the Heritage NSW website for more information on managing Aboriginal cultural heritage.

What is archaeological test excavation?

Archaeological test excavation is the process of verifying and assessing site conditions to establish the integrity, extent, and significance of relics and to determine appropriate further action. Test excavation should be limited to the smallest impact required to understand the archaeological resource and answer the testing research design.

The purpose of test excavation under exception 2(d) is to complete this basic investigation to guide the next steps for the understanding and management of any relics.

An archaeologist must direct the test excavation and recording of relics of local heritage significance during the operation. The relics may be part of a wider archaeological site or discrete features in the landscape. The program may result in the preparation of a report.

If there are known or predicted relics of State heritage significance, the test excavation exception 2(d) **DOES NOT** apply. A section 140 application may be required for your works. See the historical archaeology information on the Heritage NSW website.

If your project area has a relic that is subject to an interim heritage order or a listing on the State Heritage Register, the test excavation exception 2(d) **DOES NOT** apply. A section 60 application will be required for your works. See the State Heritage Register items information on the Heritage NSW website.

Step 1: Assess the archaeological relics

To conduct a test excavation relying on exception 2(d) and this guideline, you must assess and document the relics in a heritage management document (a heritage impact statement, archaeological assessment, etc). This document must provide:

- a short description of the type of relics and their significance against the Heritage Council guideline, Assessing Significance for Historical Archaeological Sites and 'Relics',

  Note - If relics of State heritage significance are identified, or they are State Heritage Register listed, or subject to an interim heritage order, exceptions **DO NOT** apply.
- a short description of the proposed activities/works with at least one map or diagram to show the location of the test trenches and their sizes,
- a description of any previous archaeological works in the area and the cumulative impact of the works (see cumulative impact section below),
- a short discussion of the test excavation and how it will answer questions to guide the understanding and management of the relics,
- a test excavation research design and excavation methodology in accordance with steps 2 and 3 below,
- the name and contact details of the historical archaeologist who will complete the archaeological works,
- confirmation that information on the test excavation will be submitted to the Heritage Council under section 146 of the *Heritage Act 1977* if relics are identified.

The Heritage Council has guidelines which provide information on preparation of an historical archaeological assessment in NSW (Archaeological Assessments 1996, Historical Archaeology Code of Practice 2006 and Assessing Significance for Historical Archaeological Sites and 'Relics' 2009).

Heritage NSW has also provided a template Record of Use form that may be used in the recording of exceptions. Attach any professional advice sought for your records.

Cumulative Impact

As archaeology is non-renewable, ongoing or repeated excavation and disturbance of archaeology will deplete this resource. Consequently, the cumulative impact of activities/works on archaeology must be assessed. A cumulative impact assessment must carefully analyse any previous works at

the site and their impact over time, along with the effect of the proposed activities/works to be undertaken now.

One project by itself may be of minor impact, however several activities/works that impact archaeology, when combined, may present an unreasonable overall impact by eroding or entirely removing the resource or heritage value. Preparation for minor works using an exception must address the cumulative impact of the works. The works will not fall under the exception if they may generate more than a limited impact to relics of local heritage significance.

Strategies that can minimise cumulative impact must be considered when planning your work, such as:

- reusing existing service trenches and utility corridors,
- consolidating ground disturbance areas, or
- building up not down.

Step 2: Prepare the test excavation research design

The research design is the framework for the investigation and identifies questions which will be addressed during the test excavation. The research questions below must be addressed as part of the archaeological program. Additional questions may be added at the discretion of the archaeologist.

The aim of archaeological testing under exception 2(d) is not to address a long list of research questions. However, the testing may highlight the potential the site has to address important substantive research questions in the future. It may be helpful to divide questions into descriptive, analytical, and interpretative sections to ensure that the test excavation is able to provide clarity on the relics of local heritage significance.

The required research questions are:

- What was identified at the site? What kinds of features and deposits?
- When were these features or deposits created? How are they phased against the site historical analysis?
- What site formation processes have occurred?
- What happened at the site?
- How does this site compare to others?
- What contexts, phases, and activity areas are evident, and how are these demonstrated by the various excavation units (trench/square/context/feature)?
- Where were the relics located?
- Compare the results with other relevant sites, related projects, and current research; how does the project fit into broader, regional frameworks and theoretical models if they exist?
- Indicate how and/or why the subject site differs from other sites.

