Appendix I

Aboriginal Cultural Heritage Stage 2 PACHCI Archaeological Report

Prepared for
Transport for NSW
ABN: 18 804 239 602

Aboriginal Cultural Heritage

Stage 2 PACHCI - Archaeological Survey Report

15-Jul-2022
Westlink M7 Widening

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Aboriginal Cultural Heritage - Stage 2 PACHCI - Archaeological Survey Report

Client: Transport for NSW

ABN: 18 804 239 602

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8008 1700 www.aecom.com
ABN 20 093 846 925

15-Jul-2022

Job No.: 60640547

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Glossary and abbreviations

Key terms	Description
Approved project	The Westlink M7 (previously referred to as Western Sydney Orbital) is an existing 39-kilometre-long toll road connecting the M5 Motorway at Prestons, the Hills M2 Motorway at Baulkham Hills and the M4 Motorway at Eastern Creek.
Conditions of Approval (CoA)	These are the current conditions that apply to the approved project. Found here: https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSI-663-MOD-5%2120190718T013836.398%20GMT
Construction footprint	The area required for construction of the proposed modification.
Modification	Proposed changes to be made to the approved project.
Operational footprint	The area required for operation of the proposed modification.
Proposed modification	The addition of a trafficable lane in both directions within the existing median of the Westlink M7, from about 140 metres south of the Kurrajong Road overhead bridge at Prestons (southern end) to the Westlink M7 Bridge at Richmond Road in Oakhurst/Glendenning (northern end), excluding at the M4 Motorway/Westlink M7 Light Horse Interchange.
Study area	The study area for this assessment, as defined in Section 1.2.
Transport for NSW	The proponent seeking approval for the modification.
Westlink M7	M7 Motorway or formerly known as Western Sydney Orbital.

Acronym	Definition
AAR	Aboriginal Archaeological Report
ACHMP	Aboriginal Cultural Heritage Management Plan
ASR	Archaeological Survey Report
ACHAR	Aboriginal Cultural Heritage Assessment Report
AFT	Artefact
AHD	Australian Height Datum
AHIP	Aboriginal Heritage Impact Permit
AHIMS	Aboriginal Heritage Information Management System
ART	Art (Pigment or Engraved)
b.g.l	Below ground level
BP	Abbreviation for ‘Before Present’. For radiocarbon dates, number of years before AD1950.
ALbp	Berkshire Park Alluvial soil landscape
REbt	Blacktown Residual soil landscape
BUR	Burial
CEMP	Construction Environmental Management Plan - A site specific plan developed for the construction phase to ensure that all contractors and sub-contractors comply with the environmental conditions of approval and that the environmental risks are properly managed.

Acronym	Definition
DECCW	Department of Environment, Climate Change and Water (now Heritage NSW)
DPE	NSW Department of Planning and Environment
DTxx	Disturbed Terrain
EIS	Environmental Impact Statement
EMS	Environmental management system
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021* (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Act 1999* (Commonwealth)
EPL	Environment protection licence
GI	Ground Integrity
GSV	Ground Surface Visibility
km	Kilometres
LEP	Local Environmental Plan
LGA	Local Government Area
ERlu	Luddenham Erosional soil landscape
m	Metres
MGA	Map Grid of Australia 1994
mm	Millimetres
MLD	Maximum Linear Dimension
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
PACHCI	Roads and Maritime Services Procedure for Aboriginal Cultural Heritage Consultation and Investigation (2011)
PAD	Potential archaeological deposit
COpn	Picton colluvial soil landscape
Transport	Transport for NSW
RTA	Roads and Traffic Authority (now Transport for NSW)
ALsc	South Creek Alluvial soil landscape
WSO Co	WSO Co Pty Limited
WSO	Western Sydney Orbital (now Westlink M7)

Executive Summary

The Westlink M7 is an existing 39-kilometre long toll road connecting the M5 Motorway at Prestons, The Hills M2 Motorway at Baulkham Hills and the M4 Motorway at Eastern Creek ('the approved project'). Transport for NSW (Transport) is seeking a modification to the approved project to widen part of the Westlink M7 into the existing median. This is proposed in response to current and forecast traffic growth, and to improve motorway efficiency, travel time performance and safety.

Potential impacts to Aboriginal cultural heritage values as a result of the proposed modification have been assessed in accordance with the Roads and Maritime Services *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (NSW Roads and Maritime Services, 2011). This Archaeological Survey Report (ASR) documents the results of AECOM Australia Pty Ltd's (AECOM) Stage 2 PACHCI assessment for the proposed modification and has been prepared to address the relevant Secretary's Environmental Assessment Requirements (SEARs) for the modification, provided by the NSW Department of Planning and Environment (DPE) (reference number SSI-663).

The study area for this assessment has been informed by the construction footprint for the proposed modification. The construction footprint includes those areas required for roadworks, bridge works, access for construction vehicles and plant, drainage infrastructure, utilities and services adjustments, temporary stockpiles, modified or new noise walls ,temporary property adjustments and temporary construction ancillary facilities (such as construction compounds and laydown areas).

Searches of the Aboriginal Heritage Information Management System (AHIMS) database on 21 July 2021 for a 500 metre buffer zone centred on the study area (AHIMS search area) returned 162 site entries. Registered centroid coordinates for previously recorded Aboriginal sites within the AHIMS search area place 40 within or immediately adjacent (i.e., within 50 metres) to the study area. Removal of two duplicate entries for open artefact site Florence Street #1, recorded under 45-5-2322, 45-5-2379 and 45-5-3551, provides a revised total of 38 sites. Of these, eight sites, consisting of seven open artefact sites (45-5-0747, 45-5-2304, 45-5-2433, 45-5-2477, 45-5-2797, 45-5-2795, 45-5-2793) and one area of Potential Archaeological Deposit (PAD) (45-5-2974), have centroids that place them within the study area. Five are listed on the AHIMS database as 'valid' sites, with the remaining three listed as 'destroyed'. However, of the five sites listed as valid (45-5-0747, 45-5-2304, 45-5-2477, 45-5-2793, 45-5-2433), all but two (45-5-2793, 45-5-2433) should, in fact, be listed as destroyed. Open artefact site 'EC-OS-1' (45-5-2433) should be listed as partially destroyed, with survey undertaken for the current assessment confirming the destruction of that portion of the site within the fenced Westlink M7 lease area (including the study area). Open artefact site 'PAD-OS-4' (45-5-2793) should likewise be listed as partially destroyed, with that portion of the site located outside of the study area but within the Westlink M7 lease area remaining extant.

Further consideration of the location of AHIMS registered sites relative to the study area indicates that an additional five sites are located either partially within or directly adjacent to the study area. These comprise open artefact sites 'PAD-OS-5' (45-5-2723), 'PAD-OS-7' (45-5-2721), 'PAD-OS-9' (45-5-2719), 'PAD-OS-10' (45-5-2718) and 'MC-2' (45-5-0779).

Open artefact site 'PAD-OS-7' (45-5-2721), located immediately east of Villiers Road in Cecil Hills, and open artefact site 'MC2' (45-5-0779), located within the Ash Road reserve in Prestons - are located at least partially within the study area. Open artefact site 'PAD-OS-7' was identified as part of Mill's (2002) Aboriginal archaeological test excavation program for the approved project. Initially identified as an area of PAD, test excavation subsequently confirmed the presence of Aboriginal objects within the site. 'PAD-OS-7' is listed on the AHIMS database as a valid site.

Open artefact site 'MC-2' (45-5-0779) was recorded by Smith (1989) as part of an archaeological site survey and planning study for the Liverpool Release Areas. 'MC-2' is listed on the AHIMS database as a valid site. However, survey undertaken for the current assessment has confirmed that it should, in fact, be listed as destroyed.

Open artefact sites PAD-OS-5 (45-5-2723), 'PAD-OS-9' (45-5-2719) and 'PAD-OS-10' (45-5-2718) directly abut the study area within the Westlink M7 lease area. As with 'PAD-OS-7' (45-5-2721), all were identified as part of Mill's (2002) Aboriginal archaeological test excavation program for the approved project. All three sites are listed on AHIMS as valid sites but should, in fact, be listed as partially destroyed, with those sections of these sites located within the study area destroyed as a result of the approved project under National Parks and Wildlife Service (NPWS) Section 90 Consent #1396.

As required under Stage 2 of the PACHCI, this assessment has been informed in part by a site survey, which was conducted over two days in August and October 2021 (31 August and 15 October 2021). Survey was restricted to the following portions of the study area, outside of the refined construction footprint for the approved M12 Motorway project:

- Proposed construction ancillary facilities assessed as retaining, either in whole or in part, reasonable potential for the presence of Aboriginal objects in surface and/or subsurface contexts, as determined through historical aerial imagery analysis and existing archaeological datasets for the study area and environs
- Those sections of proposed construction ancillary facility access tracks associated with AHIMS registered sites whose status could not be definitively determined pre-survey (i.e., potentially valid sites).

Ultimately, a total of six areas were subject to survey, four north of Elizabeth Drive, within the boundaries of the Deerubbin Local Aboriginal Land Council (LALC) area, and two south of Elizabeth Drive, within the boundaries of the Gandangara LALC area. Two of these, encompassing potential but since discounted construction ancillary facility sites adjacent to Pike Lanes and Richmond Road in Eastern Creek and Colebee respectively, were removed from the proposed modification scope post-survey. Each survey unit was surveyed by a field team consisting of one AECOM archaeologist and one relevant LALC site officer.

A single Aboriginal site, consisting of a previously unidentified area of PAD was identified during survey. Occupying part of the potential but discounted construction ancillary facility at Pikes Lane in Eastern Creek, this PAD has been designated as 'Pikes Lane PAD' and registered on the AHIMS database (45-5-5548). Due to the findings of the survey, Transport does not propose to use this area for the proposed widening or its associated construction activities.

Consistent with available historical aerials, field observations suggest that the section of registered artefact scatter with PAD site 'EC-OS-1' (45-5-2433) located within the study area was destroyed as a result of the construction of the approved project. Registered artefact scatter site 'MC-2' (45-5-0779), formerly located within the Ash Road reserve in Prestons, inside the study area, is likewise considered to have been destroyed, with field observations confirming severe ground disturbance at the site's former location.

Desktop research and archaeological survey have identified two valid Aboriginal sites within the study area and four sites directly adjacent to it. Sites located within the study area include previously recorded open artefact site 'PAD-OS-7' (45-5-2721) and newly recorded PAD site 'Pikes Lane PAD'. Both sites are located partially within the study area, but outside the proposed construction footprint and would not be impacted by the proposed modification. A further four previously recorded open artefacts sites - 'PAD-OS-4' (45-5-2793), 'PAD-OS-5' (45-5-2723), 'PAD-OS-9' (45-5-2719) and 'PAD-OS-10' (45-5-2718) – directly abut the study area but are located outside of the proposed construction footprint for the proposed modification and would likewise not be impacted. All construction activities in the vicinity of these four sites, as well as 'PAD-OS-7' (45-5-2721),would be restricted to the construction footprint for the proposed modification and/or refined construction footprint for the approved M12 Motorway project.

Subject to implementation of the management measures presented in **Section 10.0** of this report, it is concluded that there is no trigger to proceed to Stage 3 of the PACHCI process and no further impact assessment is warranted for the proposed modification.

1.0 Introduction

The Westlink M7 is an existing 39-kilometre-long toll road connecting the M5 Motorway at Prestons, The Hills M2 Motorway at Baulkham Hills and the M4 Motorway at Eastern Creek ('the approved project'). Transport for NSW (Transport) is seeking a modification to the approved project to widen part of the Westlink M7 in response to current and forecast traffic growth, and to improve motorway efficiency, travel time performance and safety.

AECOM Australia Pty Ltd (AECOM) has been commissioned by WSO Co Pty Ltd, on behalf of Transport, to undertake an Aboriginal archaeological assessment for the proposed modification in accordance with Stage 2 of the PACHCI. This Archaeological Survey Report (ASR) details the results of AECOM's assessment and provides recommendations for the management of the identified Aboriginal heritage values of the construction footprint.

1.1 Overview of proposed modification

Transport, as the proponent for the proposed modification, is requesting that the Minister for Planning and Homes modify the planning approval for the Western Sydney Orbital (now referred to as Westlink M7) under section 5.25 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The original approval (DPE reference number SSI-663) was for the construction and operation of the existing four-traffic lane motorway. The proposed modification would provide an additional trafficable lane in both directions within the existing median of the Westlink M7. The motorway would be widened from about 140 metres south of the Kurrajong Road bridge at Prestons (southern end) to the intersection with Richmond Road in Oakhurst/Glendenning (northern end), excluding at the M4 Motorway/Westlink M7 Motorway (Light Horse) interchange. Key features of the proposed modification are shown in Figure 1-1 to Figure 1-5.

This technical assessment has been prepared to support the application for the proposed modification.

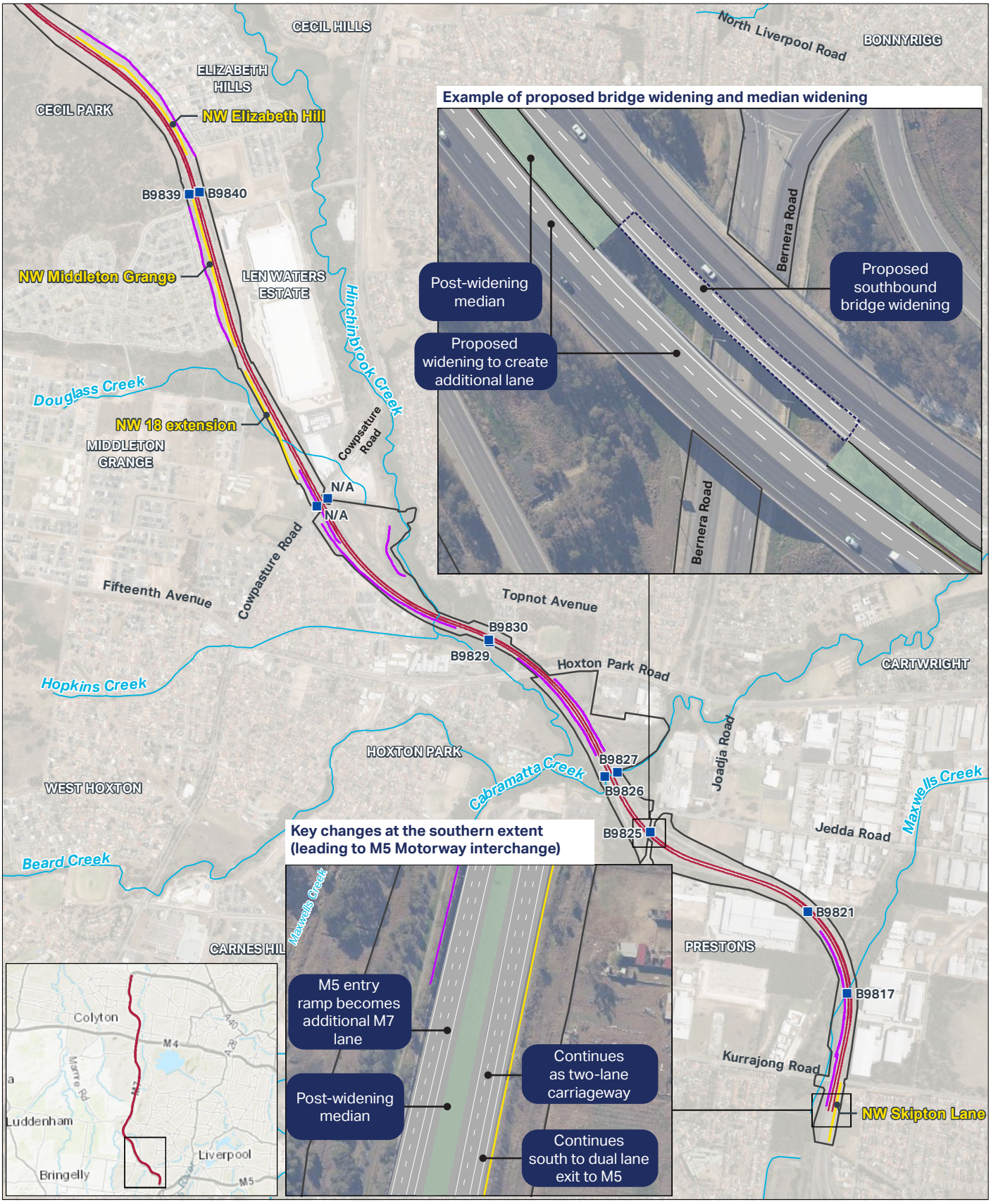

FIGURE 1-1: KEY FEATURES

N 0 400 800 m

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Legend

- Proposed widening
- Operational footprint
- Watercourse
- Existing noise wall
- New noise wall (NW####)
- Transport for NSW bridge number B9#### proposed to be widened

