BOTANY RAIL DUPLICATION

TECHNICAL REPORT

Technical Report 10 – Aboriginal Archaeological Survey Report

Botany Rail Duplication

Aboriginal Archaeological Survey Report

Report to ARTC

September 2019

artefact

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EXECUTIVE SUMMARY

Artefact Heritage Services Pty Ltd (Artefact Heritage) have been engaged by Gateway to Sydney Joint Venture (G2SJV) on behalf of the Australian Rail Track Corporation (ARTC) to prepare an Aboriginal Archaeological Survey Report (ASR) for the proposed Botany Rail Duplication (the project). The project would involve constructing a new second track within the existing rail corridor for a distance of about three kilometres. This section of line would be converted from one track to two tracks. In addition, some sections of the existing single track would be moved (slewed) sideways. The project would also involve works to four existing rail bridges in this section to provide for the new second track. This ASR will be used to inform an Environmental Impact Statement (EIS) completed in accordance with the Secretary's Environmental Assessment Requirements (SEARs) Application Number SSI 18_9714.

For the purposes of this report, the study area is defined as the project's construction footprint, including compound sites and crane pads. The study area is located approximately eight kilometres south of the Sydney central business district, in the suburb of Botany, within the Bayside Local Government Area (LGA).

A previous Aboriginal heritage assessment of the project was completed by Kelleher Nightingale Consulting (KNC) (2018), however the extent of the study area has been increased since the completion of that assessment. The current study area includes an additional 452 metre length of the Botany Rail Line located south of the corner of Ellis Street and Banksia Street, Botany. This report is a standalone assessment that utilises some of the results from the KNC survey as well as additional research, site work and consultation subsequently conducted by Artefact.

This assessment found that no Aboriginal archaeological sites or areas of Potential Archaeological Deposit (PAD) are located within the study area.

It is therefore recommended that:

- no further assessment is required as no known Aboriginal objects or areas of PAD will be impacted by the project
- an unexpected finds policy be implemented, with the following conditions:
  - Stop work within the affected area, protect the potential archaeological find, and inform environment staff or supervisor.
  - Contact a suitably qualified archaeologist to assess the potential archaeological find.
  - If Aboriginal archaeological material is identified, works in the affected area should cease, and the Office of Environment and Heritage (OEH) should be informed. Further archaeological mitigation may be required prior to works recommencing.
  - If human remains are found:
    - immediately cease all work at the particular location
    - notify site manager and project archaeologist
    - notify NSW Police
    - notify DECCW's Environment Line on 131 555 as soon as practicable and provide available details of the remains and their location
    - not recommence any work at the location until cleared.

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ABBREVIATIONS

AHC	Australian Heritage Council
AHIP	Aboriginal Heritage Impact Permit
AHIMS	Aboriginal Heritage Information Management Systems
AHMP	Aboriginal Heritage Management Plan
ALR Act	*Aboriginal Land Rights Act 1983*
Artefact Heritage	Artefact Heritage Services Pty Ltd
ASR	Aboriginal Survey Report
BP	Before Present (that is 1950)
CHAR	Cultural Heritage Assessment Report
CHL	Commonwealth Heritage List
Code of Practice	Code of Practice for Archaeological investigation of Aboriginal Objects in New South Wales
Commonwealth Act	*Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
Consultation Requirements	Aboriginal cultural heritage consultation requirements for proponents 2010
DA	Development Application
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change & Water
DLO	Darug Land Observations
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Act 1999*
GPS	Global Positioning System
Guide	Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Areas
MDP	Major Development Plan
MNES	matters of national environmental significance
NHL	National Heritage List

NPW Act	*National Parks and Wildlife Act 1974*
NTSCorp	Native Title Service Provider for Aboriginal Traditional Owners in New South Wales and the Australian Capital Territory
OEH	Office of Environment and Heritage
PAD	potential archaeological deposit
RAP	Registered Aboriginal Party

1.0 INTRODUCTION

1.1 Overview

Artefact Heritage Services Pty Ltd (Artefact Heritage) have been engaged by the Gateway to Sydney Joint Venture (G2SJV) on behalf of the Australian Rail Track Corporation (ARTC) to prepare an Archaeological Survey Report (ASR) for the proposed Botany Rail Duplication (the project).

Port Botany is one of Australia and NSW's most important infrastructure assets, with Port Botany the second largest container port in Australia, and NSW's largest bulk liquid and gas port and only container port.

The amount of container freight handled by Port Botany is predicted to significantly increase. The Australian and NSW Governments have identified clear objectives to increase the share of this freight that is moved by rail. Transporting more freight to and from Port Botany by rail will place additional demands on the existing Botany freight rail line (the Botany Rail Line), with freight that cannot be accommodated on rail placing demands on the surrounding congested road network.

ARTC proposes to upgrade and duplicate a section of the Botany Rail Line between Mascot and Botany to increase rail freight capacity to Port Botany.

As State Significant Infrastructure (SSI), the project requires approval from the NSW Minister for Planning under Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This report has been prepared as part of the Environmental Impact Statement (EIS) for the project. The EIS has been prepared to support the application for approval of the project and address the environmental assessment requirements of the Secretary of the Department of Planning and Environment, the Secretary's Environmental Assessment Requirements (SEARs), issued on 21 December 2018.

The majority of the study area was previously assessed as part of a study commissioned by Roads and Maritime Services undertaken by Kelleher Nightingale Consultants in 2018 (KNC 2018). The KNC assessment concluded that the portion of the current study area they assessed was of nil-low archaeological potential and no Aboriginal sites, objects or areas of Potential Archaeological Deposit (PAD) were identified.

On 18 July 2018, Vanessa Edmonds (Principal, Artefact Heritage) and Adele Zubrzycka (Senior Heritage Consultant, Artefact Heritage) completed a preliminary site visit of the current study area. Representatives of the Local Aboriginal Land Councils (LALCs) were not present for this site visit. Subsequently, a second site inspection was completed by Vanessa Edmonds and Selina Timothy (Site Officer, Metropolitan LALC) on 8 November 2018. This site visit confirmed the results of the KNC site survey and did not identify any intangible cultural heritage values.

An additional area of the existing rail corridor was included as part of the overall project study area to accommodate project infrastructure and a proposed construction compound to the south of Banksia Street, Botany. This area was surveyed on 6 May 2019 by Artefact Heritage. Although the La Perouse LALC were invited to attend the site survey, they were unavailable, but provided verbal comment that the area was unlikely to have Aboriginal archaeological values due to disturbance.

This report is a standalone assessment of the Botany Rail Duplication study area that incorporates the results of the field survey completed by KNC, additional fieldwork by Artefact Heritage and assessment of the additional section of rail corridor to the south of Banksia Street.

1.2 The project

1.2.1 Key features

The project would involve construction and operation of a new second track predominately within the existing ARTC rail corridor for a distance of about three kilometres between Mascot and Botany. This section of the existing Botany Rail Line would be converted from one track to two parallel tracks. The proposed new second track would be located on the southern side of the existing track for the length of the duplication. Some sections of the existing single track would also be upgraded with sections proposed to be moved sideways (slewed) within the rail corridor to make room for the new second track. The key features of the project are shown in Figure 1.1.

The project would also involve upgrading existing rail bridges to meet necessary standards and provide for the new second track as well as other ancillary infrastructure upgrades such as signalling and drainage.

It is noted that the project scope described in this chapter is based on the level of design development which has occurred to date. Detailed design would include further engineering, construction planning and detailed assessment work, and would be subject to further input from key stakeholders and the community.

Further information on the project is provided in Chapter 7 of the EIS.

1.2.2 Location

The project is generally located within the rail corridor for the Botany Line, about eight kilometres south of the Sydney central business district, in the suburbs of Mascot, Botany and Pagewood. The north-western extent of the study area is located in the vicinity of Qantas Drive, south of Coward Street in Mascot. The south-eastern extent of the project is located just to the north of the Stephen Road bridge in Botany.

The rail corridor is owned by the NSW Government (RailCorp) and leased to ARTC.

1.2.3 Study area

For the purposes of this report, the study area is defined as the project's construction footprint, including compound sites and crane pads. The location of the study area is shown in Figure 1.2.

The study area falls within the Bayside Local Government area (LGA). The southern half of the study area falls within the boundaries of the La Perouse Local Aboriginal Land Council (LALC) and the northern half is within the boundaries of the Metropolitan LALC. The study area is situated within the County of Cumberland and the Parish of Botany.

A previous Aboriginal heritage assessment of the project was completed by KNC (2018), however the extent of the study area has been increased since the completion of that assessment. The current study area includes an additional 452-metre length of the Botany Rail Line located south of the corner of Ellis Street and Banksia Street, Botany (Figure 1.3).

1.2.4 Timing

Subject to approval of the project, construction is planned to start at the end of 2020, and is expected to take about three years for the main construction works to be undertaken. Construction is expected to be completed in late 2023 with commissioning activities undertaken in early 2024.

It is anticipated that some features of the project would be constructed while the existing rail line continues to operate. Other features of the project would need to be constructed during programmed weekend rail possession periods when rail services along the line cease to operate.

During possession periods, and potentially during other times, out-of-hours work (work during weekends, mornings and at night) is likely to be required for safety reasons (to enable work to be undertaken at times trains do not operate along the line), and to minimise disruption to rail and road operations and access to Sydney Airport.

At this stage, it is assumed that construction activities would also intrude the Sydney Airport Obstacle Limitation Surface (OLS). It is assumed that these activities would be required to be undertaken outside the operational hours of Sydney Airport (between 11pm and 6am). Where work is required to be undertaken outside of this time, it is expected that ARTC and the construction contractor would consult with Sydney Airport to seek relevant approval exemptions and crane permits (as required).

1.2.5 Operation

The project would allow trains to run in both directions along the length of the Botany Rail Line. The project would include bi-directional signalling for the tracks within the study area to provide flexibility for operations. The design of the project (including signalling) allows for the operation of trains typically up to 1,300 metres in length, operating at speeds of up to 50 kilometres per hour.

It is estimated that once operational, 38 trains (or about six trains per hour) would travel along the line in 2025.

Operation of the Botany Rail Line would continue to be managed by ARTC. Trains would be operated by a variety of operators.