Step 3: Prepare the test excavation methodology

The development of the test excavation methodology must consider the extent of any proposed impacts, the perceived significance of the site, the research design questions, levels of resourcing, site constraints and other factors. The methodology must describe how the project area will be excavated, record spatial and stratigraphic information, and if needed, remove limited relics. It must also explain why these methods have been chosen and how they will help address the research design.

A test excavation methodology must be written which covers the following aspects of investigation:

- the location of test excavation trenches and reason for selection,
- trench size and dimensions (test excavation units may be combined and excavated as necessary to understand the site characteristics),
- excavation techniques (for example, backhoe stripping, hand excavation, etc),
- site recording including:
    - site photographs including north arrow and scale
    - sketch plans to scale
    - stratigraphic matrix showing context relationships
    - relic management including a catalogue
    - establishment of the site datum for maps and plans including levels reduced to Australian Height Datum for identified features/contexts, with top and base of excavation
    - context recording and a logical numbering sequence for the site (e.g. grid system)
    - illustrative maps, plans, sections, and photos, including full site plan showing location of all trenches and excavated features
    - relic records must include trench, feature, context and phase information so that activity areas can be identified as comprehensively as the integrity of the site permits.

Step 4: Complete and report on the works

If after reading this guideline you consider the proposed archaeological test excavation meets the requirements of exception 2(d), you must document your decision and a summary of the works and keep your records for a reasonable time in accordance with the general conditions. See the order published in the NSW Gazette for full details.

Heritage NSW has information on what to include in an archaeological report on the Heritage NSW website. This provides a guide to information that may be appropriate to include in a testing report.

Discovery of a relic

You **do not** need to notify the Heritage Council if no relics are found. If relics are found, notification of the relic's location under section 146 of the *Heritage Act 1977* is required. As noted in general condition (h):

> "A person who is aware or believes that he or she has discovered or located a relic, in any circumstances (including where works are carried out in reliance on an exception under section 139(4)), must notify the Heritage Council in accordance with section 146 of the *Heritage Act 1977*. Depending on the nature of the discovery, additional assessment and approval under the *Heritage Act 1977* may be required prior to the recommencement of excavation in the affected area(s)."

Having used exception 2(d) the process of section 146 notification should occur within a reasonable time and take the form of an email to the Heritage Council (heritagemailbox@environment.nsw.gov.au) identifying that the relic was discovered when relying on the exception referred to above and providing:

- the GPS location of the relic,
- a photograph of the relic in its location (for context), and
- a short summary of the test excavation results (no more than 500 words).

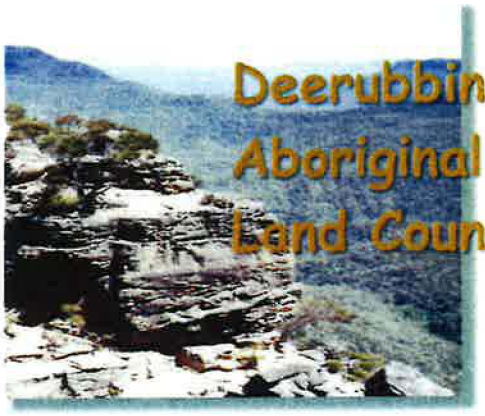
No formal acknowledgment of the notification will be provided.

If the test excavation identifies that further archaeological work is required, e.g. a salvage excavation, then a section 140 excavation permit may be necessary. See the s140 information on the Heritage NSW website. We recommend you submit any documentation relating to the exception, such as your completed Record of Use, with your application.

Version no. 1

Publication/copyright date
2022

Appendix E
Deerubbin LALC Survey Report



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RPS Group
Level 13, 255 Pitt Street
SYDNEY NSW 2000

Our Ref: 3342

26 April 2022

SUBJECT: PROTECTION OF ABORIGINAL CULTURAL HERITAGE

Parramatta Light Rail Stage 2

Attention: Bengi Selvi- Lamb - Heritage Consultant

Arepresntative of Deerubbin Local Aboriginal Land Council inspected section of Stage Light Rail Parramatta from Olympic Pk to Rosehill on Monday, 24 January 2022. An Aboriginal cultural heritage assessment was undertaken to evaluate the likely impact the proposed development has on the cultural heritage of the land.

Although no Aboriginal cultural materials (in the form of stone artefacts, for example) had been located on the surface during the assessments of the study area, Deerubbin Local Aboriginal Land Council, recommends, that the route be further investigated due to the proximity of a major waterway.

Yours Faithfully,

S Randall

(Steven Randall
Aboriginal Cultural Heritage Officer)

C.c. Barry Gunther – Office of Environment & Heritage