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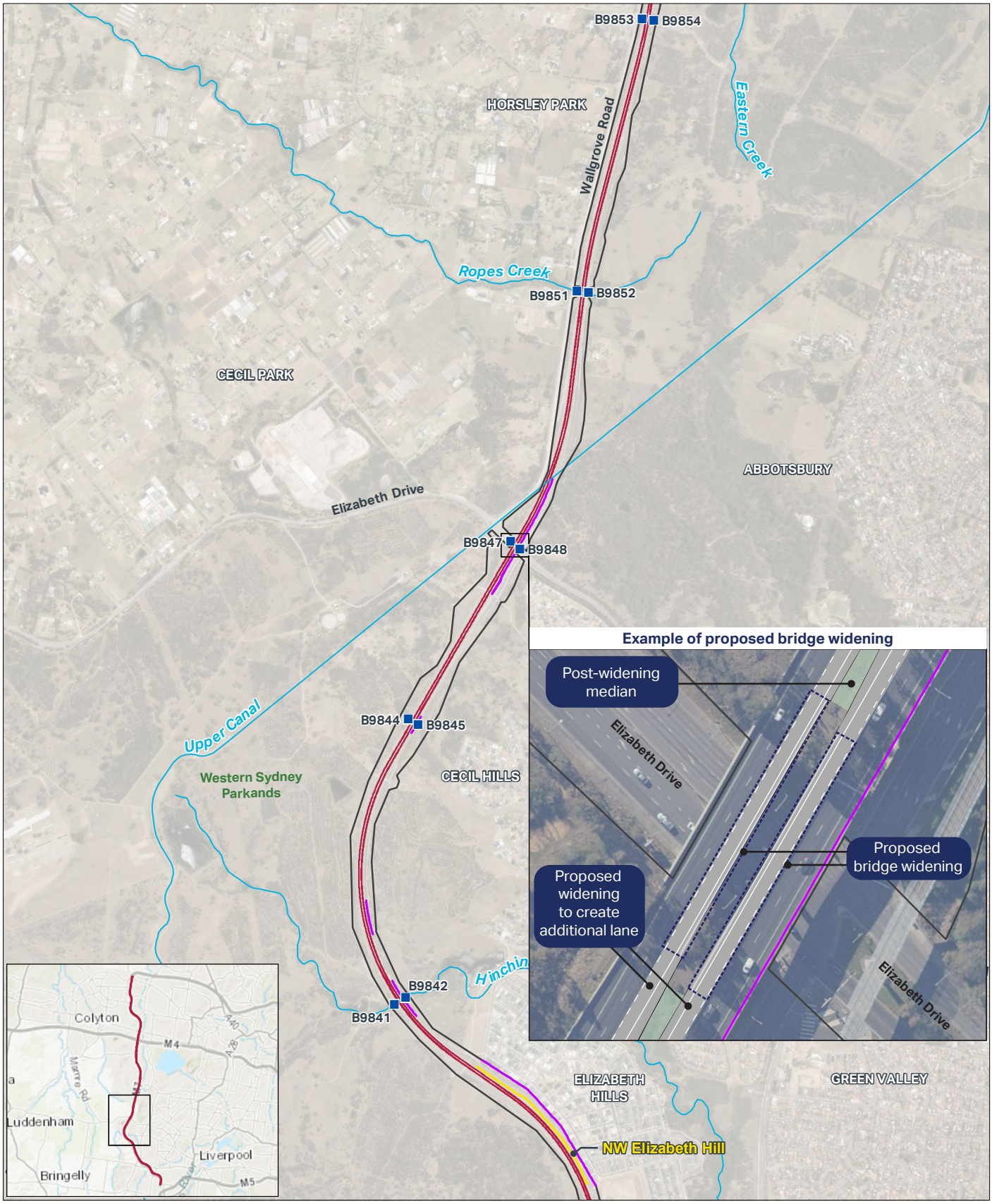

FIGURE 1-2: KEY FEATURES

N

0 400 800 m

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Legend

- Proposed widening
- Operational footprint
- Watercourse
- Existing noise wall
- New noise wall (NW####)
- Transport for NSW bridge number B9#### proposed to be widened

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FIGURE 1-3: KEY FEATURES

0 400 800 m

Legend

- Proposed widening
- Operational footprint
- Watercourse
- Existing noise wall
- Trransport for NSW bridge number B9#### proposed to be widened

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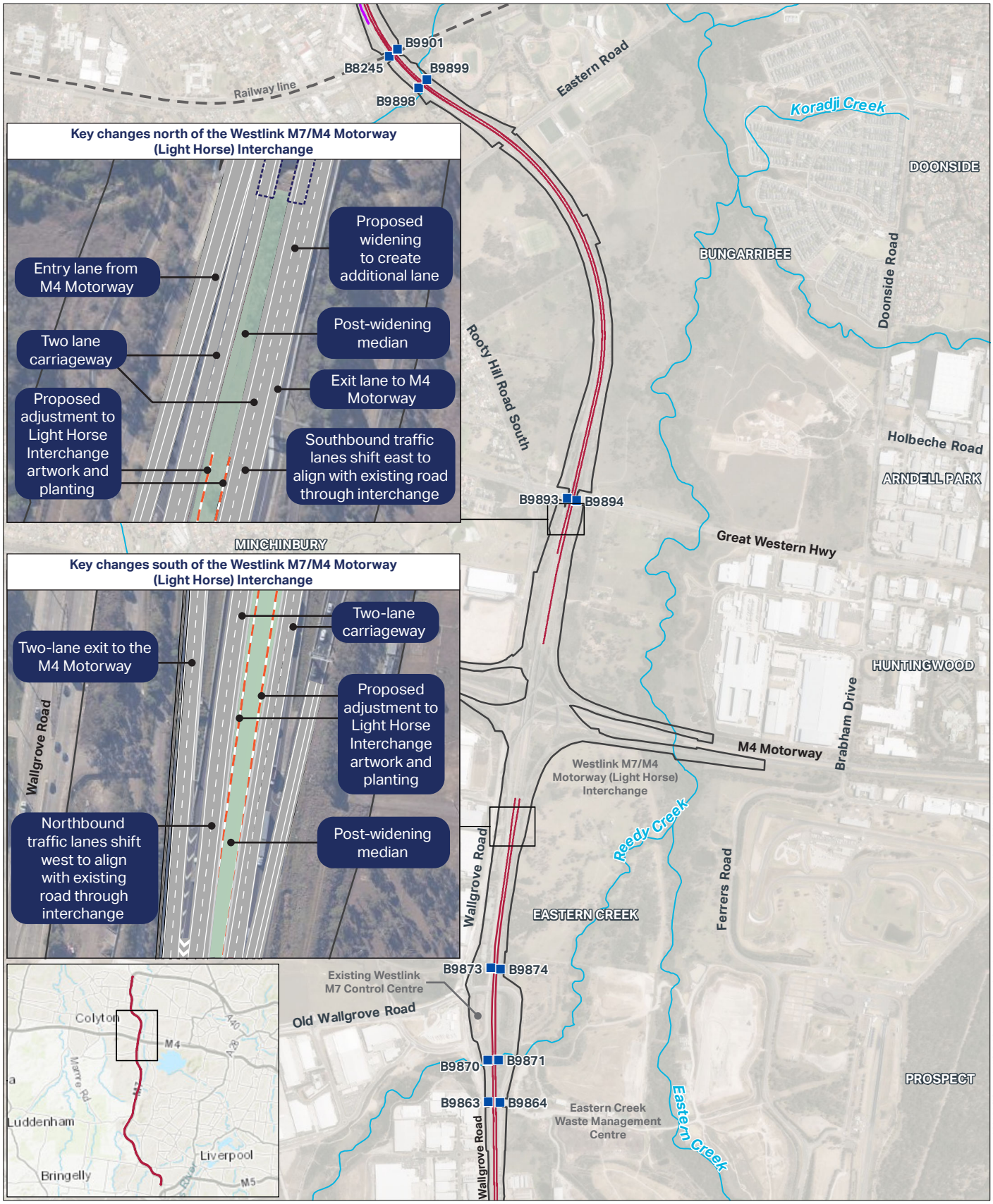

FIGURE 1-4: KEY FEATURES

N 0 400 800 m

AECOM

Legend

- Proposed widening
- Operational footprint
- Watercourse
- Existing noise wall
- Artwork potentially impacted by proposed modification
- Transport for NSW bridge number B9#### proposed to be widened

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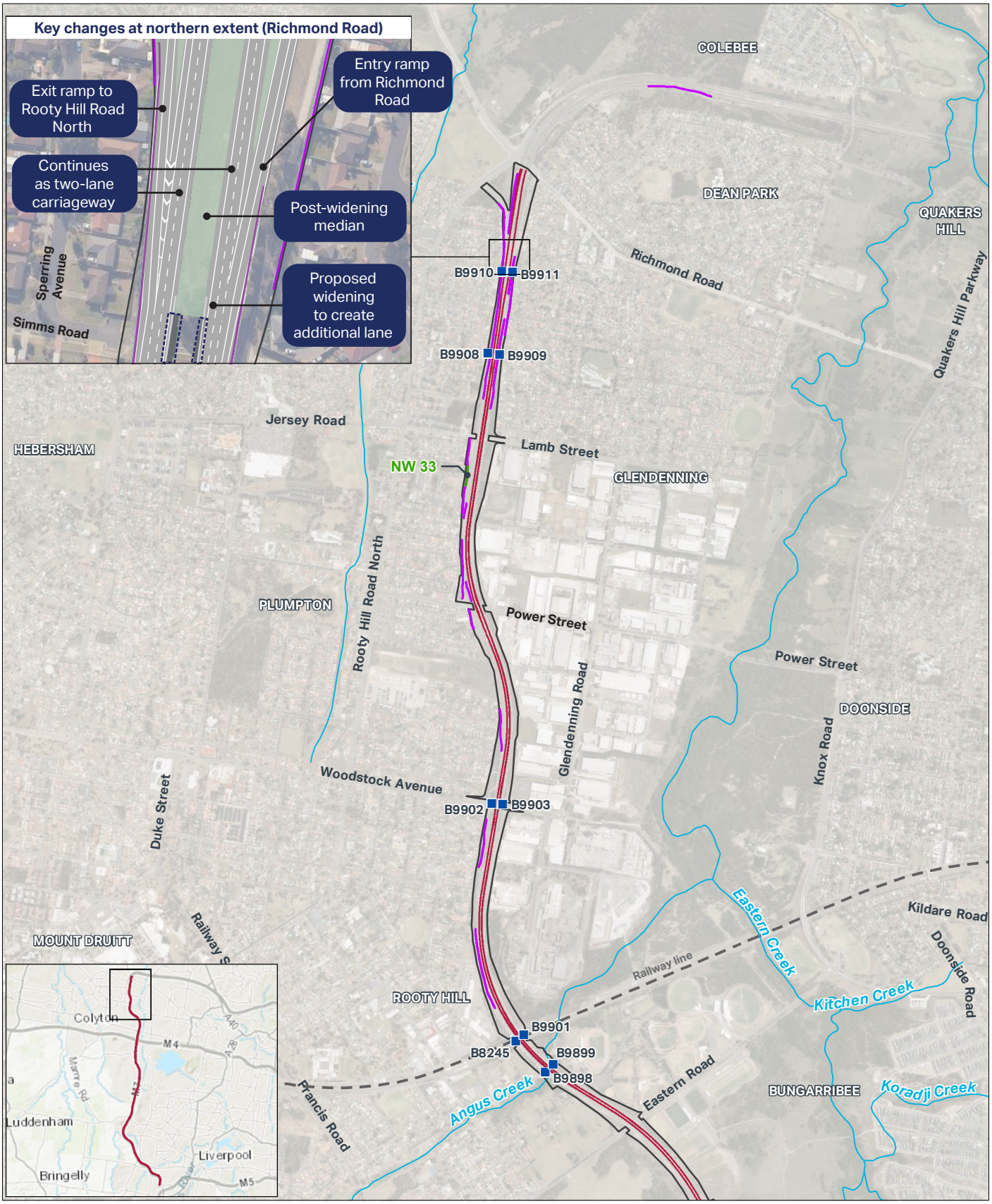

FIGURE 1-5: KEY FEATURES

Legend

- Proposed widening
- Operational footprint
- Watercourse
- Existing noise wall
- Existing noise wall height increase (NW####)
- Transport for NSW bridge number B9#### proposed to be widened

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1.2 Study area

The study area for this assessment, shown on Figure 1-6 and Figure 1-7, has been informed by the construction footprint for the proposed modification, which includes those areas required for roadworks, bridge works, access for construction vehicles and plant, drainage infrastructure, noise walls, key utilities and services adjustments, temporary stockpiles, temporary property adjustments and temporary construction ancillary facilities (such as construction compounds). It is noted that, as defined in this report, the study area includes two potential but discounted construction ancillary facility sites adjacent to Pikes Lane and Richmond Road in Eastern Creek and Colebee respectively. These were removed from the proposed modification scope following the archaeological survey detailed in Section 7.0 but have been retained as part of the study area for completeness. .

For descriptive purposes, the study area has been broken down into five (5) distinct precincts (Table 1-1). The precincts cover the study area south to north into sections of between five and 10 kilometres long. The study area precincts are illustrated in Figure 1-6 and Figure 1-7. The details of the ancillary facilities outside of the Westlink M7 lease area are listed in Table 1-2.

Table 1-1: Study area precincts

Precinct	Description
1	Prestons to Elizabeth Hills (southern extent starts north of the M5 Motorway interchange)
2	Elizabeth Hills to Horsley Park (this includes the approved M12 Motorway interchange, which is currently the intersection between the Westlink M7 and Elizabeth Drive)
3	Horsley Park to Eastern Creek
4	Eastern Creek to Rooty Hill (this includes the M4 Motorway interchange)
5	Rooty Hill to Dean Park (northern extent up to the intersection with Richmond Road)

Table 1-2: Construction ancillary facilities outside of the Westlink M7 lease area

Ancillary facility name	Site address	Identifier	Site owner	Site use	Local Government Area (LGA)	Area
Hoxton Park Road	Hoxton Park Road, Hinchinbrook	Lot 1 DP 1083454	Transport	Vacant undeveloped lot	Liverpool	0.9 ha
Len Waters Estate	20 Blackbird Close, Len Waters Estate 30 Blackbird Close, Len Waters Estate	Lot 402 DP 1141990 Lot 403 DP 1141990	Private landowner	Vacant and undeveloped	Liverpool	1.5 ha
Aviation Road	Cowpasture Road, Elizabeth Hills Part Aviation Road	Part Lot 101 DP 1158385/Aviation Road Reserve	Council	Reserve for drainage purposes	Liverpool	0.8 ha
AF8 (approved M12 Motorway compound site)	Western Sydney Parklands (east of Westlink M7, south of Elizabeth Drive)	Lot 3 DP 1087825	Western Sydney Parklands Trust	Recreational land	Liverpool	0.6 ha
AF17 (approved M12 Motorway compound site)	125-151 Wallgrove Road, Cecil Hills	Lot 24 DP1152887	Western Sydney Parklands Trust	Vacant paddock	Fairfield	5.0 ha
AF18 (approved M12 Motorway compound site)	87-95 Wallgrove Road, Cecil Park	Lot 26B DP 387529	Western Sydney Parklands Trust	Vacant paddock	Fairfield	2.1 ha
AF9 (approved M12 Motorway compound site)	84 Wallgrove Road, Cecil Park 144 Wallgrove Road, Cecil Park 112-128 Wallgrove Road, Cecil Park	Lot 11 DP1021940 Lot 12 DP1021940 Lot 14 DP1021940 Lot 13 DP1021940	Western Sydney Parklands Trust	Agricultural	Fairfield	14.9 ha

FIGURE 1-6: STUDY AREA FOR ABORIGINAL HERITAGE ASSESSMENT (SHEET 1 OF 2)

N

0 1 2 km

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Legend

Study area

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FIGURE 1-7: STUDY AREA FOR ABORIGINAL HERITAGE ASSESSMENT (SHEET 2 OF 2)

N

0 1 2 km

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Legend

Study area

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1.3 Purpose of this technical report

Potential impacts to Aboriginal cultural heritage values as a result of the proposed modification were assessed in accordance with the PACHCI) (NSW Roads and Maritime Services, 2011). This procedure outlines a four-stage process for investigating potential impacts to Aboriginal cultural heritage as a result of road planning, development, construction and maintenance activities undertaken by Transport. The four stages of the PACHCI procedure are as follows:

- **Stage 1:** Initial Transport assessment. The aim of Stage 1 is to carry out a desktop risk assessment to determine whether a Transport proposal is likely to harm Aboriginal cultural heritage or not, and whether further assessment is required.
- **Stage 2:** Further assessment and site survey. The aim of Stage 2 is to carry out further assessment and a survey with identified Aboriginal stakeholders and an archaeologist to assess a proposal's potential to harm Aboriginal cultural heritage, and to determine whether formal Aboriginal community consultation and a cultural heritage assessment report is required.
- **Stage 3:** Formal consultation and preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR). Where Stages 1 and 2 have led to the preliminary view that harm to Aboriginal objects or places would occur or is likely to occur, the statutory consultation process must take place and a cultural heritage assessment report must be prepared. Aboriginal parties must be involved in the preparation of the report in accordance with legislative requirements and Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a). Stage 3 may also involve archaeological testing in accordance with Heritage NSW's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW 2010* (DECCW, 2010b).
- **Stage 4:** Implement mitigation measures. The aim of Stage 4 is to carry out any salvage and/or proposal implementation in accordance with an Aboriginal Heritage Impact Permit (AHIP) and/or a project approval or determination under the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

In July 2021, AECOM, acting on behalf of WSO Co Pty Ltd and Transport, completed Stage 1 of the PACHCI for the proposed modification, with a search of the Aboriginal Heritage Information Management System (AHIMS) database identifying several previously recorded Aboriginal sites within and immediately surrounding the study area. Given the presence of these sites, it was determined that a Stage 2 PACHCI assessment was required to assess the likelihood of impacts and determine whether further archaeological investigations and Aboriginal community consultation under Stage 3 of the PACHCI was required.