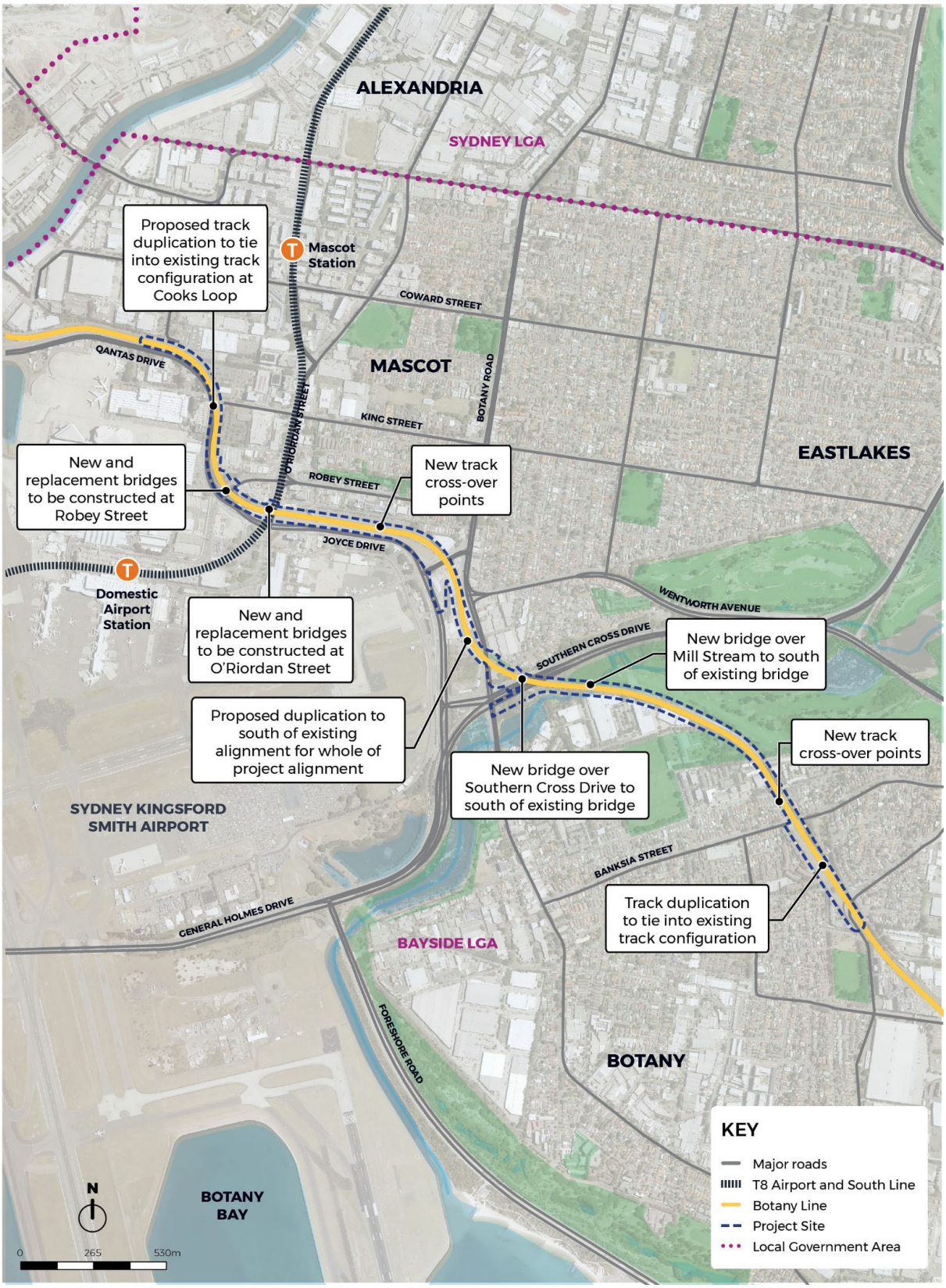

Figure 1.1. Key features and location of the project. Source. WSP

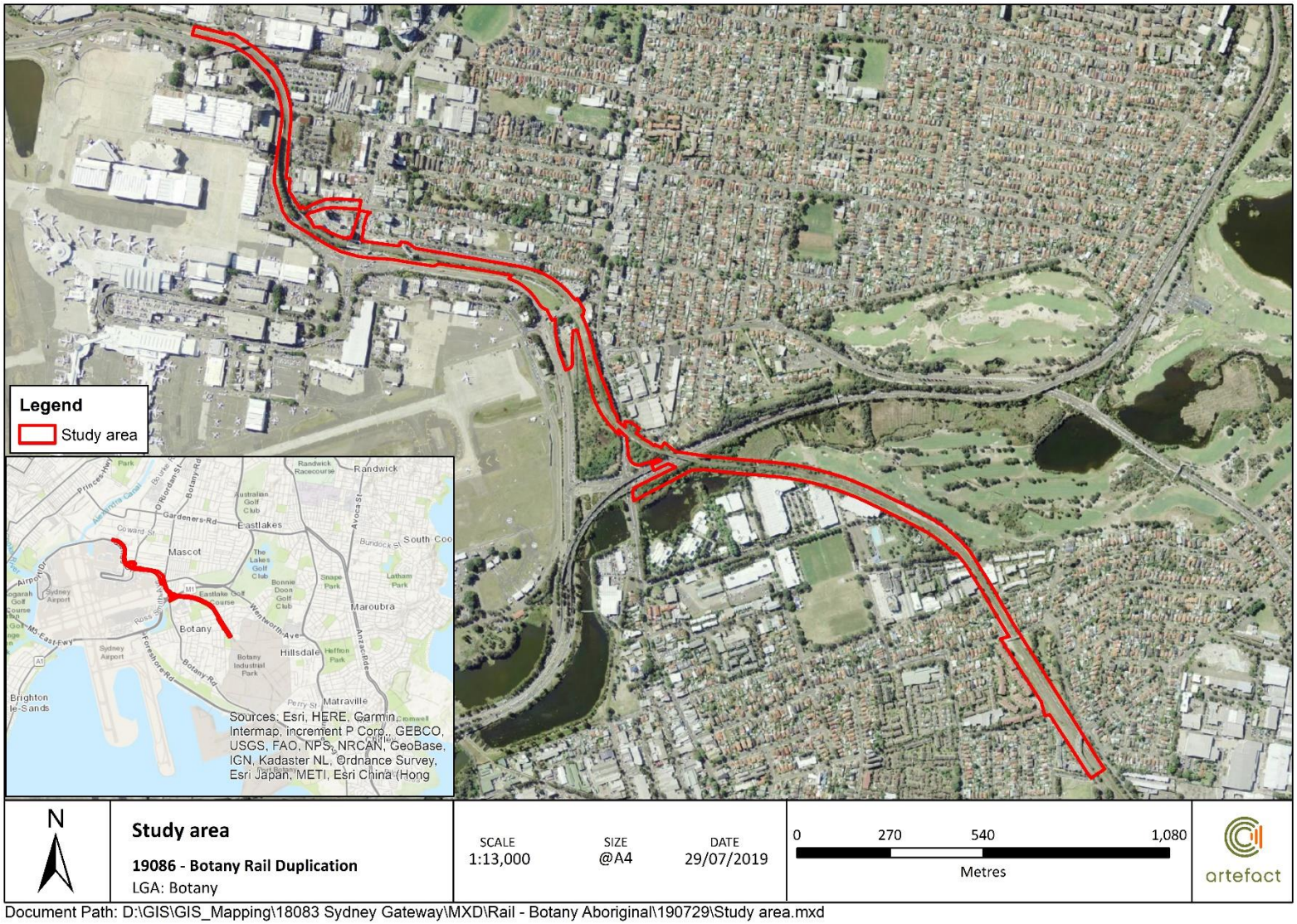

Figure 1.2. Location of the study area

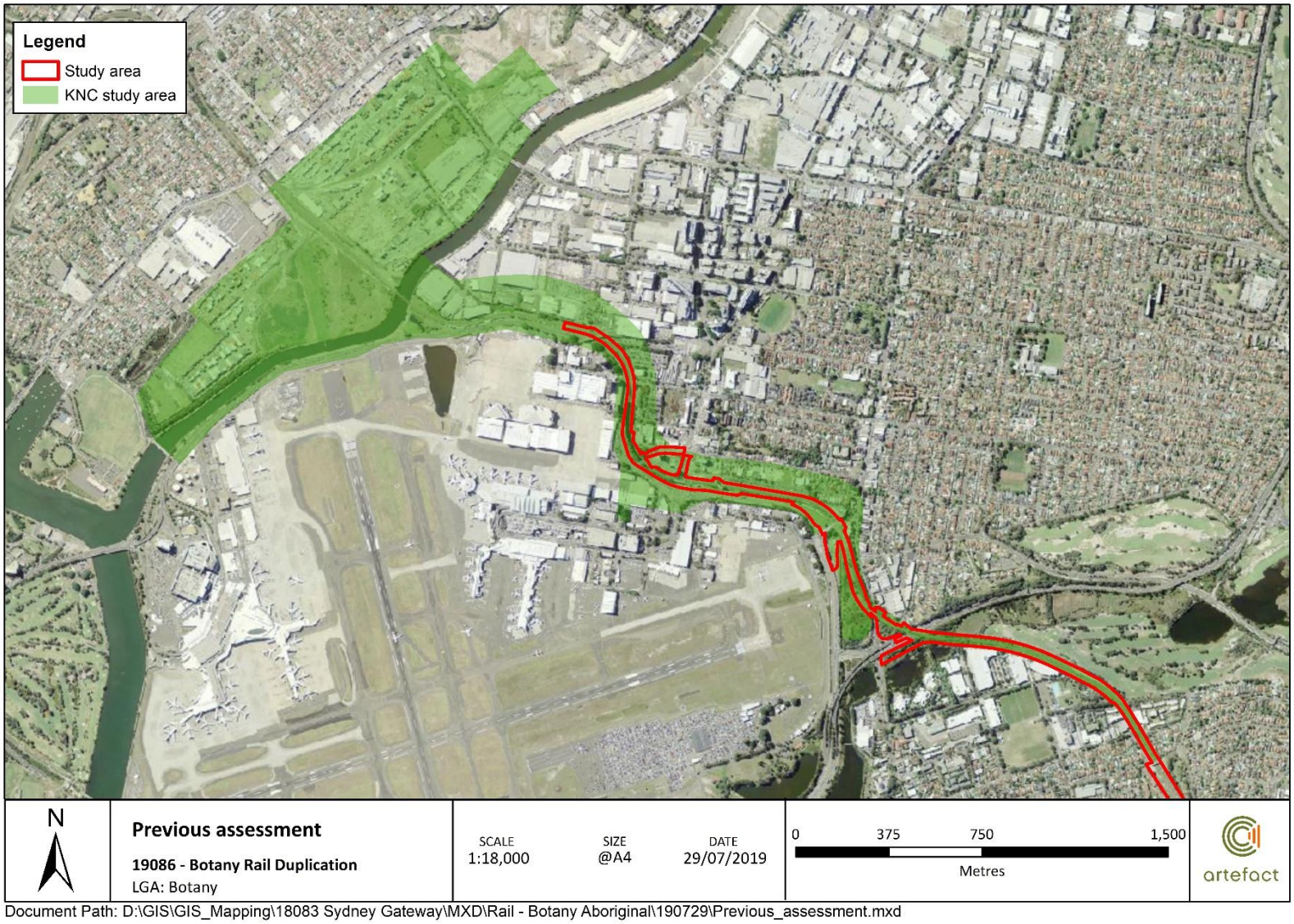

Figure 1.3: KNC 2018 survey area (indicative – based on overlays)

1.3 Purpose and scope of this report

The purpose of this ASR is to assess the potential Aboriginal heritage impacts resulting from construction and operation of the project.

The objectives of this report are to:

- describe the existing environment with respect to Aboriginal heritage
- assesses the impacts of constructing and operating the project on identified Aboriginal cultural heritage values
- recommend measures to mitigate the impacts to the identified Aboriginal cultural heritage values

This report also addresses the relevant SEARs (as outlined in Table 1.1).

Table 1.1: SEARs relevant to this assessment

Requirements	Where addressed in this report
4. Heritage	
1. The Proponent must identify and assess any direct and/or indirect impacts (including cumulative impacts and visual impacts) to the heritage significance of: (a) Aboriginal places and objects, 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 (b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan.	Section 2.3.2 Outlines search for gazetted Aboriginal Places Section 2.2.3 States that there are no CHL listed or NHL listed places in the study area Section 2.3.1 Notes that there are no LEP listed Aboriginal heritage items within the study area Section 4.3 Notes that no registered Aboriginal sites are located within the study area Section 5.0 After the completion of the survey, it was found that no Aboriginal places or objects are located within the study area Section 6.0 Notes that the study area is of no archaeological significance as there are no Aboriginal places or objects. Section 7.0 Notes that no Aboriginal places or objects where identified within the study area. Therefore, there will be no direct and/or indirect impacts (including cumulative impacts and visual impacts) to Aboriginal heritage.
3. 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).	Archaeological excavations are not required as no areas of Aboriginal archaeological potential were identified.

Requirements	Where addressed in this report
4. Where impacts to Aboriginal objects and/or places are proposed, consultation must be undertaken with Aboriginal people in accordance with the current guidelines.	No Aboriginal objects or places were identified in the study area, and initial consultation with the LALC representatives indicated there are no intangible or archaeological values associated with the study area that would be impacted by the project. As such, no further consultation was undertaken as part of this assessment.

1.4 Methodology

This ASR has been prepared in accordance with:

- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b). (the Code of Practice)
- The interests of the Aboriginal stakeholder groups
- The likely impacts of the proposed development
- SEARs SSI 18_9714.
- The Australia ICOMOS Burra Charter

To meet the SEARs SSI 18_9714 (Key issue 5 Requirement 3), this assessment has been completed in accordance with Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b). SEARs SSI 18_9714 also lists the following statutory guidelines:

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011) (the Guide)
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (Department of Environment Climate Change and Water [DECCW] 2010a) (the Consultation Requirements)

In accordance with the SEARs SSI 18_9714 (Key issue 5 Requirement 4) further investigation under the Guide and the Consultation Requirements is only required where impacts to Aboriginal objects or places is proposed. Therefore, these guidelines are not relevant to this investigation, and will only be applicable if this assessment identifies that Aboriginal objects or places will be impacted by the proposed works.

No human remains, Aboriginals sites or objects were identified in this assessment, and as such there are no impacts to Aboriginal heritage are expected as a result of the project. Given no impacts to Aboriginal sites, objects or places have been identified, the following guidelines listed in SEARs SSI18_9714 are not relevant to this assessment:

- NSW Skeletal Remains: Guidelines for Management of Human Remains (Heritage Office, 1998)
- Aboriginal site recording form
- Aboriginal site impact recording form
- Aboriginal Heritage Information Management System site registration form
- Care agreement application form.

1.5 Structure of this report

The purpose of this report is to document the results of an investigation of Aboriginal archaeology within the study area. As such, the structure of this report includes:

- Section 1 – Introduction
- Section 2 – Legislative and policy context: outlines relevant Commonwealth and State legislation for this assessment
- Section 3 – Environmental context: provides an overview of the environmental conditions to provide context for the predictive model
- Section 4 – Archaeological context: presents the results of the background ethnohistoric and literature research and database searches. This section also presents a predictive model as background to the survey sampling strategy
- Section 5 – Archaeological survey: presents the methodology and results of the Aboriginal archaeological survey
- Section 6 – Analysis and discussion: contextualises the results of the background research and the survey in the local and regional archaeological contexts
- Section 7 – Significance assessment: assessment of the archaeological (scientific) significance of the study area
- Section 8 – Impact assessment: discussion of how the proposed works will impact the archaeological value of the study area
- Section 9 – Mitigation measures: recommendations for further works
- Section 10 – Recommendations: summary of recommendations and mitigation measures
- Section 11 – References
- Section 12 – Glossary

1.6 Limitations

Only the provided study area was surveyed for Aboriginal objects and sites. Areas outside the study area were not assessed for Aboriginal objects or archaeological potential. This report has been completed in accordance with the Code of Practice and does not include Aboriginal stakeholder consultation or an assessment of cultural heritage values. Aboriginal stakeholder consultation and cultural heritage values would be documented in a separate report in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011).

1.7 Personnel

This ASR was prepared by Ryan Taddeucci (Senior Heritage Consultant, Artefact Heritage) in accordance with SEARs SSI 18_9714 and Code of Practice. A technical review was undertaken by Sandra Wallace (Managing Director, Artefact Heritage). Staff qualifications are presented in Table 1.2.