This ASR documents the results of AECOM's Stage 2 PACHCI assessment for the proposed modification and has been prepared to inform the modification report. The aim of this report is to address the relevant Secretary's Environmental Assessment Requirements (SEARs) for the modification, provided by the NSW Department of Planning and Environment (DPE) (DPE reference number SSI-663).

1.3.1 Secretary's Environmental Assessment Requirements

In preparing this report, the SEARs issued for the proposed modification have been addressed. Key matters raised by the Secretary for consideration in relation to Aboriginal heritage and where this report addresses these are outlined in Table 1-3.

Table 1-3: SEARs - Aboriginal heritage

Desired Performance Outcome	SEAR	Where addressed within the Modification Report
4. Heritage – Aboriginal Cultural Heritage The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of Aboriginal objects and places. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of Aboriginal objects and places.	1. The Proponent must provide an assessment of Aboriginal cultural heritage, prepared in accordance with relevant sections of the current guidelines, identifying, describing and assessing potential impacts to Aboriginal cultural heritage sites or values associated with the modification.	Refer to: • **Section 2.2** • **Section 5.0** • **Section 7.0** • **Section 8.0** • **Section 9.0**
	2. The Proponent must provide evidence of consultation with Aboriginal communities in determining and assessing impacts, developing and selecting options and mitigation measures (including the final proposed measures), in accordance with relevant sections of current guidelines.	Refer to: • **Section 2.2** • **Section 10**

1.4 Investigator and contributors

The primary investigator for the current assessment was Dr Andrew McLaren, Principal Aboriginal Heritage Specialist for AECOM. Andrew holds a Bachelor of Arts (Honours) from the University of Queensland, Brisbane, a Master of Cultural Heritage from Deakin University, Melbourne, and a PhD in archaeology from the University of Cambridge, England. He has over 12 years of Australian cultural heritage management experience and specialises in Aboriginal archaeology. McLaren was the primary author of this report and led the archaeological survey detailed in **Section 7.0**. Other assessment/report contributors are listed in Table 1-4.

Table 1-4: Contributors

Contributor	Affiliation (Position)	Assessment role
Steve Randall	Deerubbin LALC (Cultural Heritage Officer)	Survey
Darren Duncan	Gandangara LALC (Cultural Heritage Officer)	Survey
Strini Pillai	Gandangarra LALC (Project Manager – Ecologist and Land Manager)	Cultural heritage survey report
Kate McGrath	AECOM (Principal Scientist)	Reporting (**Table 4-3** and **Table 5-1**)
Rebecca Hibberd	AECOM (Graduate Archaeologist)	Reporting
Tilly Stevens	AECOM (Heritage Specialist)	Reporting
Geordie Oakes	AECOM (Principal Heritage Specialist)	Technical review
Mackenzie Austin	AECOM (GIS Analyst)	Graphics

Contributor	Affiliation (Position)	Assessment role
Kelly Pearsall	AECOM (Group Director - Environment, NSW + ACT)	Verification

1.5 Structure of this technical report

This technical report is structured as follows:

- **Section 1.0 Introduction**: This section provides background information on the proposed modification and the current Stage 2 PACHCI assessment
- **Section 2.0 Method of assessment:** This section outlines the statutory framework within which this assessment has been undertaken and describes the methods used to assess the proposed modification as it relates to Aboriginal heritage
- **Section 3.0 Proposed Modification**: This section provides a description of the proposed modification including construction and operational activities
- **Section 4.0 Environmental context**: This section describes the existing environment of the study area and considers its archaeological implications
- **Section 5.0 Archaeological context**: This section describes the archaeological context of the study area on a regional and local scale. Predictions regarding the nature of the study area's Aboriginal archaeological record are also provided.
- **Section 6.0 Ethnohistoric context:** This section summarises relevant ethnohistoric information for the study area.
- **Section 7.0 Archaeological survey:** This section describes the archaeological survey undertaken to inform this assessment
- **Section 8.0 Significance assessment:** This section assesses the archaeological (scientific) and cultural significance of Aboriginal sites within the study area
- **Section 9.0 Impact assessment:** This section provides an assessment of the potential impacts of the proposed modification on identified Aboriginal heritage values
- **Section 10.0 Mitigation and management measures:** This section documents the measures that are proposed to manage potential Aboriginal heritage impacts associated with the proposed modification (taking into account the existing Conditions of Approval for the approved project)
- **Section 11.0 Conclusion:** This section summarises the results of the impact assessment and briefly describes the recommended management measures.

2.0 Method of assessment

This section describes the method of assessment used in this technical assessment report, and also outlines the legislation, guidelines and policy that are relevant to the assessment.

2.1 Relevant legislation, guidelines and policy

2.1.1 Commonwealth legislation

2.1.1.1 Aboriginal and Torres Strait Islander Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (the ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The stated purpose of the ATSIHP Act is the "preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition" (Part I, Section 4).

Under the Act, 'Aboriginal tradition' is defined as "*the body of traditions, observances, customs and beliefs of Aboriginals generally or of a particular community or group of Aboriginals, and includes any such traditions, observances, customs or beliefs relating to particular persons, areas, objects or relationships*" (Part I, Section 3). A 'significant Aboriginal area' is an area of land or water in Australia that is of "*particular significance to Aboriginals in accordance with Aboriginal tradition*" (Part I, Section 3). A 'significant Aboriginal object', meanwhile, refers to an object (including Aboriginal remains) of like significance.

For the purposes of the ATSIHP Act, an area or object is considered to have been injured or desecrated if:

a. In the case of an area:
    i. it is used or treated in a manner inconsistent with Aboriginal tradition;
    ii. the use or significance of the area in accordance with Aboriginal tradition is adversely affected; and
    iii. passage through, or over, or entry upon, the area by any person occurs in a manner inconsistent with Aboriginal tradition
b. in the case of an object:
    i. it is used or treated in a manner inconsistent with Aboriginal tradition.

The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a declaration to protect an area or object. However, the Minister can only make a decision after receiving a legally valid application under the ATSIHP Act and, in the case of long-term protection, after considering a report on the matter. Before making a declaration to protect an area or object in a state or territory, the Commonwealth Minister must consult the appropriate minister of that state or territory (Part 2, Section 13).

No declarations relevant to the study area have been made under the ATSIHP Act.

2.1.1.2 Native Title Act 1993

The *Native Title Act 1993* (NTA) provides for the recognition and protection of native title for Aboriginal peoples and Torres Strait Islanders. The NTA recognises native title for land over which native title has not been extinguished and where persons able to establish native title are able to prove continuous use, occupation or other classes of behaviour and actions consistent with a traditional cultural possession of those lands. It also makes provision for Indigenous Land Use Agreements (ILUA) to be formed as well as a framework for notification of Native Title Stakeholders for certain future acts on land where Native Title has not been extinguished.

Searches of the *National Native Title Register*, *Register of Native Title Claims* and *Register of Indigenous Land Use Agreements* were undertaken in October 2021 for the Blacktown, Fairfield and

Liverpool Local Government Areas (LGAs). These searches returned no registered native title determinations, claims or ILUAs.

2.1.1.3 Environment Protection and Biodiversity Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) took effect on 16 July 2000. Under Part 9 of the EPBC Act, any action that is likely to have a significant impact on a Matter of National Environmental Significance may only progress with approval of the Commonwealth Minister for the Environment. An action is defined as a project, development, undertaking, activity, series of activities, or alteration. An action will also require approval if:

- It is undertaken on Commonwealth land and will have or is likely to have a significant impact;
- It is undertaken outside Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; and
- It is undertaken by the Commonwealth and will have or is likely to have a significant impact.

The EPBC Act defines 'environment' as incorporating both natural and cultural environments and therefore includes Aboriginal heritage. Under the Act, protected heritage items are listed on the National Heritage List (items of significance to the nation) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate (RNE), which was closed in 2007 and is no longer a statutory list. Statutory references to the RNE in the EPBC Act were removed on 19 February 2012. However, the RNE remains an archive of over 13,000 heritage places throughout Australia.

A search of the Australian Heritage Database, which includes places listed on the World Heritage List (WHL), National Heritage List (NHL), Commonwealth Heritage List (CHL), RNE and List of Overseas Places of Historic Significance to Australia, was undertaken in October 2021, with no relevant Aboriginal listings identified for the study area.

2.1.2 State Legislation

2.1.2.1 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) was established to return land in NSW to Aboriginal peoples through a process of lodging claims for certain Crown lands. The Act, administrated by the NSW Department of Aboriginal Affairs, is a compensatory regime which recognises that land is of spiritual, social, cultural and economic importance to Aboriginal people.

The ALR Act establishes the NSW Aboriginal Land Council (NSWALC) and a network of over 120 autonomous Local Aboriginal Land Councils (LALCs) and requires these bodies to:

a. take action to protect the culture and heritage of Aboriginal persons in the LALC's area, subject to any other law

b. to promote awareness in the community of the culture and heritage of Aboriginal persons in the LALC's area.

LALCs constituted under the ALR Act can make claims. The Registrar of the ALR Act has responsibility for maintaining the Register of Aboriginal Land Claims under section 166 of the Act. All land claims that have been made since the Act came into force in 1983 have been recorded in the Register.

Under Section 36(1) of the ALR Act 'claimable Crown lands' are defined as those that:

a. are able to be lawfully sold or leased, or are reserved or dedicated for any purpose, under the *Crown Lands Consolidation Act 1913* or the *Western Lands Act 1901*,

b. are not lawfully used or occupied,

b1. do not comprise lands which, in the opinion of the Crown Lands Minister, are needed or are likely to be needed as residential lands,

c. are not needed, nor likely to be needed, for an essential public service,

d. do not comprise lands that are the subject of an application for a determination of native title (other than a non-claimant application that is an unopposed application) that has been registered in accordance with the Commonwealth Native Title Act, and

e. do not comprise lands that are the subject of an approved determination of native title (within the meaning of the Commonwealth Native Title Act) (other than an approved determination that no native title exists in the lands).

A search of the Crown Lands database on 15 November 2021 identified two relevant land claims for the proposed modification: claim numbers 15704 and 15701, lodged by the Gandangara LALC on 19 March 2008 for Lot 101 DP1158385 in Elizabeth Hills and Lot 3 DP1087825 in Cecil Park respectively. Both claims were subsequently refused and thus have no bearing on the current assessment or proposed modification.

2.1.2.2 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act), administered by DPE, requires that consideration be given to environmental impacts as part of the land use planning process in NSW. In NSW, environmental impacts are interpreted as including impacts to Aboriginal and non-Aboriginal (i.e. European) cultural heritage.

Approval for the construction and operation of the Westlink M7 was granted on 28 February 2002 under the then Division 4, Part 5 of the EP&A Act. The approval granted consent for the construction and operation of a 39-kilometre-long, four traffic lane motorway with a 15-metre-wide central median, from the F5/M5 Motorway at Prestons in the south to the M2 Motorway at West Baulkham Hills in the north.

An Order was made by the Minister for Planning which came into effect on 26 April 2019 to make the original approval for the Western Sydney Orbital (now known as the Westlink M7) subject to the current State Significant Infrastructure (SSI) provisions of the EP&A Act (Division 5.2, Part 5). As such, the approved project is SSI under the Act (reference number SSI-663).

To facilitate the widening of the Westlink M7, modifications to the approved project would be required to allow for the construction and operation of additional through traffic lanes that were not assessed as part of the approved project. Accordingly, Transport as the proponent for the proposed modification, is preparing a request to the Minister to modify the project planning approval for the Westlink M7 under section 5.25 of the EP&A Act.

Pursuant to section 4.41 of the EP&A Act, AHIPs are not required for approved SSI projects. Impacts to Aboriginal heritage values associated with such projects are typically managed under Aboriginal Cultural Heritage Management Plans (ACHMPs), which are statutorily binding once approved by DPE.

An Indigenous Heritage Archaeology Management Sub Plan (IHMSP) for the approved project was finalised in June 2004 (Abigroup Leighton Joint Venture, 2004). Further information on the IHMSP is provided in **Section 2.1.4.1**.

2.1.2.3 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by Heritage NSW, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Director-General of the Department of the Premier and Cabinet (DPC) responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined under the Act as follows:

- An *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of NSW, before or during the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains)
- An *Aboriginal place* is a place declared so by the Minister administering the NPW Act because the place is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects.

Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm them and includes a 'strict liability offence' for such harm. A 'strict liability offence' does not require someone to know that it is an Aboriginal object or place they are causing harm to in order to be prosecuted. Defences against the 'strict liability offence' in the NPW Act include the carrying out of certain 'Low Impact Activities', prescribed in clause 58 of the *National Parks and Wildlife Amendment Regulation 2019* (NPW Regulation), and the demonstration of due diligence.

An Aboriginal Heritage Impact Permit (AHIP) issued under section 90 of the NPW Act is required if impacts to Aboriginal objects and/or places cannot be avoided. An AHIP is a defence to a prosecution for harming Aboriginal objects and places if the harm was authorised by the AHIP and the conditions of that AHIP were not contravened.

Applications for AHIPs must be supported by an ACHAR compiled in accordance with section 3 of Heritage NSW's *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and an Aboriginal Archaeological Report (AAR) compiled in accordance with section 2.3 of Heritage NSW's *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b). A process of Aboriginal community consultation carried out in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a) must also be demonstrated. AHIPs may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons.

As indicated in **Section 2.1.2.2**, pursuant to section 4.41 of the EP&A Act, AHIPs are not required for approved SSI projects. Impacts to Aboriginal heritage values associated with such projects are typically managed under ACHMPs, which are statutorily binding once approved by DPE.

Section 89A of the NPW Act requires notification of the location of Aboriginal sites within a reasonable time, with penalties for non-notification. Section 89A is binding in all instances, including SSI projects.

2.1.3 Local Government

Local environmental plans (LEPs) do not apply to SSI projects. Regardless, the heritage schedules of the following LEPs have been considered for this assessment:

- Blacktown Local Environmental Plan 2015 (Blacktown LEP 2015)
- Fairfield Local Environmental Plan 2013 (Fairfield LEP 2013)
- Liverpool Local Environmental Plan 2008 (Liverpool LEP 2008)

Reference to the above indicates that there are no Aboriginal objects or places of Aboriginal heritage significance listed in these schedules that are located within or immediately adjacent to the study area.

2.1.4 Other applicable procedures and management plans

2.1.4.1 Transport PACHCI

As detailed in Section 1.3, the PACHCI outlines a four-stage process for investigating potential impacts to Aboriginal cultural heritage as a result of Transport's road planning, development, construction and maintenance activities.