Table 1.2: Staff and qualifications

Name	Position/Role on project	Qualifications	Years' experience
Ryan Taddeucci	Senior Heritage Consultant Author of this ASR	Master of Museum Studies Bachelor of Arts (Honours)	7
Sandra Wallace	Managing Director Review and quality compliance	PhD (Archaeology) Bachelor of Arts (Honours)	15
Jennifer Norfolk	Heritage Consultant Mapping	Master of Science	6

2.0 LEGISLATIVE AND POLICY CONTEXT

2.1 The World Heritage Convention

The Convention Concerning the Protection of World Cultural and National Heritage (the World Heritage Convention) was adopted by the General Conference of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) on 16 November 1972, and came into force on 17 December 1975. The World Heritage Convention aims to promote international cooperation to protect heritage that is of such outstanding universal value that its conservation is important for current and future generations. It sets out the criteria that a site must meet to be inscribed on the World Heritage List (WHL) and the role of State Parties in the protection and preservation of world and their own national heritage.

The concept of a buffer zone was first included in the Operational Guidelines for the Implementation of the Wold Heritage Convention in 1977 and recognises the value of the environment that surrounds a site. The buffer zone acts as an additional layer of protection for World Heritage sites. It is a space that is itself not of outstanding universal value, but that influences the value of a World Heritage site.

There are no heritage items listed on the World Heritage List within or in study area.

2.2 Commonwealth heritage legislation and guidelines

2.2.1 Airports Act 1996 and associated regulations

The study area includes areas of Commonwealth-owned land leased by Sydney Airport Corporation Limited. The *Airports Act 1996* (the Airports Act) and associated regulations provide the assessment and approval process for development on Commonwealth-owned land leased from the Australian Government for the operation of Sydney Airport.

Section 89 of the Airports Act specifies types of development that constitute ‘major airport development’. A major development plan (MDP) approved by the Australian Minister for Infrastructure and Transport is required before major airport development can be undertaken at a leased airport.

The Airports Act and regulations are the statutory controls for ongoing regulation of development activities on Commonwealth-owned land leased from the Australian Government for the operation of Sydney Airport. Section 70 of the Airports Act requires there is a final master plan for the airport that has been approved by the Australian Minister for Infrastructure and Transport and that any major airport development must be consistent with the master plan.

Part 5 of the Act also requires that each airport develop an environment strategy which is included in its master plan. Once approved, Sydney Airport and all persons who carry out activities at the airport are obliged to take all reasonable steps to ensure compliance with the environment strategy.

The consistency of the project with the Airports Act and associated master plan and environment strategy is provided in Section 7.0.

2.2.2 Airports (Environment Protection) Regulations 1997

The objective of the Airports (Environmental Protection) Regulations 1997 (the regulations) is to establish a system of regulation for activities at airports that generate or have potential to generate pollution or excessive noise. The regulations impose a general duty to prevent or minimise environmental pollution and have as one of their objects the promotion of improved environmental

management practices at Commonwealth-leased airports. The regulations contain detailed provisions setting out:

- Definitions, acceptable limits and objectives for air, water and soil pollution, and offensive noise
- General duties to prevent or minimise pollution, preserve significant habitat and cultural areas, and to prevent offensive noise
- Monitoring and reporting requirements for existing pollution

Regulations related to Aboriginal heritage are specified in Part 4, Division 2, Section 4.04:

> *The operator of an undertaking at an airport must take all reasonable and practicable measures to ensure that, in the operation of the undertaking, and in the carrying out of any work in connection with the undertaking:*
>
> *there are no adverse consequences for existing aesthetic, cultural, historical, social and scientific (including archaeological and anthropological) values of the local area; and*
>
> *there are no adverse consequences for sites of indigenous significance on the airport site.*

The consistency of the project with the Airports Act and associated master plan and environment strategy is provided in Section 7.0.

2.2.3 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) is administered by the Australian Department of the Environment and Energy and provides a legal framework to protect and manage nationally important flora, fauna, ecological communities and heritage places defined as 'matters of national environmental significance' (MNES).

Under the EPBC Act, proposed actions (i.e. activities or projects) with the potential to significantly impact matters protected by the EPBC Act must be referred to the Australian Minister for the Environment to determine whether they are controlled actions, requiring approval from the Minister. The following matters are defined as protected matters by Part 3 of the EPBC Act:

- Matters of national environmental significance
- The environment of Commonwealth land
- The environment in general if they are being carried out by an Australian Government agency.

The EPBC Act (s160 (1) and (2c)) requires advice to be sought and considered from the Minister for the Environment and Energy prior to a decision being made on the approval of an Major Development Plan (MDP). If significant impacts are considered likely on any matter of national environmental significance, and the action is deemed to be a controlled action, then the referral to the Environment Minister will proceed to environmental assessment and approval under the EPBC Act.

The EPBC Act includes 'national heritage' as a matter of National Environmental Significance and protects listed places to the fullest extent under the Constitution. It also establishes the National Heritage List (NHL) and the Commonwealth Heritage List (CHL).

There are no CHL listed or NHL listed places in the study area.

2.2.4 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cwlth) (ATSIHP Act), deals with Aboriginal cultural property (intangible heritage) in a wider sense. Such intangible heritage includes any places, objects and folklore that 'are of particular significance to Aboriginals in accordance with Aboriginal tradition'. These values are not currently protected under the *National Parks and Wildlife Act 1974* (NPW Act).

There is no cut-off date and the ATSIHP Act may apply to contemporary Aboriginal cultural property as well as ancient sites. The ATSIHP Act takes precedence over state cultural heritage legislation where there is conflict. The Commonwealth Minister who is responsible for administering the ATSIHP Act can make declarations to protect these areas and objects from specific threats of injury or desecration. The responsible Minister may make a declaration under section 10 of the ATSIHP Act in situations where state or territory laws do not provide adequate protection of intangible heritage.

Where an Aboriginal individual or organisation is concerned that intangible values within the proposal are not being adequately protected they can apply to the Minister for a declaration over a place. No intangible places were identified during the heritage investigations undertaken for the study area.

2.2.5 Native Title Act 1993

The main purpose of the *Native Title Act 1993* is to recognise and protect native title. Native title is the rights and interests in land and waters that Aboriginal and Torres Strait Islanders have under their traditional laws and customs.

The following list is indicative of the type of land, which might be subject to native title;

- Vacant Crown land and any other public or Crown lands including oceans and inland waterways, beaches and foreshores, State forests, national parks and public reserves
- Pastoral leases
- Land held by government agencies
- Land held in trust for Aboriginal communities.

Under the amended *Native Title Act 1993*, native title is extinguished by the following;

- Private freehold land, valid grants of private freehold land or waters
- Residential, commercial or exclusive possession leases
- Mining dissection leases
- Community purpose leases (eg religious, sporting or charitable purposes)
- Scheduled interests that give exclusive possession
- Public works (eg schools, public amenities, hospitals etc.).

Section 24KA of the *Native Title Act 1993*, requires that native title claimants are notified of any 'future act' which may result in a change in land use for Crown lands affected by claims. 'Future act' is defined in section 233 of the Act as a proposed activity or development on land and/or waters that may affect native title, by extinguishing (removing) it or creating interests that are inconsistent with the existence or exercise of native title. If after one month there was no response then the proponent will be deemed to have fulfilled their obligations under the Act.

There are no Native Title claims currently registered in the study area.

2.3 State legislation

2.3.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the framework for cultural heritage values to be formally assessed in the land use planning, development assessment and environmental impact assessment processes. The EP&A Act consists of three main parts of direct relevance to Aboriginal cultural heritage; Part 3 which governs the preparation of planning instruments, Part 4 which relates to development assessment processes for local government (consent) authorities, and Part 5 which relates to activity approvals by governing (determining) authorities.

Part 3, Division 3.4 deals with the development of Local Environmental Plans (LEPs). Planning decisions within Local Government Areas (LGAs) are guided by LEPs. Each LGA is required to develop and maintain an LEP that includes Aboriginal and historical heritage items which are protected under the EP&A Act and the *Heritage Act 1977*. The study area is located within the boundaries of the Bayside LGA and is covered by the Botany Bay LEP. No Aboriginal heritage items listed on ether LEP are located within the study area.

The project is assessed under Division 5.2 of the EP&A Act, which establishes an assessment and approval regime for SSI. An EIS has been prepared to assess the impacts of the project, in accordance with requirements issued by the Secretary of the Department of Planning and Environment (DP&E).

2.3.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by the Office of Environment and Heritage (OEH) provides statutory protection for all Aboriginal 'objects' (consisting of any material evidence of the Aboriginal occupation of NSW) under section 90 of the NPW Act, and for 'Aboriginal Places' (areas of cultural significance to the Aboriginal community) under section 84.

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

There are no gazetted Aboriginal Places in the study area. All Aboriginal objects, whether recorded or not are protected under the NPW Act.

The NPW Act was amended in 2010 and as a result the legislative structure for seeking permission to impact on heritage items has changed. A section 90 permit is now the only Aboriginal Heritage Impact Permit (AHIP) available and is granted by the OEH. Various factors are considered by OEH in the AHIP application process, such as site significance, Aboriginal consultation requirements, Ecological

Sustainable Development (ESD) principles, project justification and consideration of alternatives. The penalties and fines for damaging or defacing an Aboriginal object have also increased.

The project is being assessed as SSI under Division 5.2 of the EP&A Act 1979, and under section 5.23 of the EP&A Act, permits issued under the NPW Act 1974 are not required.

2.3.3 Native Title Act 1994

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

There are no registered Native Title claims identified for the study area.

2.3.4 Aboriginal Lands Right Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) established Aboriginal Land Councils (at State and Local levels). Under Division 1A section 52(4) of the ALR Act these bodies have a statutory obligation to:

> *(a) take action to protect the culture and heritage of Aboriginal persons in the council's area, subject to any other law, and*
>
> *(b) promote awareness in the community of the culture and heritage of Aboriginal persons in the council's area.*

There are no Registered Aboriginal Owners pursuant to Division 3 of the ALR Act for the study area. The study area is within the boundary of the La Perouse LALC.

2.4 Relevant guidelines and procedures

As part of the administration of Part 6 of the NPW Act, OEH has produced a number of regulations pertaining to Aboriginal heritage:

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011)
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (Department of Environment Climate Change and Water [DECCW] 2010a)
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b).

For environmental assessments under the EPBC Act:

- Engage Early: Guidance for proponents on best practice Indigenous engagement (Department of Environment 2016)

To meet the SEARs SSI 18_9714, this assessment has been completed in accordance with Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales. Other guidelines and regulations are not relevant to this investigation.

2.4.1 Sydney Airport Master Plan 2039 and Environment Strategy 2019-2039

As part of the planning framework established by the Airports Act, airport operators are required to prepare a master plan for the coordinated development of their airport. Sydney Airport Master Plan 2039 (Master Plan 2039) outlines the strategic direction for Sydney Airport's operations and development over the next 20 years. It acknowledges that the continued growth of Sydney Airport is vital to achieving local, state and national employment, tourism and development objectives. In accordance with the requirements of the Airports Act, Master Plan 2039:

- Establishes the strategic direction for efficient and economic development at Sydney Airport over the planning period
- Provides for the development of additional uses of the Sydney Airport site
- Indicates to the public the intended uses of the Sydney Airport site
- Reduces potential conflicts between uses of the Sydney Airport site, to ensure that uses of the site are compatible with the areas surrounding the airport
- Ensures that operations at Sydney Airport are undertaken in accordance with relevant environmental legislation and standards
- Establishes a framework for assessing compliance with relevant environmental legislation and standards
- Promotes continual improvement of environmental management at Sydney Airport.

The Master Plan 2039 includes the following relevant heritage initiatives:

- Conserve the significant places of the airport, in line with the Heritage Management Plan
- Actively conserve heritage elements listed as Environmentally Significant under the Airports Act
- Deliver and continually build upon the online experience centre, to tell the history of the airport site, detail its significance and its aviation history
- Integrate heritage interpretation devices into new and existing Sydney Airport facilities, through delivery of an interpretation strategy
- Ensure that heritage items of recognised significance are recorded to an appropriate archival standard
- Establish an archive of historical records of the history of Sydney Airport and the site
- Implement the management plan for the fig trees and the Sydney Airport Wetlands, located in the South East Sector

2.4.2 Sydney Airport Environment Strategy 2019-2024

The Airports Act requires that airport operators provide an assessment of the environmental issues associated with implementing the airport master plan and the plan for dealing with those issues. This is documented in an environment strategy that forms part of the airport's master plan. The Sydney Airport Environment Strategy 2019-2024 (the Environment Strategy), which forms part of Master Plan 2039, provides strategic direction for the environmental performance and management of Sydney Airport for the five-year period between 2019 and 2024. The purpose of the Environment Strategy is to:

- Establish a framework for assessing compliance and ensuring that all operations at Sydney Airport are undertaken in accordance with relevant environmental legislation and standards
- Promote the continual improvement of environmental management and performance at Sydney Airport and build on the achievements and goals of previous strategies
- Realise improvements in environmental sustainability, by minimising Sydney Airport's environmental footprint and working towards a more efficient and resilient airport.