This ASR documents the results of a Stage 2 PACHCI assessment for the proposed modification and has been prepared to inform the modification report. The aim of this report is to address the relevant SEARs for the modification, provided by the DPE (reference number SSI-663).

2.1.4.2 Westlink M7 Indigenous Heritage Archaeology Management Sub Plan

As indicated in **Section 2.1.2.2**, an IHMSP for the approved project was finalised in June 2004 (Abigroup Leighton Joint Venture, 2004). The plan was prepared in consultation with Aboriginal stakeholder groups involved in the Western Sydney Orbital (WSO) Environmental Impact Statement (EIS), as well as the NSW National Parks and Wildlife Service (NPWS). The stated objectives of the IHMSP were:

- To ensure the appropriate management and protection of Aboriginal sites affected by the construction and/or operational phases of the Westlink M7
- To ensure the protection of previously undetected Aboriginal heritage material during the construction phase of the Westlink M7
- To involve relevant Aboriginal stakeholder groups in its formulation and implementation
- To detail all relevant licences and approvals.

Annexure A of the IHMSP, reviewed as part of this assessment, provides summary information on all Aboriginal sites that were identified as having the potential to be affected by the approved project (n = 56), including associated management strategies and NPWS Consent to Destroy permit numbers (where applicable). Management strategies detailed in the IHMSP (n = 5) included:

- Protective fencing of sites located within the Westlink M7 (Strategy 1)
- Protective fencing of sites located outside of the Westlink M7 (Strategy 2)
- Archaeological monitoring and salvage of impacted sites in accordance with associated NPWS Consent to Destroy permits (Strategies 3 & 4)
- Actions to be taken in the event of the discovery of previously undetected Aboriginal cultural heritage material (Strategy 5).

Reference to section 4.3 of the IHMSP indicates that archaeological salvage works for the approved project commenced in February 2003. AECOM understands that these works were completed by May 2003, with salvage excavations ultimately undertaken at the following AHIMS registered Aboriginal sites:

- PAD-OS-1 (45-5-2725)
- PAD-OS-4 (45-5-2793)
- PAD-OS-5 (45-5-2723)
- PAD-OS-7 (45-5-2721)
- PAD-OS-9 (45-5-2719)
- PAD-OS-13 (45-5-2717)
- PAD-OS-15 (45-5-2716)
- PAD-OS-17 (45-5-2714)
- PAD-OS-11 (Plumpton Ridge PAD) (45-5-245 / 45-5-2647).

(Barry, 2005: 56; F.Barry, Senior Environment Officer (Heritage), TfNSW, pers. comm., 6 June 2022)

2.2 Method of assessment

The methodology used for the preparation of this ASR was guided by the PACHCI and Heritage NSW's *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. It involved a combination of desktop research, consultation with key Aboriginal stakeholders and a site survey. Each component is described in further detail as follows.

2.2.1 Desktop research

The desktop component of this assessment involved:

- Searches of the National Native Title Register, Register of Native Title Claims and Register of Indigenous Land Use Agreements
- A search of the NSW Register of Aboriginal Land Claims (for Crown land parcels within the Westlink M7 lease area)
- Searches of relevant heritage databases and lists, including:
    - the Australian Heritage Database, covering the WHL, NHL, CHL, RNE and List of Overseas Places of Historic Significance to Australia
    - the NSW AHIMS database
    - the NSW State Heritage Inventory
    - Schedule 5 of the Blacktown LEP 2015
    - Schedule 5 of the Fairfield LEP 2013

- Schedule 5 of the Liverpool LEP 2008

- A review of the landscape context of the study area, with specific consideration to its implications for past Aboriginal land use and the survival of associated archaeological materials
- A review of past Aboriginal heritage assessment reports prepared to inform both the construction of the Westlink M7 and other development projects in its vicinity (including the approved M12 Motorway)
- A critical review of existing AHIMS data for the study area and its environs, including site cards, undertaken to clarify existing site locations and extents
- A review of the IHMSP prepared for the Westlink M7, to assist in determining previously implemented management strategies and current site statuses.

2.2.2 Consultation with key Aboriginal stakeholders

Key Aboriginal stakeholders for this assessment were identified by Transport in accordance with the PACHCI. Identified stakeholders included the Deerubbin LALC and the Gandangara LALC, with the Deerubbin LALC providing input for all areas north of Elizabeth Drive and the Gandangara LALC, providing input for all areas south of Elizabeth Drive, as per their respective LALC boundaries (see Figure 2-1) Both LALCs provided site officers for participation in the site survey undertaken to inform this assessment and produced their own cultural heritage survey reports, as per the PACHCI. These reports are attached as **Appendix A**.

Both LALCs were consulted throughout the production of this report for the purposes of discussing the survey results presented in Section 7.0 and providing additional information regarding changes to the proposed modification. To assist with the production of their own reports, both LALCs were provided with a draft of this report on 23 May 2022 and an updated draft on 6 June 2022.

2.2.3 Archaeological survey

The archaeological survey undertaken to inform the current assessment was completed over two days in August and October 2021 (31 August and 15 October 2021), with survey restricted to those portions of the study area either known to contain potentially valid AHIMS sites or assessed as retaining reasonable potential for the presence of Aboriginal objects in surface and/or subsurface contexts. Areas selected for survey were identified on the basis of the desktop research described in **Section 2.2.1**.

Ultimately, a total of six areas were subject to survey, four north of Elizabeth Drive, within the boundaries of the Deerubbin LALC, and two south of Elizabeth Drive, within the boundaries of the Gandangara LALC. In all instances, survey was undertaken on foot by a field team consisting of one AECOM archaeologist (Dr Andrew McLaren) and one relevant LALC site officer, with Steve Randall attending for the Deerubbin LALC and Darren Duncan for the Gandangara LALC. Additional information on the survey undertaken for the current assessment is provided in **Section 7.0**.

2.3 Assumptions and limitations

Predictions have been made within this report about the likelihood of subsurface Aboriginal archaeological deposits occurring across the study area, based on existing environmental and archaeological datasets, as well as field observations. However, it should be noted that such deposits can in occur in any environmental context.

Information regarding previously recorded Aboriginal sites within and surrounding the study area was obtained by AECOM through:

- Searches of the NSW AHIMS database
- A review of past Aboriginal heritage assessment reports prepared to inform both the construction of the existing Westlink M7 and other development projects in its vicinity (including the approved M12 Motorway project)
- A review of the final IHMSP for the approved project (Abigroup Leighton Joint Venture, 2004).

Regarding the AHIMS database, it is noted that coordinate errors are a common feature of this database, as are duplicate site entries, incorrect site statuses and types, and site content

omissions/errors. Given these issues, all Aboriginal site data sourced from the AHIMS database for this assessment was checked/validated against that available in original assessment reports and/or lodged site cards, as well as the IHMSP for the approved project.

This report is based on the reference design and is subject to detailed design. It is noted that during detailed design, details of the proposed modification may change or be refined. Further heritage assessment may be required to assess the potential additional impacts to heritage during detailed design.

A summary of the statutory requirements regarding Aboriginal heritage is provided in **Section 2.1**. The summary is provided based on the experience of the authors with the heritage system in Australia and does not purport to be legal advice. It should be noted that legislation, regulations and guidelines change over time and users of the report should satisfy themselves that the statutory requirements have not changed since this report was written.

FIGURE 2-1: STUDY AREA AND LOCAL ABORIGINAL LAND COUNCIL BOUNDARIES

N 0 1 2 km

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Legend

- Study area
- Local Aboriginal Land Council boundary

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3.0 Proposed modification

The proposed modification would permit the addition of a trafficable lane in both directions within the existing median of the Westlink M7. A full description of the construction activities and operational features are provided in detail in **Chapter 4** (Proposed modification) of the Modification Report.

The proposed modification to the approval for the Westlink M7 would include the following key operational components (refer also to Figure 1-1 to Figure 1-5):

- Widening of the motorway into the existing median for a length of about 26 kilometres along the Westlink M7, from about 140 metres south of the Kurrajong Road overhead bridge at Prestons (southern end) to Richmond Road interchange in Oakhurst/Glendenning (northern end), excluding at the M4 Motorway/Westlink M7(Light Horse) Interchange
- Widening the exit from the Westlink M7 northbound onto the M4 Motorway westbound from one lane to two lanes
- Widening of 43 existing northbound and southbound bridges on the Westlink M7 at 23 locations within the centre median, and widening on outside of the bridges on the approach to the M4 Motorway from Old Wallgrove Road
- Upgrades, additions and modifications to noise walls
- Utility works and upgrades to drainage
- Intelligent Transport System (ITS) installations, adjustments and relocations to cover the new lane configurations.

Existing operational features impacted by the proposed modification would include:

- Main road alignment, including median and bridge areas
- Interchanges, tie-ins and entry/exit ramps
- Fill embankments and cuttings
- Culverts and drainage structures
- Water quality control measures, including basins
- Landscaping
- Existing public art and landscaping at the M4 (Light Horse) Interchange
- Maintenance access
- Security fencing
- Noise barriers
- Shared path
- Other associated elements required during operation (for example, intelligent transport systems (ITS), utilities and variable message signs (VMS)).

The following activities would be required to facilitate construction of the proposed modification:

- Establishment of several construction ancillary facilities within and adjacent to the Westlink M7 and the M12 Motorway construction area. These would be used for stockpiling, construction support at bridge and median widening locations, project offices and compounds. The precise number and location of construction ancillary facilities would be determined by the construction contractor in accordance with the environmental approval
- Vegetation clearing within the widening areas and construction ancillary facilities (including construction accesses)
- Demolition of existing structures and infrastructure within the widening areas

- Provision of temporary water management infrastructure including the maintenance of stormwater drainage and establishment of waterway crossings and diversions
- Utility works within Westlink M7 and adjoining roads, particularly around existing motorway bridge substructures
- Earthworks for bridge and road widening within the existing median, and placement and compaction of fill material likely to result in a net amount of cut material
- Bridge widening works to existing structures including establishment of substructures including piles, abutments, piers and headstocks and superstructures including beams, girders, decks and barriers
- Pavement widening works within the road median
- Finishing works including asphalting the carriageway surface, line marking, signage, permanent barriers and median infill, adjustments to noise walls, installation of communications infrastructure and landscaping treatments.

Construction would likely commence in 2023 and continue through to the end of 2025. The construction program for the M12 Motorway interface has been considered in the development of this program. It is proposed to undertake the proposed modification at this interchange at the same time as the approved M12 Motorway project works to minimise disruption and achieve efficiencies during construction.

4.0 Environmental Context

This section describes the landform context of the study area as a basis for interpreting the results of the archaeological survey detailed in **Section 7.0**. Consideration of the landscape context of the study area is based on the proposition that the nature and distribution of Aboriginal archaeological materials are closely connected to the environments in which they occur. Environmental variables such as topography, geology, hydrology and the composition of local floral and faunal communities will have played an important role in influencing how Aboriginal people moved within and utilised their respective Country. Amongst other things, these variables will have affected the availability of suitable campsites, drinking water, economic plant and animal resources, and raw materials for the production of stone and organic implements. At the same time, an assessment of historical and contemporary land use activities, as well as geomorphic processes such as soil erosion and aggradation, is critical to understanding the formation and integrity of archaeological deposits, as well as assessments of subsurface archaeological potential.

4.1 Topography and drainage

Topography and drainage across the study area are summarised in Table 4-1 and shown on Figure 4-1.

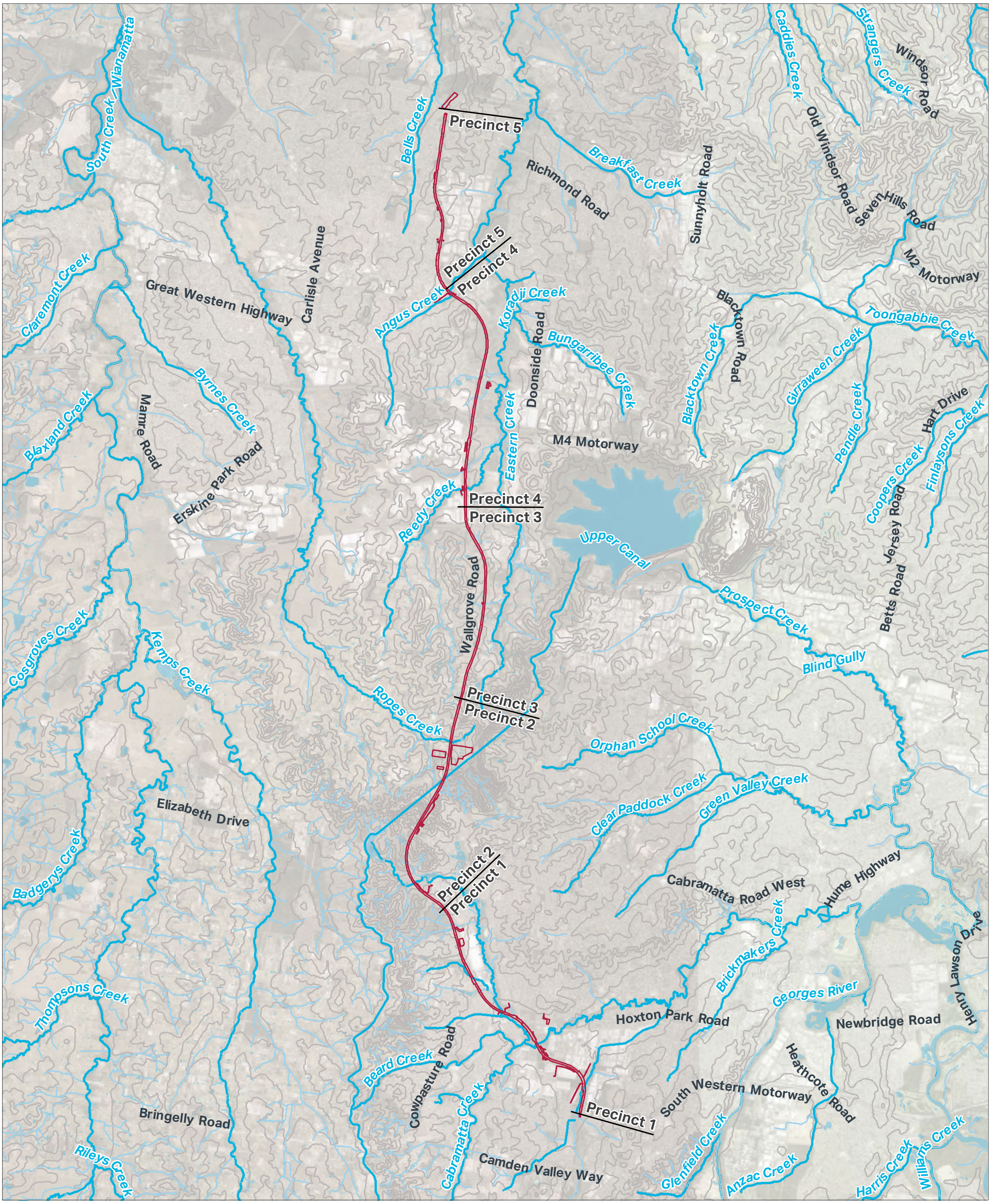

FIGURE 4-1: DRAINAGE AND TOPOGRAPHY WITHIN AND SURROUNDING THE STUDY AREA

AECOM

Legend

- Study area
- Waterbody
- Watercourse
- Drainage line
- 10m contour

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Table 4-1: Drainage and topography summary

Precinct	Landscape	Elevation range	Drainage
1- Prestons to Elizabeth Hills	Gently undulating rises. Broad rounded crests and ridges with gently inclined slopes (Blacktown Residual (REbt) soil landscape) Flat to gently sloping alluvial plain with occasional terraces/levees (South Creek Alluvial (ALsc) soil landscape) - Douglass Creek, Maxwells Creek, Hopkins Creek, Cabramatta Creek	26 metres Australian Height Datum (AHD) (Prestons) - 54 metres AHD (Elizabeth Hills)	Intercepts various water bodies including Maxwells Creek (north or Kurrajong Road), Cabramatta Creek, Hinchinbrook Creek, and Douglass Creek tributaries (between south of Hoxton Park Road to north of Cowpasture Road)
2 - Elizabeth Hills to Horsley Park including Westlink M7 interchange with approved M12 Motorway	Low rolling to steep low hills. Convex narrow ridges and hillcrests grade into moderately inclined sideslopes with narrow concave drainage lines (Luddenham Erosional (ERlu) soil landscape) Steep low hills on fine textured Wianamatta Group shales (Picton Colluvial (COpn) soil landscape)	54 metres AHD (Elizabeth Hills) - 112 metres AHD (Horsley Park). Ridge of 136 metres AHD just south of the approved M12 Motorway interchange with Westlink M7	Intercepts Ropes Creek north of Elizabeth Drive. Intercepts Hinchinbrook Creek and tributaries at various locations near Elizabeth Hills (within Western Sydney Parklands). Intercepts Ropes Creek about one kilometre north of Elizabeth Drive.
3 - Horsley Park to Eastern Creek	Low rolling to steep low hills. Convex narrow ridges and hillcrests grade into moderately inclined sideslopes with narrow concave drainage lines (ERlu soil landscape) Gently undulating rises. Broad rounded crests and ridges with gently inclined slopes (REbt soil landscape)	114 metres AHD (Horsley Park) – 64 metres AHD (Eastern Creek)	No major water bodies identified.

Precinct	Landscape	Elevation range	Drainage
4 - Eastern Creek to Rooty Hill, including Westlink M7 interchange with M4 Motorway	Gently undulating rises. Broad rounded crests and ridges with gently inclined slopes (REbt soil landscape) Flat to gently sloping alluvial plain with occasional terraces/levees (ALsc soil landscape) - Eastern Creek and Reedy Creek	60 metres AHD (Eastern Creek) – 38 metres AHD (Rooty Hill)	Intercepts Reedy Creek at the Old Wallgrove (OWG) Road interchange with Westlink M7. Intercepts Eastern Creek tributaries at various locations north of the OWG interchange up to the Westlink M7 intersection with The Great Western Highway.
5 - Rooty Hill to Dean Park	Gently undulating rises. Broad rounded crests and ridges with gently inclined slopes (Blacktown (REbt) soil landscape) – majority of precinct Flat to gently sloping alluvial plain (South Creek (ALsc) soil landscape) - Angus Creek	38 metres AHD (Rooty Hill) – 42 metres AHD (Dean Park). Ridges of 50 – 54 metres AHD) throughout.	Intercepts Angus Creek south of the rail line at Rooty Hill.

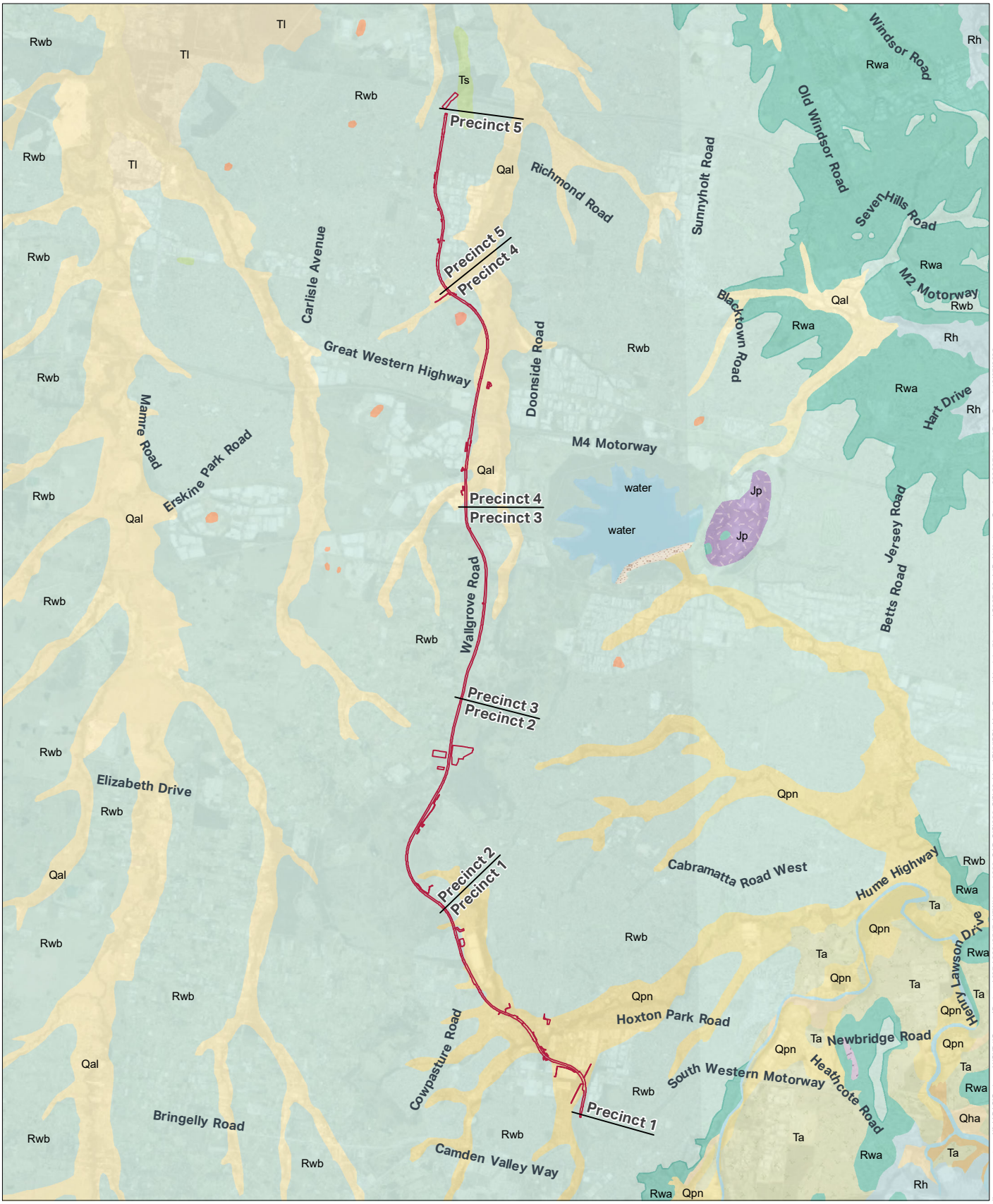

FIGURE 4-2: SURFACE GEOLOGY WITHIN AND SURROUNDING THE STUDY AREA

Legend

Study area

100K Geology

- water
- Jp
- Jv
- Jvs
- Qal
- Qha
- Qht
- Qpn
- Rh
- Rwa
- Rwb
- Rwm
- Ta
- Tc
- Tl
- Ts
- mf/Rwb

N

0 1 2 km

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4.2 Surface geology

The study area is underlain by the following geologies, as shown on Figure 4-2:

- **Rwb**: Bringelly shale from the Middle Triassic Wianamatta group. Deposited in a swampy alluvial plain, the Bringelly Shale has been described as a "complex formation of different lithologies" (Bembrick et al., 1991: 17). These include claystone, siltstone, laminate, sandstone, coal, carbonaceous claystone and tuff (Bembrick et al., 1991: 25) (majority of the study area)
- **Qpn**: Medium grained sand, clay and silt of Quaternary antiquity (majority of Precinct 1, parts of Precinct 2)
- **Qal**: Fine grained sand, silt and clay of Quaternary antiquity (parts of Precincts 4 and 5).

Outside of the study area, locally-occurring[1] geological formations/phenomena of demonstrated or potential Aboriginal archaeological significance include the Tertiary St Marys (Ts) and Rickabys Creek Gravel (Tr) formations, volcanic diatremes (Jv) of Cretaceous to Jurassic antiquity and the Middle Triassic Hawkesbury Sandstone (Rh).

The St Marys formation comprises the lowest of three stratigraphic units within the Berkshire Park Soil landscape (Bannerman & Hazelton 1990: 81). Alluvial in origin, it consists of channel remnants cut into underlying strata, and contains abundant quantities of silcrete, as well as silicified wood, quartzite and quartz, all of which are suitable for flaked stone artefact production (Corkill 1999: 56). Recorded outcrops vary in thickness from approximately one to ten metres (Smith & Clark 1991). Silcrete from the St Marys formation is typically light red or yellowish brown in colour, with a bleached outer cortex, and occurs in the form of complete pebbles, cobbles, boulders and angular fragments (Byrnes 1982; Corkill 1999; JMcD CHM 2006). Recent research by Doelman et al. (2015) indicates significant intra- and inter-exposure variation in the knapping quality of silcrete clasts derived from the St Marys formation, with variability tied to differences in grain-size, degree of silicification, the presence of internal inclusions/fractures, and the influence of bushfires.

In terms of geographic extent, the St Marys formation has been mapped at various localities in the Mulgoa, South and Eastern Creek catchments, with archaeologically significant outcrops occurring along the upper parts of Plumpton Ridge between Bells and Eastern Creeks (AMBS 2002; Dallas 1983; JMcD CHM 2006). It is, however, important to note that the formation is known to be more widely distributed than currently mapped. Observations of the distribution of silcrete pebbles/cobbles and associated ironstone fragments on and adjacent to Plumpton Ridge, for example, have indicated a formation width three to four times that depicted on the 1:100,000 Geological Series Sheet for Penrith (9030) (Mitchell, 2002, 2005). Attention is also drawn to the identification in various archaeological contexts (e.g., AECOM, 2012;Biosis 2010; Austral Archaeology 2005) of significant quantities of technologically non-diagnostic silcrete on the floodplains of Bells and Eastern Creeks, a phenomenon suggestive of extensive colluvial and/or fluvial transport of silcrete clasts from the St Marys formation[2].

The Rickabys Creek Gravel (Tr) consists of a poorly sorted, polymictic gravel deposit, with rounded to well-rounded, pebble to boulder-sized (up to 0.5 metres in diameter) clasts of quartz, quartzite, silcrete, silicified tuff, porphyry, granite, hornfels and sandstone set within a sandy clay matrix. The formation, which varies in thickness from 2 to 12 metres, occurs extensively across the north western portion of the Cumberland Plain, with scattered exposures also present on the Blue Mountains and Hornsby Plateaux (Smith, 1979: 41; Fergusson et al. 2011: 56). The unit fines upwards and exhibits a gradational boundary with the overlying Londonderry Clay (Carter, 2011: 8). Reference to 1:100,00 Geological Map Sheet for Penrith indicates that the nearest mapped occurrence of Rickabys Creek gravels to the study area occurs in association with South Creek approximately 6.5 kilometres north west of the Richmond Road interchange with Westlink M7.

On the Cumberland Plain, the Rickabys Creek Gravel comprises the basal unit of the Londonderry Terrace, a high-level river terrace associated with a palaeo-Wollondilly/Hawkesbury-Nepean river system, likely of Paleogene to Neogene antiquity (Carter, 2011; Fergusson et al, 2011; Jensen, 1911; Smith, 1979). Smith (1979: 45), citing the size, shape and poorly sorted nature of the formation's

[1] i.e., within 10 kilometres of the study area
[2] It is acknowledged that silcrete found in areas outside of those mapped geologically as St Marys formation may derive from other formations (e.g., Rickabys Creek Gravel).

constituent gravel clasts, initially proposed deposition via a meandering, high energy stream. However, subsequent research (e.g., Nanson & Young, 1985; Bishop & Hunter, 1990) has pointed strongly to deposition in a braided stream environment. While critical to debates surrounding the development of the Lapstone Structural Complex (e.g., Fergusson et al, 2011; Pickett & Bishop, 1992), the timing of the deposition of the Rickabys Creek Gravel remains poorly constrained, with no dateable floral or faunal assemblages obtained to date (cf. Nanson et al. (1987) and Stockton & Nanson (2004) for the Quaternary Cranebrook Terrace). Smith (1979), whose interpretation of the antiquity of the Rickabys Creek Gravel was based in part on the (subsequently disputed[3]) idea that the formation was deposited as a continuous and essentially contemporaneous sheet, proposed a late Oligocene to early Miocene age. More recently, Fergusson et al. (2011: 56) have cited a "probable Paleogene-Neogene age" and argued that the formation may have been deposited synchronously with the formation of the Lapstone Monocline.

Existing archaeological and geological data for the Cumberland Plain preclude detailed comment on the utility, in terms of raw material availability (sensu Andrefsky, 1994), of the volcanic diatremes (Jv) that occur in the general vicinity of the study area. Silcrete and other knappable rock types are known to occur in the vicinity of such features, having been brought to the surface from intruded strata below (Corkill, 1999: 55). However, the presence of flakeable rocks in these specific instances cannot be confirmed. As for the diatremes themselves, Attenbrow's (2010: 44) observation that many of the volcanic diatremes, dykes and intrusions present within the Sydney Region are deeply weathered and contain rock that would not have been suitable for making edge-ground hatchet heads, may be applicable. In the absence of specific geological and/or archaeological observations, however, this remains unclear.

Middle Triassic Hawkesbury Sandstone has been mapped to the immediate south of Bunbury Curran Creek, around four kilometres south of the southernmost extent of the study area. A medium to coarse-grained quartz sandstone with minor shale and laminate lenses, Hawkesbury Sandstone weathers cavernously to form overhangs (i.e., rockshelters) but also occurs as flatted-topped outcrops (platforms) and isolated boulders (McDonald, 2008). Utilised rockshelters, grinding grooves and rock art, both engraved and pigment, are common archaeological features of this formation, which also contains stone suitable for the production of flaked stone artefacts in the form of pebbles of white vein quartz, typically less than six millimetres in diameter (Attenbrow , 2010: 43; Corkill, 1999: 54).

[3] Pickett and Bishop (1992:25-26), following Chesnut (1982), have proposed that the Rickabys Creek Gravel may, in fact, be a composite diachronous unit, with progressive deposition throughout the development of the Lapstone Monocline.

4.3 Soils

Soils within the study area have been mapped by Bannerman and Hazelton (2011) as belonging to the Blacktown Residual (REbt), Luddenham Erosional (ERlu), South Creek Alluvial (ALsc), Berkshire Park Alluvial (ALbp), Picton Colluvial (COpn) and Disturbed Terrain (DTxx) soil landscapes. Three soil landscapes predominate the study area (REbt, ERlu and ALsc soils) and the dominant soil materials for the these landscapes, including their occurrence and relationships, are described in Table 4-2 (Figure 4-3).

Table 4-2: Blacktown Residual (REbt), Luddenham Erosional (ERlu) and South Creek Alluvial (ALsc) soil landscapes: dominant soil materials

Soil landscape	Dominant soil materials	Colour	Topsoil or subsoil?	Soil pH	Erodibility	Erosion hazard	Coarse fragments	Occurrence and relationships
Blacktown Residual (REbt,)	Friable brownish black loam (bt1)	Brownish black (10YR 2/2). Can range from dark reddish brown (5YR 3/2) to dark yellowish brown (10YR 3/4)	Topsoil	5.5 to 7.0	Moderate	**NC**: slight to moderate **C:** moderate to high	Rounded iron indurated fine gravel-sized shale fragments	**Crests:** Up to 30 centimetres of bt1 overlies 10-20 centimetres of bt2 and up to 90 centimetres of bt3. Bt1 is occasionally absent. **Upper slope and mid slopes:** Up to 30 centimetres of bt1 overlies 10-20 centimetres of bt2, 20-50 cm of bt3 and up to 100 centimetres of bt4. Bt1 is occasionally absent. **Lower side slopes:** Up to 30 centimetres of bt1 overlies 10-30 centimetres of bt2 and 40-100 centimetres of bt3. Below bt3, there is usually >100 centimetres of bt4.
	Hardsetting brown clay loam (bt2)	Dark brown (7.5YR 4/3). Can range from dark reddish brown (2.5YR 3/3) to dark brown (10YR 3/3).	Topsoil	5.0 to 6.5	Moderate	**NC**: slight to moderate **C:** moderate to high	Platy, iron indurated gravel-sized shale fragments	
	Strongly pedal, mottled brown light clay (bt3)	Brown (7.5YR 4/6). Can range from reddish brown (2.5YR 4/6) to brown (10YR 4/6)	Subsoil	4.5 to 6.5	Moderate	**NC**: slight to moderate **C:** moderate to high	Fine to coarse gravel-sized shale fragments	
	Light grey plastic mottled clay (bt4)	Light grey (10YR 7/1). Less commonly greyish yellow (2.5 YR 6/2). Red, yellow or grey mottles common.	Subsoil	4.0 to 5.5	Moderate	**NC**: slight to moderate **C:** moderate to high	Ironstone concretions and rock fragments common	