The Sydney Airport Environment Strategy 2019-2024 stipulates that heritage must be appropriately considered and managed. This ASR has been prepared in accordance with this requirement.

3.0 ENVIRONMENTAL CONTEXT

3.1 Vegetation

It is likely that vegetation around the study area would have comprised a combination of Coastal Dry Sclerophyll Forest and Coastal Heaths (Keith 2004). The Dry Sclerophyll Forest grows on sandstone landscapes in areas below 700 metre elevation, where rainfall average varies from 1,000 to 1,300 millimetres (Keith 2004:146). This vegetation type encompasses a wide range of related forest and woodland communities. The eucalypt canopy includes Sydney Red Gum, Red Bloodwood and Sydney Peppermint, Brown Stringybark, Broadleaved Scribbly Gum and Old Man Banksia (Keith 2004:146). The prominent and diverse Sclerophyll Shrub understory is shorter and more open on ridges than in gullies, while the open ground layer is dominated by Sclerophyll Sedges.

The Coastal Heaths generally comprise a small overstory of sparse Red Bloodwood, Heart-leaved Stringybark and Yellow-top Ash (Keith 2004:179). The low shrubby vegetation comprises a diverse array of sclerophyllous genera and is interspersed with an equally rich complement of sedges and herbs, and a small number of grasses. Various plant species within the area were exploited for food, seeds, nectars, fruits, roots and tubers. For example, various species of native lilies with small tuberous roots were collected and eaten (Australian National Botanic Gardens) (Keith 2004).

The flower-cones of the Banksia were soaked in water in bark or wooden containers to extract the nectar to make sweet drinks (Australian National Botanic Gardens). The hearts of the Grass Tree stems were eaten and the nectar from the spike flowers was also collected and eaten. They could also be utilised for making tools such as spears, shafts and handles for stone implements, as well as carrying vessels of bark and woven fibre, digging sticks and a variety of other items utilitarian and non-utilitarian. The dry flower-stems of the smaller Grass Tree species were used for spears (Australian National Botanic Gardens) (Keith 2004).

3.2 Geology

The study area (Figure 3.1) is mainly located on top of Quaternary marine sand deposits of medium to fine-grained marine sand with podsols (‘Qhd’ in Herbert 1983). Leaching of the deposit usually precludes the presence of shell material within the Qhd, and soil profiles above the sands are moderately well developed (Herbert 1983:55). The Qhd sands present within the study area are comprised of dune sands which are generally of Pleistocene age, having formed when sea levels were much lower than the present day (KNC 2018).

The remainder of the study area is located across Quaternary deposits of peat, sandy peat and mud (‘Qhs’ in Herbert 1983). This substrate is the result of sediment deposition through fluvial activity in freshwater swamps. These organic muds and peats are terrestrial deposits formed above the high tide level (Herbert 1983: 66). The shallow drowned estuaries of the Cooks River and Sheas Creek hosted terrestrial swamp environments after sea level stabilisation in the Holocene, which have been reclaimed by historical development (Herbert 1983: 83). Peat from a similar environment within the Lakes Valley (located near Centennial Park and Paddington) was dated at 8,880 ± 200 years BP, indicating that the swampy conditions have existed in these areas for the majority of the Holocene (c. 11,700 years age – present) (KNC 2018). The swampy conditions from this period would have provided Aboriginal people within vital resources for long-term occupation. The Hawkesbury Sandstone around the Cooks River would have provided Aboriginal people with shelter and the surrounding environment would have provided ample materials for tools and other material culture.

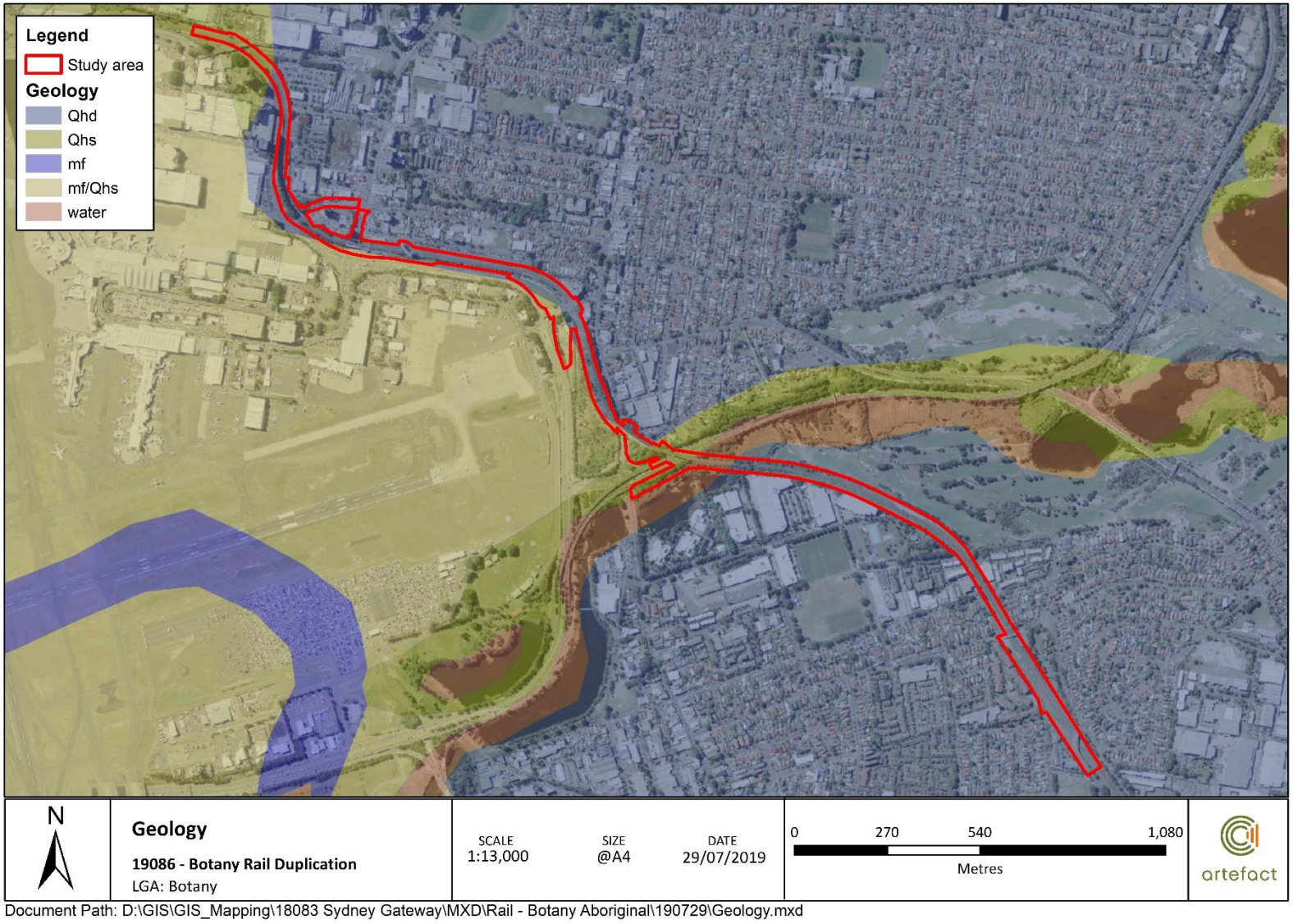

Figure 3.1: Geology landscapes across the study area

3.3 Soils

The study area is mainly located in terrain that was extensively disturbed by historic human activity (disturbed terrain) including the infilling and realignment of Sheas Creek, construction of Alexandra Canal and land reclamation (Figure 3.2). This disturbance also includes the removal of buried soils, landfilling, construction of buildings and clearing of original vegetation.

The remainder of the study area is located within the Tuggerah soil landscape. The Tuggerah soil landscape comprises quaternary (Holocene and Pleistocene [c. 2,588,000 to 11,700 years ago]) wind-blown, fine to medium grained, well sorted marine quartz sand. Prior to European occupation and development, the area would have comprised gently undulating to rolling coastal dune fields. Sand dune systems are considered to be a landform sensitive for the presence of Aboriginal cultural heritage.

3.4 Natural resources

Aboriginal people used different landscapes and resource strategies within their clan territories across the Sydney Basin. Different resources were possibly available seasonally, necessitating movement or trade across the landscape (Attenbrow 2010: 78). Aboriginal people hunted kangaroo and wallaby and snared possums and other small animals and birds for food and skins.

Mammals such as kangaroos and wallabies and arboreal mammals such as possums can be used as a food source and also for tool making. For example, tail sinews were used as a fastening cord, whilst ‘bone points’ which would have functioned as awls or piercers are an often-abundant part of the archaeological record (Attenbrow 2010:118). Ethnographic observations of early European settlers noted that Aboriginal people used a variety of animal parts; claws, talons, bone, skin, teeth, shell, fur and feathers for a variety of tools and non-utilitarian functions

Plants were likewise an important source of nutrition for past Aboriginal peoples with numerous plant species utilised for food, manufacture and medicinal purposes (Attenbrow 2010: 41).

The study area would have provided a variety of resource and suitable climatic conditions for year-round occupation by traditional Aboriginal groups inhabiting the area. The Cooks River and Botany Bay would have provided valuable resources such as fish and shellfish (Attenbrow 2010: 62). The region surrounding the study area would have provided an abundance of native animals and vegetation forming a food source and source of useful materials.

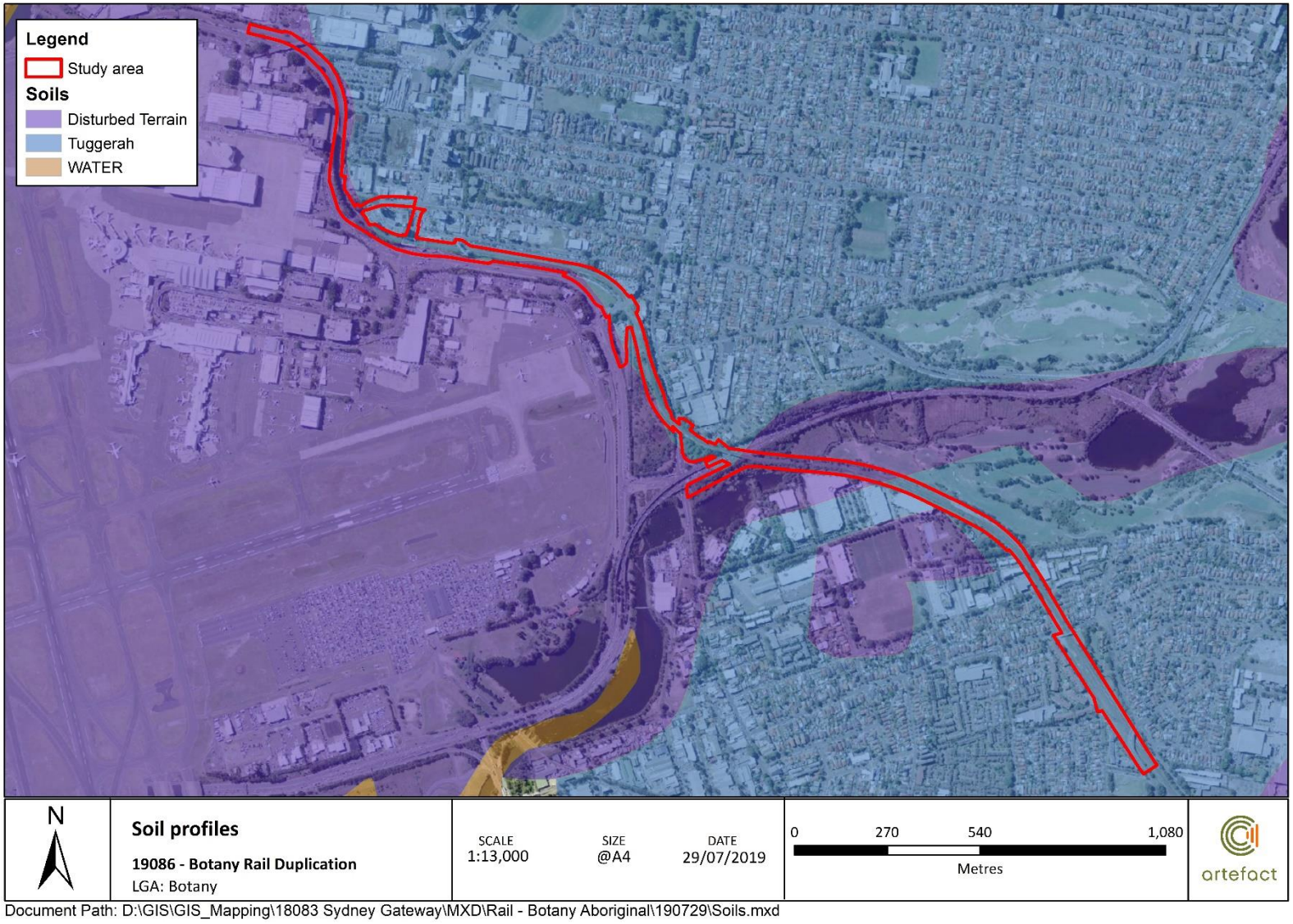

Figure 3.2: Soil profiles of the study area

3.5 Historical land use

Phase 1 - Early occupation and industry (circa 1809-1862)

This historical occupation phase is associated with early European settlement and land grants along the Cooks River, industry and some scattered residential settlement. Early land use comprised timber getting, the collection of shells for lime production, pastoralism and agriculture. Potions of land within the study area remained unoccupied at this time, although informal land use such as timber getting is likely to have taken place in wooded areas.