Soil landscape	Dominant soil materials	Colour	Topsoil or subsoil?	Soil pH	Erodibility	Erosion hazard	Coarse fragments	Occurrence and relationships
Luddenham Erosional (ERlu)	Friable dark brown loam (lu1)	Dark brown (10 YR 3/3, 7.5YR 3/3). Can range from brownish black (5YR 3/1) to brown (10 YR 4/4).	Topsoil	5.0 to 6.5	Moderate	**NC**: moderate to very high **C:** high to very high	Few small, subrounded-rounded weakly weathered shale fragments	**Crests:** Up to 10 centimetres of lu1 overlies <40 centimetres of lu5. Lu5 usually directly overlies shale bedrock. Lu1 not present in some areas. **Upper slopes and mid-slopes:** Lu1 rare but <10 centimetres may occur. Up to 40 centimetres of lu2 overlies >50 centimetres of lu3 and <90 centimetres of lu4. **Lower slopes and drainage lines:** Up to 50 centimetres of loamy sandy overlies >100 centimetres of lu5. In some locations, up to 40 centimetres of lu2 overlies <50 centimetres of lu5 and >100 centimetres of lu3.
	Hardsetting brown clay loam (lu2)	Brown (7.5YR 4/4). Can range between dull yellowish brown (10YR 5/4) and reddish brown (5YR 4/6).	Topsoil	4.0 to 6.5	Moderate	**NC**: moderate to very high **C:** high to very high	Shale rock fragments	
	Whole coloured, strongly pedal clay (lu3)	Reddish brown (5YR 4/6-8). Can range from bright reddish brown (2.5 YR 4/8) to bright yellowish brown (10YR 6/6)	Subsoil	4.0 to 5.5	Moderate to high	**NC**: moderate to very high **C:** high to very high	Shale rock fragments	
	Mottled grey plastic clay (lu4)	Usually light grey (10YR 7/1) but ranges to light reddish grey (2.5 YR 7/1)	Subsoil	4.0 to 5.5	Moderate to high	**NC**: moderate to very high **C:** high to very high	Shale rock fragments and gravels	
	Apedal brown sandy clay (lu5)	Usually brown (7.5 YR 4/4-6) but ranges from dull reddish brown (5YR 4/4) to dull yellowish brown (10YR 5/4)	Subsoil	5.0 to 7.0	Moderate to high	**NC**: moderate to very high **C:** high to very high	Small (2-6 millimetres) angular, well weathered shale fragments	

Soil landscape	Dominant soil materials	Colour	Topsoil or subsoil?	Soil pH	Erodibility	Erosion hazard	Coarse fragments	Occurrence and relationships
South Creek Alluvial (ALsc)	Brown apedal single-grained loam (sc1)	Dull reddish brown (5YR 4/3) to dull yellowish brown (10YR 4/3)	Topsoil	4.5 to 6.5	High	Very high to extreme	Small, angular or rounded gravels may occur.	**In channel:** Variable depth sc1 over sc3. **Near channel:** 30-50 centimetres of sc1 overlies 15 centimetres sc2 and 70 centimetres of sc3. Swales sometimes filled by sand splays. **Low terrace:** 2-50 centimetres of sc1 overlies 15 centimetres sc2 and 60-85 centimetres sc3. **High terrace:** Up to 190 centimetres of stratified clay (sc3) over shale bedrock.
	Dull brown clay loam (sc2)	Dull brown (7.5 YR 5/4). Can range from greyish brown (5YR 4/2) to yellowish brown (10YR 5/6)	Topsoil	5.5 to 7.0	High	Very high to extreme	None	
	Bright brown clay (sc3)	Reddish brown (5YR 4/8) to bright yellowish brown (10YR 5/1). Mottles, when present, are yellow or grey.	Subsoil	3.0 to 7.0	High	Very high to extreme	Small (2-20 millimetres) subrounded or subangular gravels.	

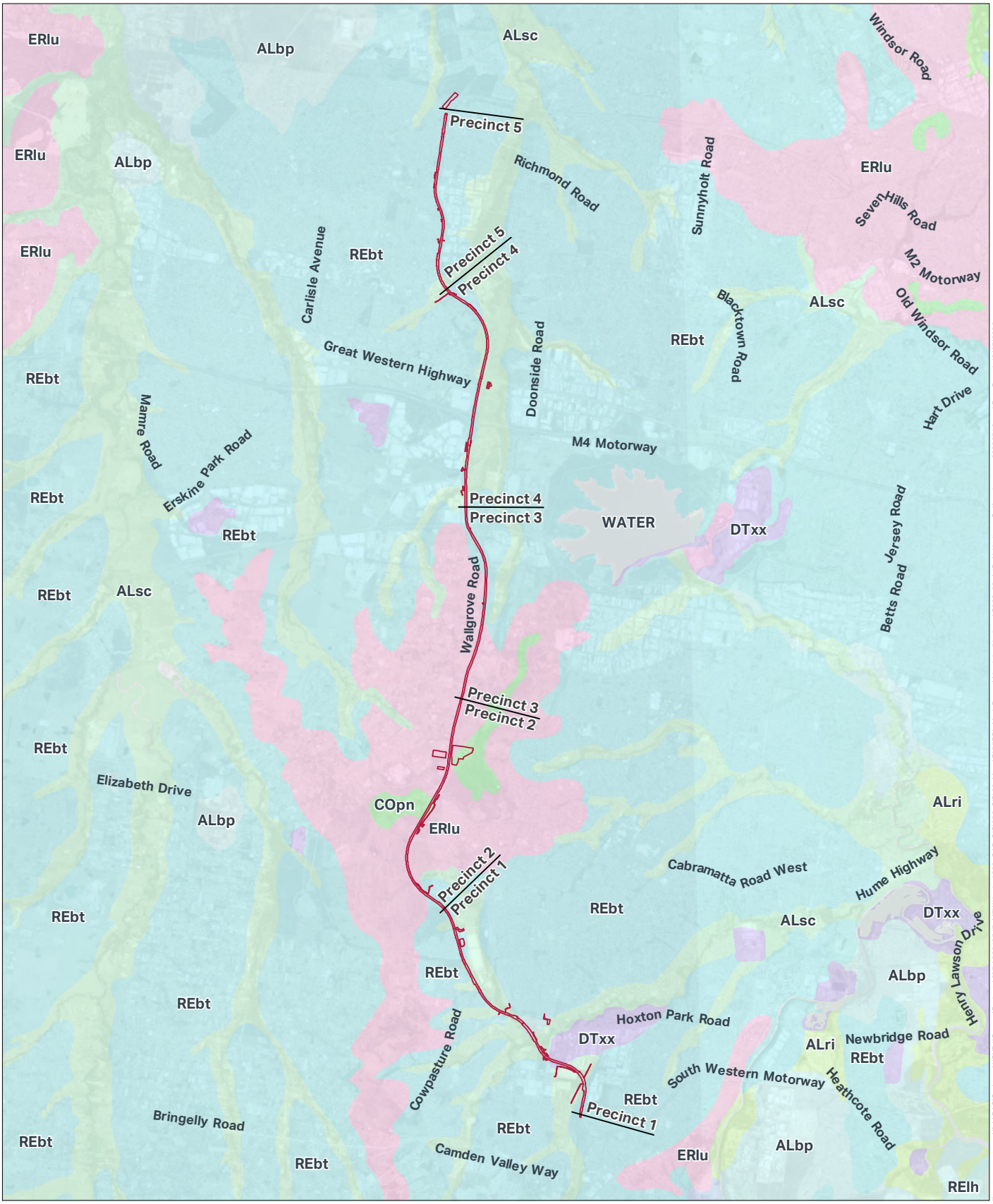

FIGURE 4-3: SOIL LANDSCAPES WITHIN AND SURROUNDING THE STUDY AREA

N 0 1 2 km

AECOM

Legend

Study area

Soil Landscapes

- ALbp
- ALfr
- ALri
- ALsc
- COha
- COpn
- DTxx
- ERgn
- ERgy
- ERlu
- REbt
- RElh
- REvo
- Water

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4.4 Flora and fauna

Native vegetation within and immediately surrounding the study area has been extensively modified, with the majority cleared historically for grazing and/or cropping, and remaining vegetation communities affected more recently via residential and light industrial development, as well as road construction.

Historical and more recent clearance activities notwithstanding, field observations and remnant native vegetation mapping for the Cumberland Plain suggest a pre- and early-post European settlement vegetation regime dominated by woodland communities; specifically, Tozer's (2003) Shale Plains Woodland, Shales Hills Woodland and Alluvial Woodland communities (Figure 4-4 and Figure 4-5). Described in further detail below, these communities will have occupied different landscape positions across the study area, with Shale Plains Woodland concentrated in areas of gently undulating terrain, Shales Hills Woodland in areas of steeper terrain and Alluvial Woodland on floodplains.

Shale Plains Woodland is the most widely distributed community on the Cumberland Plain (Tozer, 2003: 36). It is typically dominated by Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E.tereticornis*), with Narrow-leafed Ironbark (*E. crebra*), Thin-leafed Stringybark (*E. eugenioides*) and Spotted Gum (*Corymbia maculate*) also occurring, though less frequently. A shrub stratum dominated by Blackthorn (*Bursaria spinosa*) is usually also present. Common ground stratum species for this vegetation community include Kidney Weed (*Dichondra repens*), Threeawn Speargrass (*Aristida vagans*), Weeping Grass (*Microlaena stipoides*), Kangaroo Grass (*Themeda australis*), Brunoniella (*Brunoniella australis*), Tender Tick-trefoil (*Desmodium varians*), Thin Leaf Stink Weed (*Opercularia diphylla*), Blue Bell (*Wahlenbergia gracilis*) and Shorthair Plumegrass (*Dichelachnemicrantha*).

In common with its plains counterpart, Shale Hills Woodland is dominated by Grey Box (*E.moluccana* and Forest Red Gum (E. tereticornis), with Narrow-leafed Ironbark (*E. crebra*) occurring less frequently. A small tree stratum consisting of Lightwood (*Acacia implexa*) and various other Eucalyptus species is often present, as is a shrub stratum dominated by Blackthorn (*Bursaria spinosa*). A dense ground cover of grass and herb species is typical for this community, with common species including Kidney Weed (*Dichondra repens*), Brunoniella (*Brunoniella australis*), Purple Wiregrass (*Aristida ramose*), Variable Tick-trefoil (*Desmodium varians*), Weeping Grass (*Microlaena stipoides var. stipoides*), Kangaroo Grass (*Themeda australis*) and Poison Rock Fern (*Cheilanthes sieberi subsp. sieberi*).

Alluvial Woodland is most often dominated by Cabbage Gum (*Eucalyptus amplifolia*) and Swamp Oak (*Casuarina glauca*), with Apple Box (*Angophora floribunda*) occurring less frequently (Tozer, 2003). A shrub stratum is usually present though is often sparse and dominated by Blackthorn (*Bursaria spinosa*). A dense ground cover of grasses such as Basket-grass (*Oplismenus aemulus*), Weeping grass (*Microlaena stipoides*), Bordered Panic (*Entolasia marginata*) and Forest Hedgehog Grass (*Echinopogon ovatus*) is also typical as is the presence of herb species such as Forest Nightshade (*Solanum prinophyllum*), Whiteroot (*Pratia purpurascens*) and Native Wandering Jew (*Commelina cyanea*). Alluvial Plain Woodland is typically associated with minor watercourses draining soils derived from Wianamatta Group shales.

While available historical records provide only limited insight into Aboriginal exploitation of plants across the Cumberland Plain and Sydney Region more broadly (see in particular, Attenbrow, 2010: 76-78 and Kohen, 1986: 36-52), it can be confidently asserted that the original vegetation communities of the study area and its environs will have supplied Aboriginal people camping within or travelling through the area with an extensive array of edible and otherwise useful plant species. Recorded native vegetation communities and locally occurring watercourses would likewise have supported a large and diverse range of economic terrestrial, aquatic and avian fauna. Historical evidence for Aboriginal peoples' uses of the floral and faunal resources of Sydney's Cumberland Plain is discussed in further detail in **Section 6.1**.

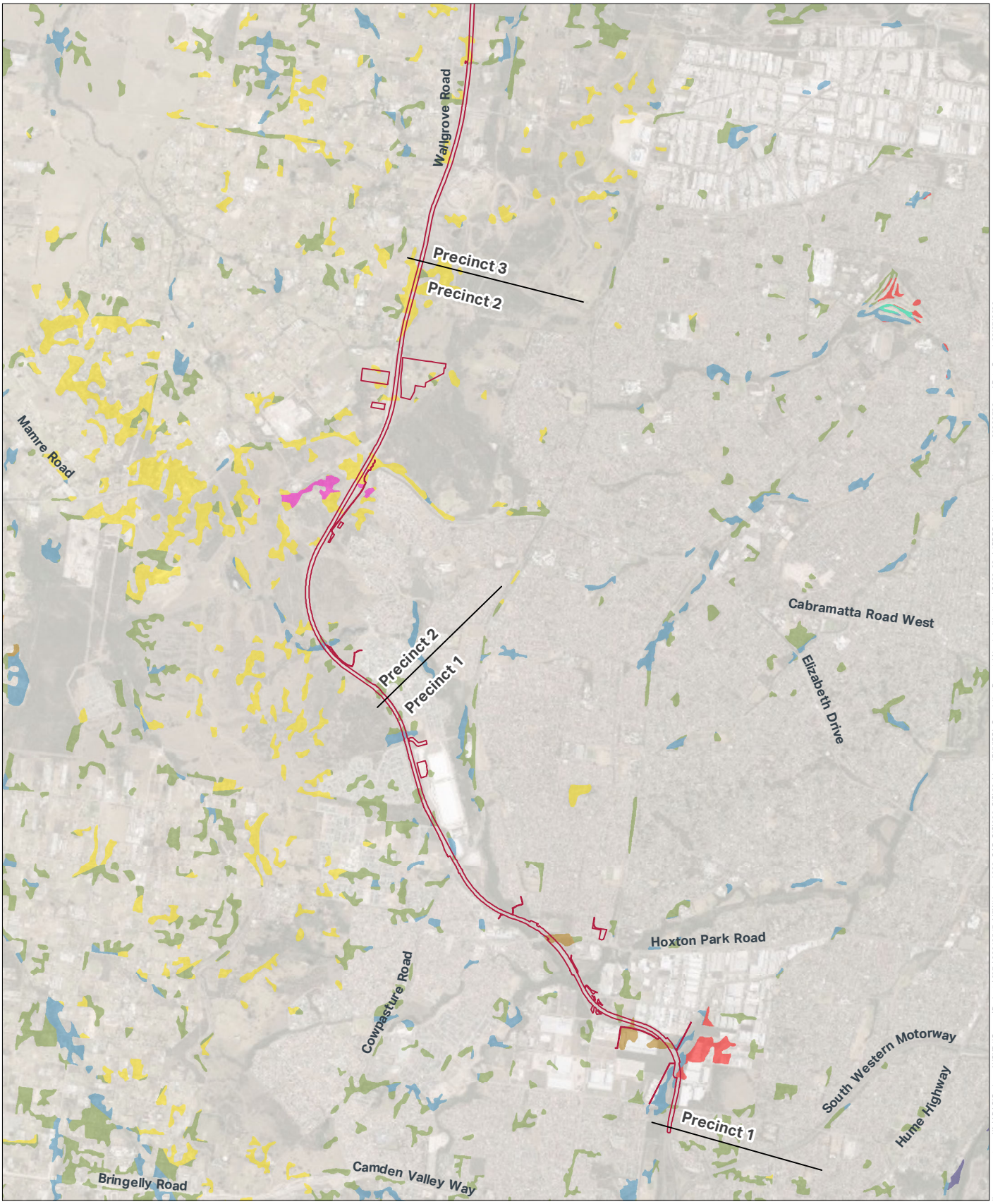

FIGURE 4-4: REMNANT VEGETATION WITHIN AND SURROUNDING THE STUDY AREA (SHEET 1 OF 2)

N

0 1 2 km

AECOM

Legend

- Study area

Cumberland Plain Vegetation

- 3 - Cooks River Castlereagh Ironbark Forest
- 4 - Castlereagh Swamp Woodland
- 9 - Shale Hills Woodland
- 10 - Shale Plains Woodland
- 11 - Alluvial Woodland
- 12 - Riparian Forest
- 14 - Moist Shale Woodland
- 15 - Turpentine-Ironbark Forest
- 103 - Shale/Gravel Transition Forest