The study area is located on a 600 acre area of land that was allotted to ex-convict Simeon Lord. Lord's land was formally granted to him in 1823, although he had erected his first mill near the Lachlan Stream in 1815.

Market gardens were first established around Botany and Mascot in the 1830s and became common following the Gold Rush of the 1850s (Larcombe 1970). The majority of market gardens were established between Shea's Creek and O'Riordan Street which acted as a boundary between residential subdivisions to the east and agricultural activity to the west.

Due the area's sandy soils, 'night soils' were often used as a fertiliser. These were generally collected from cesspits and earth closets across Sydney by night soil carters, dumped at a night soil depot near the Victoria Barracks or sold directly to market gardeners (Asset Management and Sydney Water Corporation 2003). Shell from middens and natural deposits were also used to neutralise acid sulphate affected farm soils.

The mid-19th century saw significant changes to land use in and around the study area a result of the 1848 Noxious Industries Act. The Act pushed industries out of the city limits and into Botany, Tempe, St Peters and Mascot and the area was soon being heavily utilized for wool washing, meat works, candle works, leather tanning, paper making, soap making, boiling down works and brick making (Lawrence 2001).

Phase 2 - Residential development, Botany Water Pumping Station and Botany Rail Line development (1858-1925)

In 1852, the Botany Wetlands were chosen as Sydney's third fresh water source under what would be named 'The Botany Scheme'. The Botany Scheme replaced Busby's Bore, which had replaced the Tank Stream (Sydney's first fresh water source) and involved damming the wetlands and directing water downstream to a large pond and pumping station near today's Sydney Airport (Henry 1939). A total of six dams were created as part of the scheme, all of which remain within the landscape today and are shown in Figure 3.3. Although some modifications to the wetlands were required for the dams, Mill and Engine Ponds were not altered for the scheme and therefore represent intact evidence of Lord's early industrial activities in the area.

The scheme was successful for over a decade, however; by 1869 water had become polluted and unreliable. The development of the Upper Nepean Scheme led to the decommissioning of the Botany Pumping Station in 1886. All machinery and boilers were dismantled in 1896 and sold at auction, leaving only the chimney stack. The end of the Botany Scheme was followed by a short industrial renaissance, with factories and wool washing establishments taking over land and waterways once again.

The Botany Rail Line, which runs through the study area, was first planned in 1861 and approved in 1863, however it was not completed until 1925 (Butler 2011). The line followed Botany Road and was designed to carry goods from Sydney's western industrial sites (more specifically a new abattoir in Homebush to tanneries at Botany) to Port Botany (Pollard 1988).

Although partially constructed by 1915, it wasn't until an additional line linking Marrickville to Botany was completed in 1925 that the route was finally opened (Butler 2011). According to Pollard, all culverts and major earthworks were almost completed in 1922 and all steel bridges were completed by 1924 (Pollard 1988).

These included the single line steel girder bridge over Botany Road, a reinforced concrete bridge over O'Riordan Street and a single line wooden trestle bridge over Mill Pond. The O'Riordan Street underbridge was the first reinforced concrete underbridge constructed in NSW (Drew 2002).

The construction of the goods line also required the establishing of a railway embankment to the north of Mill Pond, in a water body referred to in the Botany Wetlands Conservation Management Plan (CMP) as 'New Pond'. New Pond comprises two ponds formed by the construction of a weir along their southern extent and the c.1925 construction of the embankment for the Botany Rail Line.

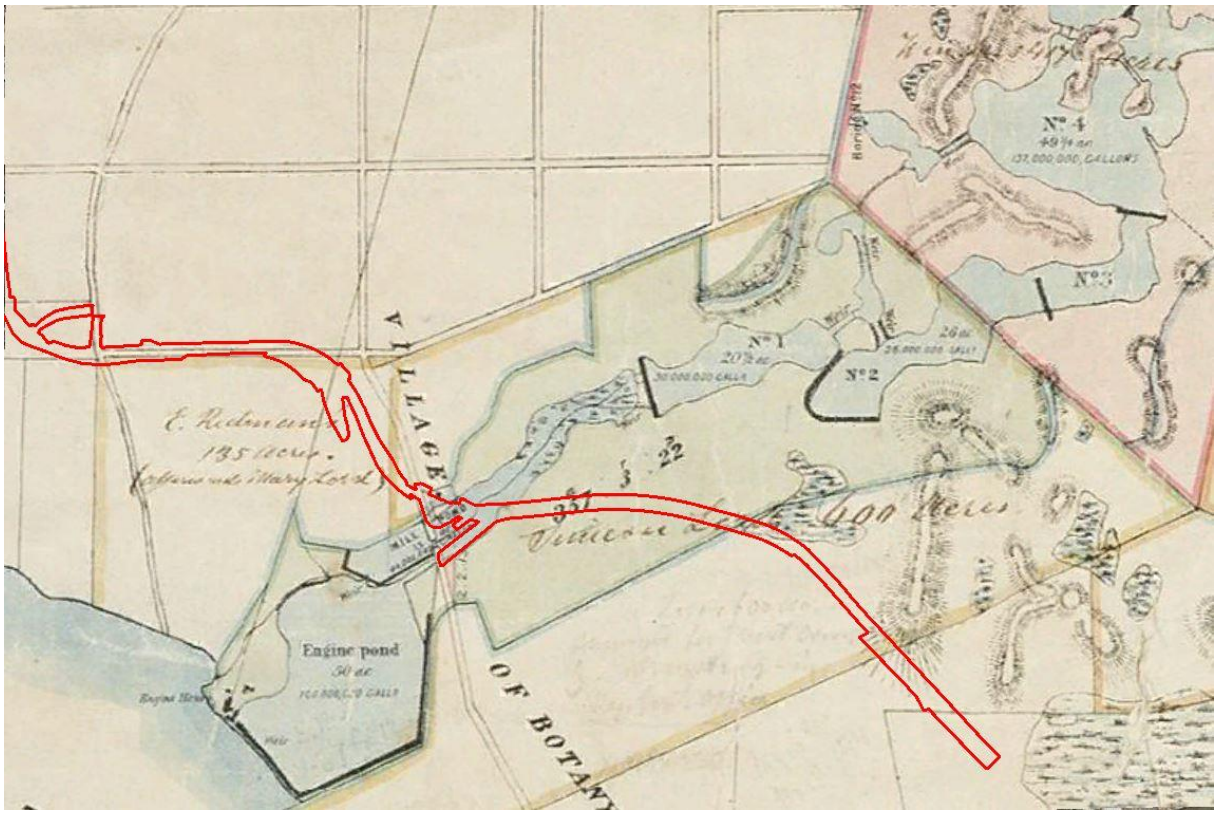

Figure 3.3: 1875 plan of the Botany and Lachlan Watersheds with the study area outlined in red. Source. SLNSW.

Phase 3 - Botany Rail Line and Sydney Airport (1924-1960)

The advent of World War II (WWII) required the airport to expand to nine times its original size. Following the War, it was once again enlarged, this time requiring the resumption of residential subdivisions, farmland, the Sydney sewerage farm and two golf courses (Chaffey 2011).

In 1947 the first phase of alteration of the Cooks River near Tempe Bridge commenced. The works involved the diversion of sewer lines and the construction of the Endeavour Bridge for General Homes Drive Once this was completed the Cooks River had to be diverted to allow for the construction of a new east – west runway. The old section south-east of Alexandra Canal was backfilled with sand (Government Architects Office 2004).

Phase 4 - Post-War development (1960-2002)

In 1960, large scale expansions of Sydney Airport required that a portion of the Botany Rail Line be deviated approximately 100 and 400 metres north of its original alignment between O'Riordan Street and the Alexandra Canal (Pollard 1988, 17). Construction on the north-south runway commenced in 1963, requiring the diversion of Alexandra Canal westwards to provide an additional 800 feet for the runway. The moving of the Canal was completed by 1970.

Prior to 1988, roads to the city from Mascot and Botany were reached via Botany Road or O'Riordan Street. As the suburbs grew and airport expanded, various arterial roads were created to reduce traffic congestion and accommodate the changing shape of the area (Oz Roads).

An increase in container traffic to Port Botany in the 1990s and pre-Olympic Games upgrades to Sydney Airport in 1999 made it necessary to upgrade and duplicate portions of the Botany Rail Line to allow for updated signalling at General Holmes Drive and additional trains. The majority of upgrade works took place outside of the study area, to the west.

Phase 5 - Contemporary management and use of the Botany Rail Line (2002-present)

The WestConnex and Airport East projects included a new rail bridge (RMS ID: B11701), which was constructed over Wentworth Avenue for the Airport East Works (Aurecon Australasia Pty Ltd 2016). This involved the demolition of an original underpass associated with Botany Rail Line and diversion of the existing line to the west while the bridge was under construction. Construction of the bridge required 1,000 cubic metres of concrete and included a space for future duplication of the Botany Rail Line.

3.6 Summary

Overall, the study area is highly modified and includes few remnant areas of natural ground. Landforms within the study area are generally flat to gently sloping, the result of levelling activities carried out to facilitate industrial development and transport.

4.0 ARCHAEOLOGICAL CONTEXT

4.1 Evidence of Aboriginal occupation

The archaeological understanding of the early Aboriginal settlement of the Sydney Basin and surrounds is constantly expanding and developing. At present, the earliest occupation known is associated with deposits on the Parramatta and Nepean Rivers, which were dated to c.25-30,000 years before present (JMCHM 2005a) and 36,000 years before present (AHMS 2015). The archaeological material record provides evidence of this long occupation, but also provides evidence of a dynamic culture that has changed through time.

The existing archaeological record is limited to certain materials and objects that were able to withstand degradation and decay. As a result, the most common type of Aboriginal objects remaining in the archaeological record are stone artefacts, followed by bone and shell. There is potential for Aboriginal objects to occur across the landscape. The nature of the underlying geology and proximity of water sources to portions of the study area indicates the potential for the occurrence of artefact sites and/ or midden sites.

Stone artefacts are one of the most common types of Aboriginal objects remaining in the archaeological record. Archaeological analyses of these artefacts in their contexts have provided the basis for the interpretation of change in material culture over time. Technologies used for making tools changed, along with preference of raw material. Different types of tools appeared at certain times. It is argued that changes in material culture were an indication of changes in social organisation and behaviour.

The northern portion of the study area is located approximately 800 metres south of the site of where the skeleton of a dugong (*Dugong dugon*) with marks of butchering and several edge ground stone axe heads were uncovered during the construction of the Alexandra Canal in the 1890s. The investigation noted that deep transverse and oblique curved cuts and scars were present on the dugong bones, particularly at the distal ends of the ribs that were consistent with the marks on dugong bones from Queensland which were known to have been butchered by Aboriginal people (Etheridge et al. 1896: 174).

Dugongs were known to inhabit the warm waters of northeast Queensland and were only occasionally found as far south as the Tweed and Richmond Rivers. The investigation therefore hypothesised that,

> *…at the time this Sirenian was stranded, and before the final geological changes had taken place that brought about the present aspect of the Botany and contiguous swamps, man was an inhabitant of the locality (Etheridge et al. 1896: 174).*

The importance of this site is tied to both its clear demonstration of climactic/environmental change and the evidence of past Aboriginal peoples' presence in the area at that time.

A more recent analysis of the dugong skeleton and drawings of the sedimentary sequence from the 1890s excavation was conducted in 2004 (Haworth et al. 2004). Conventional radiocarbon (14C) dating from a sample of the dugong bones produced an age of 5,520 ± 70 years before present (BP) (WK 8616), which is consistent with three older 14C dates for a layer of buried trees that underlies much of the north Botany sediments (Haworth et al. 2004: 50).

4.2 Aboriginal histories of the locality

Prior to European colonisation in 1788, areas surrounding Sydney were occupied by the Eora people. The name Eora is derived from *Ea*, meaning yes and *ora*, meaning this place or here (Smith et al 2006). The Eora inhabited a territory bordered by the coast to the east, Pittwater and the mouth of the Hawkesbury River to the north and the Georges River and Botany Bay to the south. Their geographical location meant that the Eora subsisted on a predominantly marine based diet of fish, shellfish and edible plants from the shoreline (Kohen 1986). Today their occupation is evident from various middens, rock shelter art and engravings along the coastline.

The Eora were distributed into family and clan groups, which included different languages and varying settlements around the harbour. These groups included the Gadigal, the Wangal and the Cammeraygal (Smith et al 2006).

Upon initial contact, the population of the Eora is likely to have been around 1,000 people; however, some estimates put the figure at between 3,000-5,000 (Smith 2006). The arrival of Europeans had a rapid effect on the Eora population due to introduced disease and dislocation and disruption of traditions and established behaviours. In 1789, the area was hit by an epidemic of smallpox or similarly contagious disease, leading to a significant drop in population and, by the 1820s the number of Aboriginal people inhabiting the area had been irreversibly reduced (Curon 1985: 9).

Of the three Eora clans, the Gadigal people occupied the land closely associated with the study area. Their traditional occupation of the area is believed to have been for at least 20,000 years prior to European arrival in 1788. The territory associated with the Gadigal people stretched from the south side of Port Jackson from South Head to Petersham (Heiss 2002).

The name Gadigal and its alternative spellings (Cadigal, Cadi) was used in the earliest historical records of the European settlement in Sydney to describe the Aboriginal band or clan that lived on the southern shore of Port Jackson, from South Head west to the Darling Harbour area. The study area is likely located within the area that was inhabited by the Wangal clan. The Wangal clan's territory extended between the Parramatta River and the Cooks River from Darling Harbour to Rosehill (Attenbrow 2010: 34).

The study area is located within an area that was rich with resources. The wetlands associated with Cooks River and Gumbramorra Swamp was likely a source of reliable fresh water and food. The Hawkesbury Sandstone around the Cooks River would have provided Aboriginal people with shelter and the surrounding environment would have provided ample materials for tools and other material culture.

Observations of Aboriginal people living on the Cooks River made early after the British arrival in Australia indicate the importance of these riverine and estuarine environments for Aboriginal people. Watkin Tench noted a camp consisting of twelve huts near the Cooks River in 1788 (Muir 2013), whilst another account by James Backhouse details the construction of canoes using heat from fires in the 1830s (Backhouse 1838). Other accounts observed Aboriginal people in canoes and shell middens indicate the procurement of fish and shell fish for food (Backhouse 1838). The discovery of butchered dugong bones during the excavation of Alexandra Canal in the late 19th century highlights the ways in which Aboriginal people took advantage of their environments particularly during periods of climate change around 6,000 years ago (Etheridge et al. 1896).

Figure 4.1: From Mud Bank Botany Bay – Mouth of Cooks River 1830 - three Aboriginal people can be seen seated in the foreground next to wooden spears, one of which appears to have a barbed head (State Library of NSW)

4.3 Registered Aboriginal sites

The location of Aboriginal sites is considered culturally sensitive information. It is advised that this information, including the AHIMS data appearing on the heritage map for the proposal be removed from this report if it is to enter the public domain.

Redacted for public display

Redacted for public display

Redacted for public display

Figure 4.2: AHIMS sites

Redacted for public display

Figure 4.3: Close up of AHIMS sites

4.4 Previous archaeological investigations

A number of archaeological investigations have been conducted in the vicinity of the study area. The results of those investigations and implications for the study area are discussed below.

Val Attenbrow 1984, St Peters Brick Pit, Sydney NSW Investigation of Shell Material.

Val Attenbrow was originally engaged by the Sydney City Council in 1983 to assess shell material identified within the St Peters Brick Pit, 1.2 kilometres north of the study area. The material was considered to form part of a shell midden and subsequently registered with AHIMS ID 45-6-1496. The 1984 report details a reassessment of the site, to determine if the site was a midden or the product of natural processes.

This reassessment considered the material to represent a former shoreline associated with Botany Bay rather than cultural consumption and discard. This hypothesis was supported by the discovery of dugong bones during the excavations of Alexandra Canal in the late 19th century. Another hypothesis proposed that the shell material was introduced during brick production.

It was recommended that the site card be updated and that AHIMS ID 45-6-1496 not be considered to be an Aboriginal site. The site is currently listed as valid therefore it appears that this recommendation was not followed through.

Susan McIntyre-Tamwoy 2003, MetroGrid Project Test Excavation of Buried Shell Bed at Fraser Park, Marrickville, NSW – Preliminary Report

As part of investigations for proposed underground electricity supplies in the area, McIntyre-Tamwoy conducted archaeological investigations at Fraser Park, approximately 2.1 kilometres northwest of the current study area. The sub-surface investigation involved excavation by machine of five pits along the proposed underground service alignment. The excavation identified layers of introduced fill overlying natural swamp deposit and naturally deposited shell beds. The report noted that due to the nature of the silt associated with the shell bed it was assumed that the shell was deposited when that area was underwater. The conclusion of the report is that prior to British settlement, the Fraser Park area was submerged by a low-lying swamp.

AMBS 2003, Report on the Salvage Excavation of a Portion of the Kendrick Park Midden, Tempe NSW (Report to Marrickville Council)

Archaeological excavation was undertaken within a portion of AHIMS ID 45-6-2198, located on a sandstone outcrop at the back of Kendrick Park, Tempe (approximately 2.2 kilometres west of the western part of the study area). The midden encompassed an area of approximately 7.6 metres by 3 metres and had been heavily disturbed by past sandstone quarrying and the dumping of modern rubbish. Various shellfish species were recorded, with the faunal assemblage dominated by Sydney cockle (Anadara trapezia). Three animal bone fragments, six stone artefacts and locally available estuarine shell material were identified. Two radiocarbon dates were obtained from an intact layer of the midden and returned dates of 4328 ± 50 years BP and 3901 ± 53 years BP.

Jo McDonald Cultural Heritage Management 2005a, Archaeological testing and Salvage Excavation at Discovery Point, Site # 45-6-2737 in the former grounds of Tempe house, NSW.

Salvage excavation was undertaken at AHIMS ID 45-6-2737 located at Discovery Point, directly north of Tempe House (2.2 kilometres west of the study area). Despite considerable levels of ground disturbance in the area, 389 stone artefacts and an Aboriginal hearth was identified within a sand body (possibly part of earlier Pleistocene aged dune) and subsequently radiocarbon dated to 9,376 ± 61 years BP.

Artefact densities were considered generally low, with the exception of one knapping floor with silcrete the dominant material. Due to historic levels of disturbance it was uncertain whether the identified material was part of a continuous scatter or a series of discrete, low density clusters. Nonetheless, it is suggested that the excavated site continues around the grounds of Tempe House. Following excavation, the site was destroyed by development.

Jo McDonald Cultural Heritage Management 2005b, Archaeological assessment of Aboriginal site (45-6-615) a rock shelter with art and midden at 32 Undercliffe Road, Undercliffe, NSW

An archaeological assessment was prepared by JMcD CHM for AHIMS ID 45-6-0615. The site consists of a rock shelter with art, with a shell midden at the front of the shelter. The art comprised of hand and foot stencils in white. The coordinates on AHIMS place the site within 42 Undercliffe Road. However, the site description records the site as located at the rear of 32 Undercliffe Road. The examination of aerial imagery available on Google Earth indicates what appears to be a sandstone overhang at the rear of 32 Undercliffe Road. Therefore, there is likely to be an error in the coordinates recorded on the AHIMS site register. AHIMS ID 45-6-0615 is located approximately 3.3 kilometres west of the current study area.

The surrounding environment of the site was characterised by JMcD CHM as comprising the Cooks River estuarine system of extensive marshes prior to 20th century development. The underlying geology is similar to that outside the study area at Sydenham, which consists of Quaternary sediments overlying Hawksbury sandstone. The shelter itself is located in an outcrop of Hawkesbury sandstone which originally formed part of an outcrop along a ridge crest landform context.

JMcD CHM assessed the site as demonstrating high archaeological significance at the local and regional level. The site was considered to be rare within the Sydney basin context, especially in association with the shell midden. The rock art was assessed to be in good condition. The midden was assessed to be in relatively poor condition based on superficial inspection. Subsurface inspection was recommended to fully assessed impacts to the midden. No information is available to suggest that any archaeological investigation was conducted at AHIMS ID 45-5-0615.

AECOM 2015, WestConnex New M5, Technical Working Paper: Aboriginal Heritage

An Aboriginal heritage assessment was conducted by AECOM as part of the M5, WestConnex EIS. The WestConnex assessment area was located 1.4 km northwest of the current study area.

The predictive statements for the assessment area considered that there was potential for archaeological deposits to occur within areas of the Gymea, Blacktown and Birrong soil landscapes across all landforms. However archaeological potential in areas of the Gymea and Birrong soils where high erosion has occurred could be limited. AECOM considered it likely that artefact bearing deposits would be present in areas adjacent to Alexandra Canal. It was also considered likely that shell midden sites could occur at considerable distances from existing foreshore areas due to past sea level fluctuations.

The study identified two areas of potential remnant landscape, 2.5 km west of the study area, which could contain evidence of past Aboriginal occupation of the area. This assessment was based on the location of previously recorded AHIMS sites and disturbance levels. The study also identified a number of new Aboriginal sites consisting of five sandstone overhangs with associated PAD to the south of the Cooks River and outside the current study area.

4.5 Summary

The study area was originally part of Wangal clan territory. Aboriginal people would have utilised the rich resources of the estuarine environment and would likely have camped on the estuary's margins. Although there are no registered Aboriginal sites within the study area, Sheas Creek Dugong (AHIMS ID 45-6-0751) is located around 800 metres to the north. Partial remains of a dugong skeleton, with cut marks, were identified during an excavation in 1896. The site also featured stone axes. The findings at this site demonstrate the use of marine resources by Aboriginal people in the area.

5.0 ARCHAEOLOGICAL SURVEY

5.1 Kelleher Nightingale Consulting 2018 survey

In 2018 KNC completed an Aboriginal heritage assessment for the study area. The assessment involved an archaeological survey (undertaken on 14 and 21 September 2016) and consultation with the La Perouse LALC and the Metropolitan LALC.

5.1.1 Methodology and coverage

The aim of the archaeological survey was to conduct a full coverage, pedestrian survey of the study area and to record any Aboriginal archaeological sites or areas with potential to contain Aboriginal objects. The study area was divided into three survey units based on landform and physical features.

Overall, three Survey Units were investigated:

- Survey Unit 1 encompassed land from Banksia Street to Southern Cross Drive, Botany. The survey unit included the Botany Rail Line and the southern boundary of the Eastlakes Golf Course.
- Survey Unit 2 encompassed Southern Cross Drive to the Alexandra Canal. The survey unit contained a combination of land occupied by the Botany Rail Line, adjacent urban areas, road corridors and the riparian areas adjacent to Mill Stream and Mill Pond.
- Survey Unit 3 comprised the northern portion of the study area from the Alexandra Canal in the south to the northern boundary occupied by the suburbs of St Peters and Tempe. The survey unit consisted of the Botany Rail Line and adjacent industrial areas, road corridors and vacant lots.

The survey was undertaken by Mark Rawson (Archaeologist, KNC) and representatives from the Metropolitan LALC and the La Perouse LALC.

The survey team were equipped with high resolution aerial photography and topographic maps showing the study area boundary. A non-differential GPS receiver was used for spatial recordings. All GPS recordings were made using the Geocentric Datum of Australia (GDA) coordinate system. Detailed notes on the condition of the survey unit were compiled by the survey team including an assessment of surface visibility, vegetation coverage, modern disturbance and current land use.

5.1.2 Survey results

The survey identified two areas (Investigation Area 1 and Investigation Area 2) with no visible disturbance to the ground surface and where intact sub-surface deposits could be present. These areas are located 500 m west of the northern most part of the study area (Figure 5.9). The remainder of the KNC assessment area was determined to be unlikely to contain Aboriginal objects or archaeological deposits.

5.2 Artefact Heritage 2018 site visits

The majority of the study area had been subjected to a survey completed by KNC (2018) in accordance with the Code of Practice. Subsequently, Artefact Heritage completed two site inspections (not in accordance with the Code of Practice) to substantiate the findings of KNC survey.

On 18 July 2018, Vanessa Edmonds (Principal, Artefact Heritage) and Adele Zubrzycka (Senior Heritage Consultant, Artefact Heritage) completed a site visit of the current study area. This site visit was not completed in accordance with the SEARs or any statutory guidelines under the *National Parks and Wildlife Act*. Representatives of the LALCs were not present for this site visit, as this was considered to be an initial 'ground truthing' exercise. Subsequently, a second site inspection was completed by Vanessa Edmonds and Selina Timothy (Site Officer, Metropolitan LALC) on 8 November 2018. This site visit confirmed the results of the KNC site survey and did not identify any intangible cultural heritage values.

Artefact Heritage identified that the southern section of the study area had not been included in the assessment completed by KNC. As a result, Artefact Heritage completed an archaeological survey of this area on 6 May 2019 in accordance with the Code of Practice which is discussed further in Section 5.3.

5.3 Artefact Heritage 2019 survey

5.3.1 Aims

The aims of the archaeological survey were to:

- cover the areas not covered by the KNC assessment (2018) and to include all areas that will potentially be impacted by the proposed works
- record the landform, general soil information, surface conditions and vegetation conditions encountered during the survey and how these impact on the visibility of objects
- record any Aboriginal objects observed during the survey
- define the boundaries of any Aboriginal sites and areas of PAD based on landmarks and historical maps
- identify areas of disturbance which may have impacted the presence of intact soils and archaeological features
- engage a representative of the La Perouse LALC to provide information on the intangible cultural heritage values of the study area
- collect information to ascertain whether further archaeological investigations are required.

5.3.2 Site definition and recording

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

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

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

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

5.3.3 Timing and personnel

The archaeological survey was conducted on 6 May 2019 and undertaken by Jennifer Norfolk (Heritage Consultant, Artefact Heritage) and Holly Mae Steane Price (Heritage Consultant, Artefact Heritage). Stephanie Mifsud (Environmental Consultant, ARTC) was in attendance with a Protection Officer (PO). A site officer representing the La Perouse LALC was invited to attend the survey but was not available to participate.

5.3.4 Survey methodology

A full coverage survey of the study area was completed within a single survey unit (Figure 5.9).

The survey was completed on foot in accordance with the Code of Practice. A handheld Global Positioning System (GPS) was used to track the path of the survey team and record the coordinates of survey transects, as well as the location of key features (disturbances, areas of archaeological sensitivity/potential). The coordinate system projection used for all site recording was GDA94 MGA 56.