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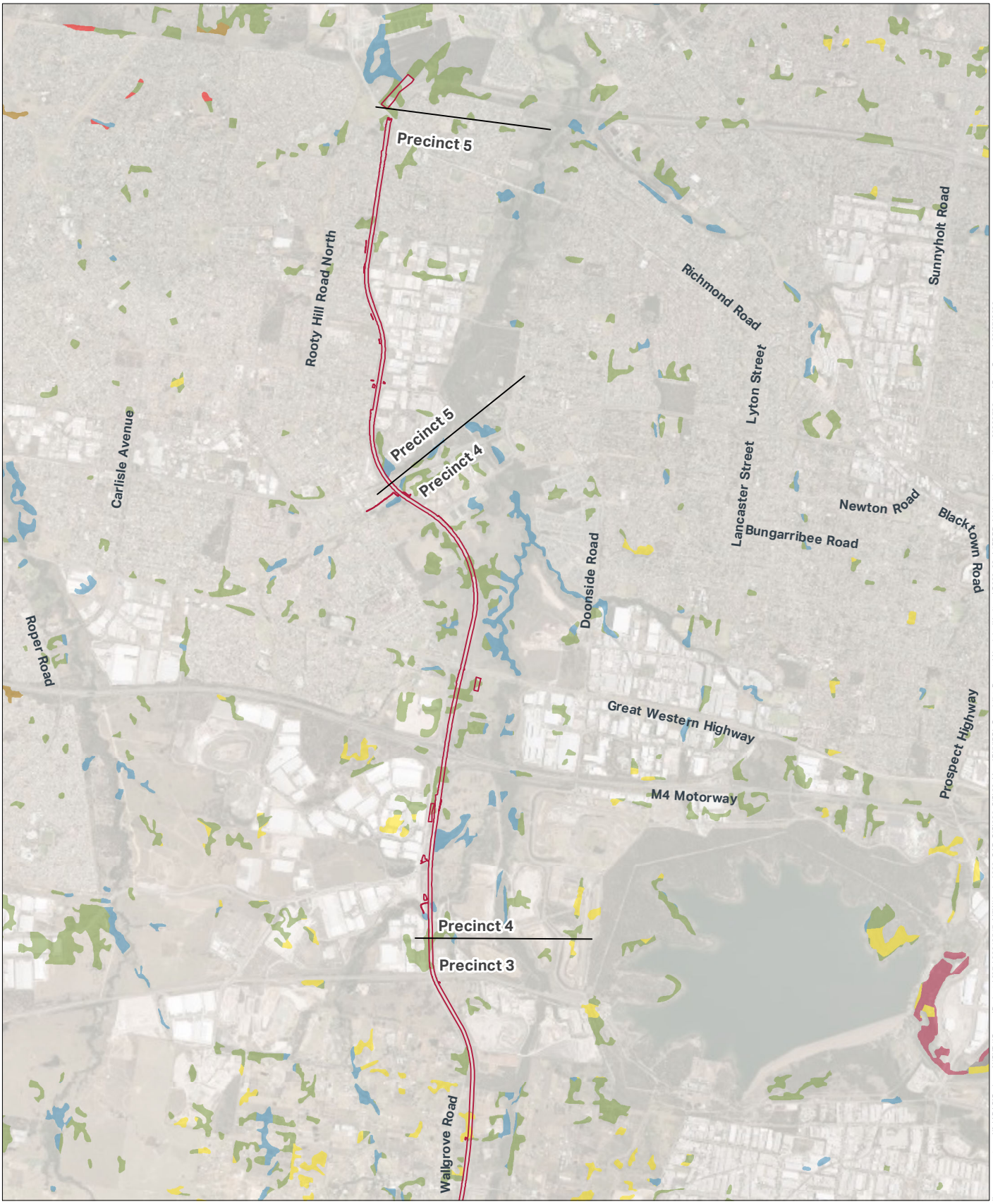

FIGURE 4-5: REMNANT VEGETATION WITHIN AND SURROUNDING THE STUDY AREA (SHEET 2 OF 2)

N 0 1 2 km

AECOM

Legend

- Study area

Cumberland Plain Vegetation

- 3 - Cooks River Castlereagh Ironbark Forest
- 9 - Shale Hills Woodland
- 10 - Shale Plains Woodland
- 11 - Alluvial Woodland
- 103 - Shale/Gravel Transition Forest
- 67 - Vegetation Of Volcanic Substrates
- 9999 - Unclassified Vegetation

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4.5 Land disturbance

Alongside field observations, historical aerial photographs provide an avenue for assessing the nature and extent of post-European settlement land use activities and ground disturbance across the study area. Aerials examined for the current assessment indicate that the overwhelming majority of land within the study area has been severely disturbed, with the most significant impacts to natural landform elements and features therein associated with construction of the Westlink M7, as well as adjoining residential, commercial and industrial development activities. Findings of a review of historical aerials for the Westlink M7 and proposed construction ancillary facilities outside the Westlink M7 lease area are provided in Table 4-3 and Table 4-4 respectively.

Table 4-3: Historical land use – historical aerial review – Westlink M7

Precinct	Description
1	The Westlink M7 is visible in the 2009 aerial imagery. Historical land uses prior to the construction of the Westlink M7 include farming and rural residential with former building structures. Filling may have occurred historically in parts of the Westlink M7 in the vicinity of surface water bodies such as Cabramatta and Hinchinbrook Creeks and tributaries (north of Cowpasture Road intersection, north of Hoxton Park intersection, and north of Bernera Road intersection), as well as Maxwell Creek (north of Kurrajong Road). Former cut and fill is likely to have occurred in areas associated with road intersections constructed in the past. These areas include Cowpasture Road, Hoxton Park Road, Bernera Road, and Kurrajong Road. The Endeavour Energy site with associated substation in Hoxton Park has been present since the 1970's. Quarry and disturbed ground are visible in this area also between 1991 and 2009. The industrial area has generally developed post-2000. A former runway is visible in the 1949 aerial, north east of the intersection with Cowpasture Road (north of the precinct). This has been redeveloped into an industrial precinct (warehouses) circa-2014. No other major former industrial land uses (prior to the Westlink M7 construction) were identified within this precinct of the study area. Existing industrial land adjoin the Westlink M7 to the north east and south of Cowpasture Road, as well as between Bernera and Kurrajong Roads (on both sides of the study area).
2	The Westlink M7 is visible in the 2009 aerial imagery. Elizabeth Drive and Wallgrove Road (north of Elizabeth Drive) are visible in the 1949 aerial. Historical land uses prior to the construction of the Westlink M7 include farming and rural residential, with former building structures. Various water bodies are visible and historical filling may have occurred in parts of the intercepting water courses. The northern extent of the former runway is visible in the 1949 aerial north east of the intersection with Cowpasture Road (south of the precinct). A water course appears to drain from the runway towards the west and intercepts the current Westlink M7. Historical contamination from the runway may have migrated and be present in this area. Former tracks and road, as well as building structures, are present in the vicinity of the approved M12 Motorway interchange, north of Elizabeth Drive. The Upper Canal System (across the approved M12 Motorway interchange) is visible in the 1949 aerial. Historical cut/fill is likely in this area. The approved M12 Motorway interchange remained undeveloped, with the exception of some farming building structures near the intersection between the two existing roads, as well as the industrial area north of Elizabeth Drive. The quarry is visible in the 1982 aerial photograph. Residential areas have developed since the 2000s.

Precinct	Description
3	The Westlink M7 is visible in the 2009 aerial imagery. Wallgrove Road is visible in the 1949 aerial, as well as roads intercepting Wallgrove Road. Wallgrove Road runs parallel to the current Westlink M7, and traverses what appears to be productive farm land (crops), with numerous building structures and farm dams. Historical filling and buried waste material may be present within the current Westlink M7 footprint. Areas of historical cut/fill may have occurred at road intersections within the current Westlink M7. The brick quarry is visible in the 1961 aerial. The waste facility (landfill) is visible in the 1970 aerial. The drainage line north of the precinct (between Precincts 3 and 4) is visible in the 1949 aerial. Since this feature intercepts the current Westlink M7, historical filling is likely to have occurred.
4	The Westlink M7 is visible in the 2009 aerial imagery. Wallgrove Road is visible in the 1949 aerial, as well as Old Wallgrove Road, which intercepts Wallgrove Road. Former structures and farm dams are present at this intersection, and historical cut/fill may have occurred at the current Old Wallgrove Road interchange. North of the junction between these roads, disturbed ground and many structures of similar rectangular shapes are visible in the 1949 aerial until the 1970s. Buried building waste may be present in this area. A road within the footprint of the current Great Western Highway is visible in the 1949 aerial. Land near and north of the intersection was historically used as farmland with various building structures. The drainage line south of the precinct (between Precincts 3 and 4) is visible in the 1949 aerial. Since this feature intercepts the current Westlink M7 footprint, historical filling is likely to have occurred. Disturbed ground and a quarry are visible west of the Old Wallgrove Road interchange from 1970 until the area was redeveloped into an industrial precinct with warehouses circa-2009. The quarry east of the Old Wallgrove Road interchange is visible since 1991 aerial and has expanded since to become the waste management facility as of 2020. Prior to the construction of the Westlink M7, former building structures are visible since 1961 north of the drainage line (south of the Precinct). Buried building waste may be present in this area. Industrial precincts have been established since 2009 and have increased since.
5	The Westlink M7 is visible in the 2009 aerial imagery. The railway is visible in the 1949 aerial, and disturbed land is visible within the footprint of the current Westlink M7 footprint, south of the railway. Prior to the construction of the Westlink M7, historical land uses included farmland and rural residential with building structures and farm dams. Historical filling as well as demolished buildings may be present within the Westlink M7 footprint. Construction of low and medium density residential areas have intensified near the railway line since 1982. Industrial buildings are first visible in the 1982 aerial, north of the railway. The steel manufacturing site is visible in the 1991 aerial. The industrial area has expanded since.

Table 4-4: Historical land use – historical aerial review – land outside Westlink M7 within study area

Ancillary Facility	Description
345 Hoxton Park Road, Hinchinbrook (Lot 1 in DP 1083454, located on eastern side of 355 Hoxton Park Road)	In 1949 and 1955 the land appeared to be part of grazier land with no other visible features. In the 1961 aerial imagery the land appeared to be market gardens. From 1970 to 1991 the land appeared to be pastured paddocks. The surrounding land use was rural until a factory was constructed to the south of Hoxton Park Road by 1970. Since 2009 the land appeared to be used on and off as a construction compound for storage of construction materials and spoil. The 2021 aerial imagery showed the land was vacant with a mostly gravel surface.

Ancillary Facility	Description
20 Blackbird Close, Len Waters Estate (Lot 402 DP 1141990) 30 Blackbird Close, Len Waters Estate (Lot 403 DP 1141990)	Between 1949 and 1991 the land was pastured land within Hoxton Park Airport, located about 100 metres west of the taxi way and 100 metres north of the main airport hangar and terminal area. There was also an erosional gully located along and within the southern boundary of the land which appears to have been filled in when the airport was redeveloped into part of Len Waters Estate in the late 2000s. The land has remained vacant in subsequent areal imagery.
Cowpasture Road, Elizabeth Hills Part Aviation Road (Part Lot 101 DP 1158385/Aviation Road Reserve)	Between 1949 and 1991 the land was pasture within Hoxton Park Airport, located about 80 metres west of the taxi way and runway. The land was developed as Aviation Road between 2009 and 2014. A flood detention basin/reserve was also constructed on the northern side of this land.
Western Sydney Parklands (east of Westlink M7, south of Elizabeth Drive) (Lot 3 DP 1087825)	The land appeared to be grazier land between 1949 and 1991 with no obvious features until the construction of the Westlink M7 in the late 2000s. The surrounding area to the east remained undeveloped with the residential subdivision of Cecil Hills developed by 2000 about 130 metres east of the land.
125-151 Wallgrove Road, Cecil Hills (approved M12 Motorway project) (Lot 24 DP1152887)	In 1949 the land comprised paddocks and a small building or house in the eastern portion and cultivated fields fronting Wallgrove Road. In 1955 there were a dozen additional small buildings/sheds across the eastern portion of the land since 1949 and additional large shed/building by 1970. Half of the buildings/sheds were demolished by 1982 and all were demolished by 2000. The land appears to have remained vacant since.
87-95 Wallgrove Road, Cecil Park (approved M12 Motorway project) (Lot 26B DP 387529)	The construction compound was pastured with scattered trees in 1949. In 1955 a small building (house or shed) and two smaller sheds were present. Larger buildings were present by 1961 and 1970 with other indistinguishable items in the eastern half of the land. One of the buildings likely a house appeared to have been gutted by a fire in the 1982 aerial image and the house appears to have been rebuilt by 1991. All buildings and structures were demolished by 2007. There appeared to be some small areas of dumped waste in the land in recent aerial images.
84 Wallgrove Road (Lot 11 DP1021940) 144 Wallgrove Road (Lot 12 DP1021940) 112-128 Wallgrove Road, Cecil Park (approved M12 Motorway project) (Lot 14 DP1021940 Lot 13 DP1021940)	Lots 11 and 12 in the southern portion of the land were market gardens between 1949 and 1970. From 1991 Lots 11 and 12 appeared to be pastured paddocks. Lot 14 in the northwest portion of the land appeared to be used as pastured paddocks crops. Several small buildings or sheds were present in the western portion since 1961 and demolished by 2007.
121 Great Western Highway, Eastern Creek (Part Lot 7 DP 545017) (Part Lot 101 DP1109052)	A house, small sheds and other indistinguishable items were located in the southern quarter of the land between 1949 and 1982. In 1991 all structures had been demolished. The surrounding land uses comprised rural properties with buildings on the northern side of the land demolished by 1991.

Ancillary Facility	Description
Richmond Road (at Westlink M7 Interchange), Colebee	The land was mostly undeveloped land in 1949 except for a cleared area with several small buildings/sheds and a house in the northern half of the land until pre-1970. In 1949 most of the building or sheds appeared to be demolished and evidence of small stockpiles and were visible. In 1982 the land had mostly been cleared and a house and pool had been constructed in the middle of the land and several sheds which are still present today. Stockpiles and a potential excavation were visible in the northern third of the land. In 1991 one of the sheds appears to have been demolished and there appears to have been additional earthworks in the northern third of the land. By 2009 the house appears to have been demolished and the land appeared similar to the present-day land.

5.0 Archaeological Context

This section describes the archaeological context of the study area on a regional and local scale. Archaeological data of relevance to this area, including the results of archaeological investigations undertaken to inform the construction of the existing Westlink M7, are reviewed in order to contextualise the results of the current assessment.

5.1 The Sydney Region

Available archaeological data indicate that Aboriginal people have occupied the Sydney Region[4] for at least 36,000 years (Williams *et al.*, 2014). Late Pleistocene/early Holocene occupation of the region is evidenced by radiometric dates from both coastal and hinterland sites (see Attenbrow, 2010b: 18, Table 3.1). Excavated material culture assemblages from these periods have been interpreted as evidence of relatively small populations of Aboriginal people employing settlement patterns of high residential and low logistical mobility (Attenbrow, 2010b: 152-154; McDonald, 2008: 39; Williams *et al.*, 2014). Late Pleistocene/early Holocene chipped stone assemblages attest to a preference for silicified tuff sourced from secondary geological sources such as the Hawkesbury-Nepean River gravels (McDonald, 2008; Williams *et al.*, 2014). However, they also indicate the exploitation of other raw material types such as silcrete, quartzite, petrified wood and quartz. Direct freehand percussion appears to have been the dominant reduction technique employed by Late Pleistocene/early Holocene Aboriginals knappers, with bipolar flaking comparatively poorly represented in available assemblages. Retouched 'tools' include unifacially-flaked pebble implements, dentated saws, burins and a variety of scrapers, with unmodified utilised flakes also well represented (Kohen *et al*., 1984; Williams *et al.*, 2014). Stone tools such as these will have been complemented by a range of organic implements such as wooden digging sticks, spears and boomerangs. However, these do not survive archaeologically (Attenbrow, 2010b: 154).

Compared with the late Pleistocene/early Holocene, archaeological evidence for mid-to-late Holocene Aboriginal occupation of the Sydney Region abounds (for recent syntheses see Attenbrow, 2010b; McDonald, 2008). In keeping with broader Australian developments (e.g., Allen and O'Connell, 1995; Beaton, 1985; Brumm and Moore, 2005; Attenbrow *et al.*, 2009; Lourandos, 1983, 1997; Lourandos and Ross, 1994), the social and economic systems of Aboriginal groups living in the region during this period appear to have become increasingly complex. Available archaeological data, for example, suggest a significant increase in site establishment and population densities over time, as well as a concomitant growth in the size and complexity of social aggregation (but see Attenbrow (2012) and Hiscock (2008) for cautionary commentary on the interpretive significance of radiometric date graphs). Growing economic specialisation is indicated by the emergence and/or proliferation of complex fishing and stoneworking technologies, with the latter linked variously to increased foraging risk associated with greater climatic variability as well as other variables such as the redefinition of social space, reduction of resources and increased logistical pre-equipping (Attenbrow *et al.* 2009; McDonald, 2008: 40). Complex, long-distance exchange networks are also attested archaeologically (e.g., Attenbrow *et al.*, 2012; Grave *et al.,* 2012) as are important developments in artistic activities (McDonald, 2008). Higher levels of stylistic heterogeneity in pigment and engraved art across the region, for example, have been linked to increasing territoriality (McDonald, 2008: 42).