All ground exposures were examined for Aboriginal objects (stone artefacts, imported shell, or other traces of Aboriginal occupation). An attempt was made to identify and examine stone outcrops and Old growth trees for signs of cultural scarring and marking.

A photographic record was kept during the survey. Photographs were taken to record aspects of survey units including vegetation and disturbance. Scales were used for photographs where appropriate.

5.3.5 Survey coverage

A summary of survey coverage, in accordance with the Code of Practice, is outlined in Table 6.1 and landform survey coverage in Table 6.2

Table 5.1: Effective survey coverage

Landform	Survey unit area (sq. m)	Visibility (%)	Exposure (%)	Effective coverage Area (sq. m)	Effective coverage (%)
Embankment	23117	5	0	0	0

Table 5.2: Landform survey coverage

Landform	Landform area (sq. m)	Area effectively surveyed (sq. m)	% of landform effectively surveyed	Number of surface sites	Total No. of sites
Embankment	23117	0	0	0	0

5.3.6 Survey results

The study area is restricted to within the rail corridor south of the pedestrian overpass at Banksia Road and north of Railway Road. The site is currently an active transport corridor for non-passenger trains and is used as a layby for maintenance resources such as ballast and sleepers. The tracks run north south along the eastern edge of the site, an access track and layby area in the west. A gas pipeline runs the length of the survey unit on the western boundary.

The study area is located across a truncated sloping landform. The area has been levelled to accommodate the rail infrastructure. The general slope of the area is north east to south west towards Botany Bay. The original landscape would have rolling coastal dunes, which is evident by the disturbed sands visible at the site. The vegetation has been cleared and replaced with gravel, ballast and grass cover. There is remnant or regrowth vegetation around the perimeter of the study area, none of sufficient age to have cultural markings.

Visibility in the survey unit was limited to areas along the western half that has been experiencing motor vehicle traffic, and along the edge of the rail infrastructure that experiences foot traffic and is kept clear of vegetation. The entire landform has been heavily modified to accommodate its existing rail infrastructure. The slope has been truncated in the east of the site and built up in the west. Gas pipelines and electrical cables run the length of the site.

No new Aboriginal sites or areas of PAD were identified during the survey.

Figure 5.1: View south-east of survey unit (J Norfolk, 6 May 2019)

Figure 5.2: View east of the north end of the survey unit (J Norfolk, 6 May 2019)

Figure 5.3: View north-east showing northern end of site and disturbance and levelling in survey unit (J Norfolk, 6 May 2019)

Figure 5.4: Ground visibility (J Norfolk, 6 May 2019)

Figure 5.5: View south east along study area showing train infrastructure, subsurface disturbance (J Norfolk, 6 May 2019)

Figure 5.6: Ground visibility showing disturbed sands (J Norfolk, 6 May 2019)

Figure 5.7: View north west along gas pipeline on western boundary of study area (J Norfolk, 6 May 2019)

Figure 5.8: View east of landform modification from gas pipeline and levelling (J Norfolk, 6 May 2019)

5.3.7 Consultation with La Perouse LALC

Following the completion of the survey, La Perouse LALC was contacted by Jennifer Norfolk (Heritage Consultant, Artefact Heritage) to discuss the results of the survey. The LALC was provided photos from the survey, comments from *Redacted for public display* confirmed that the survey undertaken by Artefact Heritage was sufficient, and they did not require an additional site visit as he thought there was nothing there due to the disturbance. No intangible cultural heritage values were identified.

Redacted for public display

Figure 5.9: Location of Survey unit 1 and KNC 2018 survey area (indicative – based on overlays)

5.4 Analysis and discussion

In accordance with the Code of Practice, this section provides a discussion of the regional and local archaeological context of the study area, based on the desktop analysis completed for this assessment, and results the site inspections and surveys undertaken in 2018 and 2019.

5.4.1.1 Regional archaeological context

Within the Sydney Basin, the most widely used terminology for the phases within what is currently known as the Eastern Regional Sequence are the Capertian, followed by the Early, Middle and Late Bondaian. This sequence continues to be refined by ongoing archaeological work in the region.

The Capertian comprises large, heavy stone artefacts. Tool types include uniface pebble tools, core tools, denticulate saws, scrapers, hammerstones, some bipolar and burins. The change from the Capertian to the Bondaian took place sometime after 5,000 years Before Present (BP) and is largely characterised by a shift in raw material use (and the proportions of raw materials), in addition to a developing predominance of smaller implements.

The three phases which are generally recognised within the Bondaian sequence are primarily based upon the introduction and subsequent decline of backed implements and the use of a bipolar flaking technique. Other technological innovations which are evident during the Bondaian include the introduction of ground-edge implements around 4,000 years BP and shell fish hooks during the last 1,000 years.

During the Early Bondaian, which is dated to between approximately 5,000 years BP and 2,800 years BP, the predominant raw materials for artefact manufacture appear to have been fine-grained siliceous cherts and silcretes. Features of the Capertian appear to have continued in many sites but backed and edge ground implements were also introduced.

The Middle Bondaian which dates between approximately 2,800 years BP and 1,600 years BP, displays a greater percentage of Bondi points (backed and pointed artefacts which are generally characteristic of Bondaian assemblages) to bipolar pieces. The proportion of quartz artefacts (a raw material which is frequently 'reduced' by employing bipolar techniques) appears to increase within assemblages of this time frame. Some sites have also produced edge-ground implements.

The Late Bondaian which dates from approximately 1,600 years to the present, is dominated by artefacts of quartz, although other raw materials are present. Bondi points are absent. Eloueras and bipolar pieces are predominant within assemblages of this period. Edge-ground implements are also more common. Bone and shell implements occur in some sites.

At Contact, European observations of Aboriginal life around the Sydney region suggest that toolkits were fashioned largely on organic materials, such as wood, bark, palm leaves, shell and bone. The use of stone does not figure prominently within the early-European descriptions.

The identification of butchered dugong remains within a sedimentary sequence of alternating marine and terrestrial units that was found during the construction of the Alexandra Canal demonstrates the antiquity of Aboriginal occupation in the area and the changing environment of the Botany Bay region during the Holocene (KNC 2018). The heritage value of the Alexandra Canal as described on the State Heritage Register specifically acknowledges the Aboriginal archaeological significance of this site. Archaeological excavations of midden sites AHIMS ID 45-6-2737 and AHIMS ID 45-6-2198 further demonstrate the occupation of the area and use of marine resources during the Holocene (KNC 2018).

5.4.1.2 Local archaeological context

No Aboriginal archaeological objects or areas of PAD were identified within the study area. However, archaeological evidence indicates that Botany Bay, the Cooks River and its tributaries were a focus for intensive Aboriginal occupation, due to the combination of maritime, estuarine and terrestrial resources available in the area (KNC 2018). The terraces surrounding these waterways are likely to have functioned as camp sites from which past Aboriginal people could have exploited these resources. The survivability of this archaeological evidence is dependent on low levels of soil disturbance (from both natural and anthropogenic factors) (KNC 2018).

6.0 SIGNIFICANCE ASSESSMENT

6.1 Significance assessment criteria

An assessment of the archaeological significance of an item or place is required in order to form the basis of its management. The OEH (2011) provides guidelines for heritage assessment with reference to the Burra Charter (Australia ICOMOS 2013) and the Heritage Office guidelines (2001). OEH requires consideration that includes the following:

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

It is important to note that heritage significance is a dynamic value.

6.2 Archaeological significance assessment

The archaeological surveys did not result in the identification of any Aboriginal sites or areas of PAD. Therefore, the study area is of no archaeological significance.

Unexpected Aboriginal archaeological material may be present within the fill layer. Any Aboriginal objects retrieved from the fill would likely be assessed as holding low scientific significance due to a lack of archaeological context and integrity.

7.0 IMPACT ASSESSMENT

7.1 Proposed works

Key features of the project include:

- Track duplication – constructing a new track within the rail corridor for a distance of about three kilometres
- Track slewing – a total of 1.4 kilometres of existing track would be moved sideways in sections (slewed) to improve the alignment of both tracks and minimise impacts to adjoining land uses
- Crossovers – constructing new rail crossovers to maintain and improve access at two locations
- Bridge works – constructing new bridge structures at Mill Stream, Southern Cross Drive, O'Riordan Street and Robey Street, re-constructing the existing bridge structures at Robey and O'Riordan streets, and potential foundation strengthening works at the Botany Road bridge
- Embankment/retaining structures – constructing a new embankment and retaining structure adjacent to Qantas Drive between Robey and O'Riordan streets and a new embankment between the Mill Stream and Botany Road bridges.

Ancillary work would include communication and signalling upgrades, drainage work, protecting/relocating utilities and removing or relocating/adjusting advertising billboards (as required).

7.2 Potential impacts to Aboriginal heritage

No Aboriginal places or objects were identified within the study area. Furthermore, due to the highly disturbed nature of the ground, intact archaeological deposits are not likely to be present below the ground surface. Therefore, the proposed development is unlikely to impact any Aboriginal heritage items or places, or potential Aboriginal archaeology.

As no impacts to Aboriginal sites, places or archaeology associated with the project have been identified, , direct and/or indirect impacts (including cumulative impacts and visual impacts) to Aboriginal places or objects are considered unlikely.

7.3 Consistency with the Sydney Airport Master Plan 2039 and Environmental Strategy 2019-2024

This assessment was completed in accordance with the objectives outlined in section 2.3 of the Sydney Airport Master Plan 2039, to ensure heritage items are appropriately considered and managed.

8.0 MITIGATION AND MANAGEMENT

The proposal is unlikely to impact any intact archaeological remains therefore no further archaeological investigation or mitigation is required.

An unexpected finds policy would be implemented in the event of any unexpected finds of Aboriginal sites, objects or archaeological deposits being identified during construction.

An unexpected finds policy would involve the following actions:

- Stop work within the affected area, protect the potential archaeological find, and inform environment staff or supervisor.
- Contact a suitably qualified archaeologist to assess the potential archaeological find.
- If Aboriginal archaeological material is identified, works in the affected area should cease, and the Office of Environment and Heritage (OEH) should be informed. Further archaeological mitigation may be required prior to works recommencing.
- If human remains are found:
    - immediately cease all work at the particular location
    - notify site manager and project archaeologist
    - notify NSW Police
    - notify DECCW's Environment Line on 131 555 as soon as practicable and provide available details of the remains and their location
    - not recommence any work at the location until cleared.

9.0 RECOMMENDATIONS

The following recommendations are based on consideration of:

- statutory requirements under the *National Parks and Wildlife Act 1974* as amended
- the results of the survey completed by KNC (2018)
- the results of the survey and site inspections completed by Artefact Heritage as part of this assessment
- the interests of the Aboriginal stakeholder groups
- the likely impacts of the proposed development.

It was found that no Aboriginal archaeological site or areas of PAD are located within the study area.

It is therefore recommended that:

- no further assessment is required as no known Aboriginal objects or areas of PAD will be impacted by the project.
- an unexpected finds policy be implemented, as outlined in Section 8.0.

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11.0 GLOSSARY

Aboriginal cultural heritage: The material (objects) and intangible (mythological places, dreaming stories etc) traditions and practices associated with past and present day Aboriginal communities.

Aboriginal object: Any deposit, object or material evidence (not being a handicraft made for sale), including Aboriginal remains, relating to the Aboriginal habitation of NSW.

Aboriginal place: Any place declared to be an Aboriginal place under s.94 of the National Parks and Wildlife Act 1974.

Aboriginal stakeholders: Members of a local Aboriginal land council, Aboriginal groups or other Aboriginal people who have registered their interest with the RTA to be consulted about a proposed RTA project or activity

AHIMS: Acronym for 'Aboriginal heritage information management system'. AHIMS is a register that contains information about NSW Aboriginal heritage, and it is maintained by DECCW.

Alluvium: A deposit left by the flow of water. It can include sediments of gravel, mud or sand.

Angular fragment: A flaked piece of stone that does not have characteristic features which allow for it to be positively identified as a flake, core or tool.

Archaeological site: A location that has evidence of past Aboriginal activity (both material and mythological/ritual).

Archaeology: The scientific study of human history, with focus on material remains and ethnographic evidence.

Area of archaeological sensitivity: A part of the landscape that contains demonstrated occurrences of cultural material. The precise level of sensitivity will depend on the density and significance of the material.

Artefact: An item of cultural material created by humans.

Artefact scatter: Where two or more stone artefacts are found within an area of potential archaeological deposit or a site.

Backed blade/ artefact: Bladelets that have one edge blunted by steep retouch to form a back.

Basalt: A common volcanic rock. It is fine grained (approximately 45-50 per cent silica) and rich in iron and magnesium.

Bedrock: A consolidated rock that is unbroken and un-weathered, located beneath soil or rock fragments.

Bifacial flaking: The removal of flakes from two faces of a single platform.

Bipolar: A method of flaking stone, especially quartz, where cores are rested upon an anvil during flaking.

Bipolar core: A core used to create bipolar flakes.

Blade: A stone flake that is at least twice as long as it is wide.

Bioturbation: Disturbance in soil profiles caused by living organisms, such as ants and roots.

Bora ground: These are usually identified as flat, mounded earth rings that were used for Aboriginal ceremonial activities.

Bulb of percussion: A partial cone of force produced when a flake is struck off a core. The cone occurs on the ventral (inside surface) of the flake.

Burials: Burial sites may be composed of a single burial, isolated individuals in a general area, or cemeteries containing many individuals.

Carved/ modified trees: Carved trees exhibit evidence of purposeful removal of bark but differ from scarred trees in that geometric patterns and figures are cut into the tree. The motifs of the mid-north coast region are mostly linear geometric patterns (Craib and Bonhomme 1995: 27).

Chalcedony: A mineral with high silica content that has a microcrystalline structure. It is often described as 'waxy' and can be translucent. It is found in a variety of colours such as white, grey, greyish-blue or brown.

Chert: A fine grained rock composed of cryptocrystalline silica. It exhibits a range of textures and colours including red, green or black. Chert is easy to work and retains a sharp edge for an extensive period of time before resharpening is required. It has a low to medium fracture toughness.

Clast: A broken fragment of rock or crystal particle that was created either through erosion or weathering.

Clay: A type of sediment with particles less than 4 microns in size and that is composed of clay minerals (Keary 2001: 49).

Conglomerate: Is a geological term used to describe clasts that are cemented in a fine-grained matrix. It is a sedimentary rock.

Core: A stone piece from which a flake has been removed by percussion (striking it) or by pressure. It is identified by the presence of flake scars showing the negative attributes of flakes, from where flakes have been removed.

Cortical platform: This term is used to describe a platform that has cortex present and may indicate that the core's surface (where the flake was struck) was previously un-worked.

Cortex: The outer weathered surface of stone; if smooth, it can indicate the source of stone was a pebble.

Crushed platform: This term is used to describe a flake that has a damaged platform and where the platform's attributes cannot be recorded as a result.

Cultural heritage assessment report: A report combining an Aboriginal archaeological assessment and Aboriginal cultural assessment, required to be submitted to DECCW for any Part 6 National Parks and Wildlife Act 1974 approval or prepared for projects under section 5.1 of the Environmental Planning and Assessment Act 1979 where Aboriginal cultural heritage is identified as a key issue.

Debitage: Small, unmodified flakes produced as part of the flaking process, but discarded unused.

Distal: Term of view used to describe the lower portion of a flake in respect to where the striking force terminates.

Distal flake: A broken flake with the presence of a termination and the absence of a platform or impact point.

Dorsal: The side of a flake that was originally part of the core's outer surface (often referred to as the 'dorsal surface').

Dynamic value: Characterized by constant change, activity, or progress. As new information is accumulated over time the value and significance of a heritage item will change

Easting: This is a measurement used to determine location. The easting is the x-coordinate and relates to the vertical lines on a map, which divide east to west. It increases in size when moving further east.

Edge damage: Where the edge of a tool has been used, resulting in microscopic fractures along the surface.

Ethnohistory: The branch of anthropology concerned with the history of peoples and cultures, especially non-Western ones.

Exposure: The level of ground exposure is based on the whether the landform is eroding, aggrading or stable.

Faceted platform: A faceted platform has three or more flake scars present on its surface.

Feather termination: A feather termination has a 'minimal thickness at the distal end and an acute angle between the dorsal and ventral surfaces' (Holdaway and Stern 2008: 129). In appearance, a feather termination becomes gradually thinner towards the end of the flake.

Fine grained siliceous material: A rock that has a high content of silica and that is fine grained in appearance without any further identifying characteristics.

Flake: A stone piece removed from a core by percussion (striking it) or by pressure. It is identified by the presence of a striking platform and bulb of percussion, not usually found on a naturally shattered stone.

Flake scar: Often called a 'negative flake scar', it is the remnant of a previous flake that was struck from the core. This appears on the dorsal surface of a flake.

Flaked fragment: This is a chipped stone artefact which cannot be classed as a flake, core or retouched flake, the reason being that the defining attributes are missing. This often happens when a core contains a number of incipient fracture planes. Artefacts that are heavily weathered or which have been shattered in a fire are also difficult to categorise.

Flaked platform: This term is used to describe a platform that has been worked previously; one or more flakes were removed prior.

Floodplain: The area covered by water during a major flood and/or the area of alluvium deposits laid down during past floods.

Fluvial: Pertaining to or produced from a river.

Focalised platform: A small platform that is intentionally prepared for percussion by overhang removal.

Footprint: The scale, extent or mark that a development makes on the land in relation to its surroundings.

Geometric microliths: Backed at one end, the other end or both, these tools are made on geometric shaped flakes, <80 mm maximum dimension.

Geomorphic: Relating to the structure, shape and development of landforms.

Hammerstone: A piece of stone used to knock flakes from a core. Evidence of pitting or bashing can usually be seen along some part of the margins of this artefact.

Hinge termination: A hinge termination occurs 'when the fracture meets the surface of the core at approximately right angles to the longitudinal axis of the flake' (Holdaway and Stern 2008: 130). This can present as a rounded surface that curves downwards at the distal end of a flake.

Holocene: The Holocene epoch forms part of the late Quaternary period and extends from about 11,000 years ago to the present day.

Humic: Soil that contains organic matter (from 'humus').

Igneous: After magma or lava cools and solidifies, it forms igneous rock. This can happen in volcanic and plutonic (under the surface of the earth) scenarios. An example of this is basalt.

In situ: A description of any cultural material that lies undisturbed in its original point of deposition.

Ironstone: A type of sedimentary rock that contains iron.

Knapping: The removal of flakes and flaked pieces from a stone core by the use of percussion.

Layer: In stratigraphy, it is used to describe a horizon (soil, rock, charcoal) that is distinct from its surrounds.

Landform: Description for an area of land based on an assessment of a series of environmental characteristics including geology, geomorphology, soils and vegetation.

Lithic (raw material): of the nature of or relating to stone

Loam: Soil that contains roughly equal concentrations of silt, sand and clay.

Longitudinally split flake: This is a flake that is broken (split) from the point of percussion (the strike) through to the termination.

Manuport: An unmodified piece of stone transported to a site by humans.

Medial: Term of view referring to the intermediate section or middle section of a broken flake.

Medial flake: Absence of proximal and distal margins, but with an identifiable ventral surface.

Metamorphism: The process where an existing rock (which can be sedimentary or igneous) is transformed into another mineral through the application of temperature and pressure. An example of this is hornfels.

Mudstone: A sedimentary rock formed from mud/clay.

Muller: A large stone artefact which differs in construction depending on the environment. These were used as an aide for processing seeds and other low return plant material or ochre.

Multiple platform core: Is a core with more than one identifiable platform.

Munsell colour: This is a colour code chart used to standardise colour specifications.

Non-diagnostic: An amorphous piece of stone that is neither a flake, flaked fragment, core or retouched flake.

Northing: This is a measurement used to determine location. The northing is the y-coordinate and relates to the horizontal lines on a map, which divide north to south. It increases in size when moving further north.

Notched tool: Flakes that exhibit a small area of retouch, forming a concave edge on lateral or distal margin.

Oriented length: This is a measurement taken from the point of impact through to the termination.

Oriented thickness: This is a measurement taken from where the oriented width and oriented length intersect.

Oriented width: This is a measurement taken across the middle of a flake (halfway between the point of impact and the termination).

Overhang removal: This occurs when a platform is prepared for striking; small flakes are struck before a flake is detached, leaving visible scars behind.

Potential Archaeological Deposit (PAD): A PAD is a location that is considered to have a potential for sub-surface cultural material. This is determined from a visual inspection of the site, background research of the area and the landform's cultural importance.

pH: A measure of the acidity or alkalinity of the soil. Neutral is indicated by a pH of 7, with strongly acidic being 0 and strongly basic (alkaline) being 14. The 'pH' is said to stand for 'potential of hydrogen'.

Platform: On a flake, this is a core remnant from where the flake was struck off the core.

Platform width: This is a measurement taken across the width of a platform between the two lateral margins of a flake.

Platform thickness: This is a measurement taken from the ventral to dorsal surfaces of a flake (beginning at the point of impact/percussion).

Plunge termination: This occurs when the ventral surface 'curves markedly away from the face of a core...and continues directly into the core, removing the base of the core' (Holdaway and Stern 2008: 132). This can present as a 'J' shape when holding the flake in profile.

Pot-lidded: The damage caused by exposure to extreme heat, resulting in a circular depression on the surface of a stone artefact.

Podsol: an infertile acidic soil characterized by a white or grey subsurface layer resembling ash, from which minerals have been leached into a lower dark-coloured stratum. It typically occurs under temperate coniferous woodland

Proximal: Term of view used to describe the upper portion of a flake in respect from where it was initially struck off a core.

Proximal flake: A broken flake with the presence of a platform, but the absence of a termination.

Pressure flaking: A process to remove a flake from a core by applying pressure (from a piece of wood or bone) along the core's edge.

Quarry: In this report, 'quarry' can refer to a native source of stone that was mined by Aboriginal people in the past. Rock from these sites could be used to make artefacts.

Quartz: A mineral composed of silica with an irregular fracture pattern. The quartz used in artefact manufacture is generally semi-translucent, although it varies from milky white to glassy. Glassy quartz can be used for conchoidal flaking, but poorer quality material is more commonly used for block fracturing techniques. Quartz can be derived from water worn pebbles, crystalline or vein (terrestrial) sources.

Quartzite: A form of metamorphosed sandstone. It is often white or grey in colour but can occur in other shades due to mineral impurities.

Quaternary: Relating to or denoting the most recent period in the Cenozoic era, following the Tertiary period and comprising the Pleistocene and Holocene epochs

Refit: Knapping is a reductive technology. As such, it is possible to 'refit' tools back together after breakage or knapping (i.e. refitting a proximal and distal flake back together or refitting a flake back to the core it was knapped from).

Resource area: An area of the landscape or part of the environment that provides a resource (be it food or material items such as a source of stone for making artefacts) for Aboriginal people. Swamps are good examples of rich resource zones.

Retouch: A flake, flaked piece or core with intentional secondary flaking along one or more edges.

Sand: A material composed of small grains (0.625-2.0 mm) (Keary 2001: 233). Sand is formed from a variety of minerals and rocks, but commonly contains silica, such as quartz.

Sandstone: Is a sedimentary rock formed from sand-sized grains.

Scarred trees: Trees that feature Aboriginal derived scars are distinct due to the scar's oval or symmetrical shape and the occasional use of steel, or more rarely, stone axe marks on the scar's surface. Scarred trees are identified by the purposeful removal of bark for use in the manufacture of artefacts such as containers, shields and canoes. The bark was also used for the construction of shelters. Other types of scarring include toeholds cut in the trunks or branches of trees for climbing purposes and the removal of bark to indicate the presence of burials in the area.

Sediment: Is a mineral that has undergone erosion or weathering and that is then deposited via aeolian, glacial or fluvial means.

Sedimentary: Sedimentary rock is formed through the accumulation of sediment deposits that are then consolidated. An example of this is mudstone.

Shale: A sedimentary rock of well-defined layers comprised of small particles (less than 4 microns in size) (Keary 2001: 16) sourced from weathered or eroded materials.

Significant ground disturbance: Means disturbance of (a) the topsoil or surface rock layer of the ground; or (b) a waterway, by machinery in the course of grading, excavating, digging, dredging or deep ripping, but does not include ploughing other than deep ripping.

Silt: A sediment with grains ranging from 4.0-62.5 microns in size (Keary 2001: 245). It can be found as a soil or in water.

Single platform core: Is a core with one identifiable platform.

Scraper: A stone tool, usually with steep retouch along its edges that was ethnographically used to make wooden implements or process foods and other resources.

Silcrete: Soil, clay or sand sediments that have silicified under basalt through groundwater percolation. It ranges in texture from very fine grained to coarse grained. At one extreme it is cryptocrystalline with very few clasts. It generally has characteristic yellow streaks of titanium oxide that occur within a grey and less commonly reddish background. Used for flaked stone artefacts.

Site inspection: A preliminary walk over of an area not completed in accordance with the Code of Practice. The function of a walkover may be to determine the general character of an area and assess if require investigate is required

Spit: Refers to an arbitrarily defined strata of soil removed during excavation (often 50 millimetres to 100 millimetres in depth).

Step termination: This occurs when a 'flake terminates abruptly in a right-angle break' (Holdaway and Stern 2008: 130).

Stratification: The way in which soil forms in layers.

Stratigraphy: The study of soil stratification (layers) and deposition.

Sub-surface testing: An archaeological method used to determine the cultural sensitivity of an area by excavating small (0.5 metre x 0.5 metre) pits and recording the stratigraphy, material remains (such as stone tools) and disturbance.

Survey: In archaeological terms, this refers to walking over a surface while studying the location of artefacts and landmarks. These are then recorded and photographed. An archaeological survey would be completed in accordance with the requirements outlined in the Code of Practice

Termination: Refers to the shape of the distal end of a flake.

Tool: A stone flake that has undergone secondary flaking or retouch.

Usewear: A pattern of wear that is left on a stone artefact due to utilisation.

Ventral: The side of a flake that was originally attached to the core (often called the 'ventral surface'). Features such as the bulb of percussion are found on this surface of a flake.

Visibility: Refers to the degree to which the surface of the ground can be observed. This may be influenced by natural processes such as wind erosion or the character of the native vegetation, and by land use practices, such as ploughing or grading. It is generally expressed in terms of the percentage of the ground surface visible for an observer on foot.

APPENDIX 1 – AHIMS DATA

Redacted for public display

artefact

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