With some modification, McCarthy's (1967) *Eastern Regional Sequence* (ERS) of stone artefact assemblages remains the dominant chronological framework for Aboriginal occupation of the region. Based on appreciable changes in the composition of chipped stone artefact assemblages over time, the ERS hypothesises a three phase sequence of 'Capertian' (earliest), 'Bondaian' and 'Eloueran' (most recent) assemblages and was developed on the basis of McCarthy's (1948, 1964) pioneering analyses of stratified flaked stone assemblages from the Lapstone Creek rockshelter, on the lower slopes of the Blue Mountains eastern escarpment, and the Capertee 3 rockshelter in the Capertee Valley north of Lithgow. At present, the most widely cited characterisation of the ERS in the Sydney Region is that of a four-phase sequence beginning with the *Pre-Bondaian* (McCarthy's *Capertian*) and moving successively through the Early, Middle and Late phases of the *Bondaian*, the last of which equates to McCarthy's (1967) *Eloueran* phase (Table 5-1). The tripartite division of the Bondaian is based

[4] Following Attenbrow (2012a), the land bounded by the coast on the east, by the Hawkesbury-Nepean River in the north and west, and by a line running east-west through Picton and Stanwell Park in the south.

principally on the presence/absence and relative abundance of backed artefacts (Attenbrow, 2010: 101). However, other factors, such as changes in the abundance of bipolar artefacts and different stone materials, as well as the presence/absence of edge-ground hatchet-heads are also relevant.

Table 5-1: McCarthy's (1967) Eastern Regional Sequence (ESR) of stone artefact assemblages

Current phasing	McCarthy's (1967) Phasing	Approximate date range	Backed artefact frequency	Bipolar artefacts	Edge-ground hatchet heads
Pre-Bondaian	Capertian	36,000-8,000 Before Present (BP)	Absent	Rare	Absent
Early Bondaian	Bondaian	8,000-4,000 BP	Very low	Rare	Absent
Middle Bondaian		4,000-1,000 BP	Very high	Increasingly common	Present
Late Bondaian	Eloueran	1,000 BP to European contact	Low	Very common	Present

5.1.1 McDonald's (2008) behavioural land use model

Drawing, in particular, on the results of several large-scale archaeological salvage projects across the Cumberland Plain, including those undertaken for the various stages of the Rouse Hill Infrastructure Project (e.g., Jo McDonald CHM, 2001, 2005a), McDonald (2008) has proposed a behavioural model for prehistoric Aboriginal land use across the Sydney Region. Developed in partnership with lithic analyst Beth White over several years, McDonald's (2008) model remains the most comprehensive model of its type for the region. The model, which differs from existing land use models for the region (i.e., Kohen, 1986, 1988; Kohen & Lampert, 1987; Ross, 1976, 1988) in its explicit, dual emphasis on stone artefact technology and rock art, is summarised below.

According to McDonald's (2008) model, Aboriginal groups occupying the Sydney Region during the late Pleistocene/early Holocene were highly mobile. Groups travelled considerable distances between base camps and camped proximate to exploited resources (McDonald, 2008: 39). Group territories at this time were large and the preferred raw material for flaked stone tool manufacture was silicified tuff. This raw material was sourced principally from the Hawkesbury-Nepean River gravels (McDonald, 2008: 40). Transported lithics were used in woodworking and animal butchery and comprised large cores and simple flake-based implements. Though large, transported cores and implements served as portable raw material supplies and were curated. Backed artefacts were rarely produced during these periods (McDonald, 2008: 40). In the late Pleistocene, rock art served as communicative medium for emphasising broad-scale group cohesion. Social networks at this time were more open and extensive than those recorded at contact (McDonald, 2008: 41).

Rising seas associated with the Post-Glacial Marine Transgression (c.21-6.5ka) forced groups previously occupying the region's coastal plain inland. Former low-lying valleys and flats were converted into bays and estuaries. Initially, population densities remained relatively low. However, over time, these increased dramatically, necessitating social mechanisms to mediate uncontrolled and potentially hostile interactions between groups (McDonald, 2008: 349). Pigment and engraved art was one of several such mechanisms and was now used to assert both local group distinctiveness and larger-scale (i.e., cultural bloc) cohesion. By 4,000 BP, groups were occupying smaller territories on a more permanent basis. Groups occupying the Cumberland Plain and surrounding sandstone country now did so on a full time-basis though movement between biogeographic zones still occurred (McDonald, 2008: 40). Rockshelters in the latter zone were increasingly used for artefact manufacture and discard. Mobility strategies became increasingly logistically organised, with groups exploiting the resources of well-defined foraging ranges out of base camps located in environmentally strategic locations (i.e., in terms of resource availability) (McDonald, 2008: 40).

The stone artefact technology being employed by Aboriginal people occupying the Sydney Region underwent substantial change as a result of these broader changes in demography and settlement

organisation. Locally available lithic raw materials were increasingly utilised and there was an overall diminution in the size of utilised toolkits (McDonald, 2008: 40). On the Cumberland Plain, silcrete was the preferred raw material and was frequently heated to improve flaking quality. Stone packages were most commonly prepared at exploited stone sources before being transported to residential and other task-specific sites for further use. Blanks selected for reduction were typically reduced via freehand percussion, with bipolar reduction sometimes also utilised. Various core reduction methods were employed, with asymmetric alternating flaking frequently used. During the Middle Bondaian period (c.4,000 to 1,000 years BP), backed artefacts were manufactured in large numbers across numerous sites, with 'industrial' scale production occurring at some sites. These tools were utilised in a range of craft and subsistence activities including bone-working, wood-working, plant processing and animal butchery.

During the Late Bondaian period (c.1,000 years to European contact), there was a reduced emphasis on the occupation of rockshelters, with open camp site locations now the foci for habitation. This shift away from rockshelters was a response to the increased spatial requirements of larger social groups associated with a dual social system (McDonald, 2008: 349). During times of seasonal abundance, groups lived in large, semi-permanent open 'villages'. However, in times of resource stress, these larger groups dispersed into smaller family or gender-gender based hunting/fishing groups who reverted to exploiting their traditional foraging ranges. An increased emphasis on bipolar flaking during this period was linked to an even more intensive use of locally available stone. In coastal areas, backed artefacts all but ceased to be produced. Edge-ground hatchets were widely made and used across the region. As in earlier periods, rock art during the Late Bondaian continued to function as an important communicative medium for the assertion of both local group identification and broader culture area cohesion (McDonald 2008: 350).

5.2 The Cumberland Plain

Concentrated archaeological investigation of the Aboriginal archaeological record of Sydney's Cumberland Plain can be traced to the early-to-mid 1980s, a period marked by a rapid growth in residential and other forms of development across the Plain. Intensive development activities since this time have secured the Cumberland Plain's place as one of the most intensively investigated archaeological regions in Australia, with thousands of Aboriginal archaeological investigations involving survey and/or excavation having now been undertaken, the majority as part of larger environmental impact assessments associated with residential development and affiliated infrastructure projects. Unsurprisingly, these investigations have varied significantly in scale and scope, ranging from targeted small-scale surveys to complex, multi-phase survey and excavation projects over large areas. Nonetheless, together they have revealed a rich and diverse record of past Aboriginal occupation, with thousands of Aboriginal archaeological sites now registered on the NSW AHIMS database. Key investigation themes are detailed in brief below.

5.2.1 Open artefact sites: distribution, contents and definition

Surface and subsurface distributions of stone artefacts, variously referred to as open artefact sites, open camp sites and artefact scatters, are the most common and widely distributed form of Aboriginal archaeological sites on the Cumberland Plain (see Attenbrow, 2010: Plate 12; Przywolnik, 2007: 46, Table 4.2). Other site types, such as scarred trees, quarries, grinding grooves and rock shelters with deposit and/or art or PAD, have also been identified but are comparatively rare. Accordingly, open artefact sites remain the most intensively investigated component of the Aboriginal archaeological record of the Cumberland Plain, with site distribution and the technology of associated flaked stone artefact assemblages, in particular, comprising key research topics (e.g., AMBS, 2000; Craib et al., 1999; Jo McDonald CHM, 2001, 2003, 2005a, 2006a, 2006b, 2006c, 2007, 2009a, 2009b; Kohen, 1986; White & McDonald, 2010).

Existing archaeological survey data for the Cumberland Plain indicate a strong trend for the presence of open artefact sites along watercourses, specifically, on creek banks and 'flats' (i.e., flood/drainage plains), terraces and bordering lower slopes. Although this distribution pattern can be attributed in part to geomorphic dynamics and archaeological sampling bias, with extensive fluvial erosion activity along watercourses resulting in higher levels of surface visibility and, by extension, concentrated survey effort, an occupational emphasis on watercourses is supported by the results of numerous subsurface investigations (e.g., AMBS, 2000; Craib et al., 1999; GML, 2012; Jo McDonald CHM, 2001, 2003,

2005a, 2006a, 2006b, 2007, 2009a, 2009b). Collectively, these investigations have demonstrated that assemblage size and complexity tend to vary significantly in relation to stream order and landform, with larger, more complex[5] assemblages concentrated on elevated, low gradient landform elements adjacent to higher order watercourses. Artefact distributions associated with major creek lines and confluences tend to consist of localised high density artefact concentrations set within lower density artefact scatters. Outside of these contexts, surface and subsurface artefact distributions have typically been found to be sparse and discontinuous and are often referred to as 'background scatter', being "artefactual material which is insufficient in number or in association with other material to suggest focussed activity in a particular location" (Douglas and McDonald, 1993).

Flaked stone artefacts dominate archaeological finds assemblages from recorded open artefact sites on the Cumberland Plain, with heat shattered rock also well represented. Items such as complete and broken grindstones, hammerstones and edge-ground hatchet heads have also been recorded though comparatively infrequently. With the notable exception of 'knapping floors', a relatively common component of the Aboriginal archaeological record of the Cumberland Plain, associated archaeological features (e.g., hearths, ground ovens and heat treatment pits) have likewise proven elusive (but see AHMS, 2013; McDonald and Rich, 1994; Jo McDonald CHM, 2009a for examples). Investigated knapping floors across the Plain have varied considerably in size and complexity, with the largest and most complex examples identified through excavation as opposed to surface survey (e.g., Jo McDonald CHM, 2001, 2005a, 2006b, 2007). Backed artefacts (i.e., Bondi points, geometric microliths and elouera) are a common feature of knapping floors and most of these features were likely specifically associated with their production. In common with regions such as the Hunter Valley (e.g., Hiscock, 1993; Moore, 2000), available evidence supports the suggestion that backed artefact manufacture on the Cumberland Plain was a structured or systematic activity.

Although relevant to a variety of site types, geomorphic processes such as soil erosion and colluvial/fluvial aggradation are of particular relevance to the identification and definition of open artefact sites. As in other archaeological contexts (e.g., Dean-Jones & Mitchell, 1993, the visibility of open artefact sites across Sydney's Cumberland Plain can, for the most part, be attributed to such processes, which have variously exposed or obscured them. Critically, surface artefacts invariably represent only a fraction of the total number of artefacts present within recorded surface open artefact sites across the Plain, with a typical surface to subsurface artefact ratio of 1:25 proposed (Jo McDonald CHM, 2005b: 35). Artefact exposure, unsurprisingly, is highest on erosional surfaces and lowest on depositional ones. At the same time, in many areas, surface artefacts have been shown through dispersed testing programs to form part of more-or-less continuous subsurface distributions of artefacts, albeit with highly variable artefact densities linked to environmental variables such as distance to water, stream order and landform (e.g., White & McDonald, 2010). The presence or absence of surface artefacts on the Cumberland Plain, therefore, is not a reliable indicator of Aboriginal archaeological sensitivity.

5.2.2 Flaked stone artefact technology

Virtually indestructible, flaked stone artefacts are a ubiquitous element of the Aboriginal archaeological record of the Cumberland Plain and have assumed a prominent position in archaeological reconstructions of past Aboriginal land use across the region. To date, hundreds, if not thousands, of surface-collected and excavated flaked stone assemblages from across the Cumberland Plain have been analysed, with individual assemblage sizes, research questions, aims, analytical methodologies and terminological schemes varying significantly between researchers and projects. Studies to date have ranged from basic descriptive accounts of assemblage composition in typological terms to detailed reconstructions of past stone reduction and quarrying behaviours through rigorous technological analyses. Particularly informative analyses in the context of the Cumberland Plain include those conducted by Jo McDonald Cultural Heritage Management (CHM) (2001, 2003, 2005a, 2006a, 2006b, 2006c, 2007, 2009a, 2009b) as part of archaeological salvage projects associated with development activities within the Rouse Hill Development Area (RHDA), the former Australian Defence Industries (ADI) site at St Marys and the Colebee Release Area (CRA). Technological analyses of stone artefact assemblages recovered from deep fluvial/aeolian sand bodies adjacent to the Parramatta (Jo McDonald CHM, 2005b, 2005c, 2006b) and Hawkesbury Rivers (AHMS 2013; Williams et al. 2012) have likewise

[5] Those containing a wider variety of raw materials and technological types and/or higher mean artefact densities and features such as knapping floors.

proven highly informative, particularly with respect to the documentation of diachronic changes in raw material use and stone artefact technologies.

Available technological and typological data for surface collected and excavated flaked stone artefact assemblages from the Cumberland Plain suggest that the majority of these assemblages belong to what is known as the 'Australian small-tool tradition', a term coined by Gould (1969) to describe what was then thought to be the first appearance, in the mid-Holocene[6], of a new suite of flaked stone tool forms in the Aboriginal archaeological record of Australia, including backed artefacts, adzes and points (both unifacially and bifacially flaked). Complex, hierarchically-organised reduction sequences associated with the production of these tools contrast markedly with the simple sequences of earlier periods (Moore, 2011). Tools of the Australian small-tool tradition, it has been suggested, formed part of a portable, standardised and multifunctional tool kit aimed specifically at risk reduction (Hiscock, 1994, 2002, 2006). Stone artefact assemblages from late Pleistocene and early Holocene contexts, in contrast, are described by archaeologists as belonging to the 'Australian core tool and scraper tradition', a term first used by Bowler *et al.* (1970) to describe the Pleistocene assemblages recovered from Lake Mungo in western New South Wales. Bowler *et al.* (1970) saw the main components of these assemblages - core tools, steep-edged scrapers and flat scrapers - as characteristic of early Australian Aboriginal assemblages and as being of a distinctly different character to those associated with the proceeding small-tool tradition. In south eastern Australia, including the Cumberland Plain, the Australian 'small-tool' and 'core tool and scraper' traditions are most commonly described in terms of McCarthy's (1967) ERS, with 'Capertian' assemblages assigned to the latter tradition and 'Bondaian' assemblages, the former.

Flaked stone artefact assemblages from excavated and surface collected/recorded open artefact sites on the Cumberland Plain attest to the exploitation of a diverse range of lithic raw materials (Corkill, 1999, 2005). However, two rock types - silcrete and silicified tuff (also known as indurated mudstone) - dominate the region's existing stone artefact record. Other, less commonly exploited raw materials represented in excavated and surface collected/recorded assemblages include quartz, quartzite, petrified wood, chert and various fine-grained volcanics. Alongside silcrete and silicified tuff, these materials occur variously in a number of geological formations and units across the Cumberland Plain (for a detailed review see Corkill 1999). Oft-cited sources include the Tertiary St Marys (Ts) and Rickabys Creek Gravel (Tr) formations, as well as the various unconsolidated Pleistocene units that line as terraces the present day and abandoned channels of the Nepean-Hawkesbury River.

In common with the Sydney Region as a whole (Attenbrow, 2010:120-121), various excavated assemblages from the body and peripheries of the Cumberland Plain (e.g., Jo McDonald CHM, 2001a, 2005a; Williams *et al.,* 2012, 2014) attest to a shift, over time, in the relative significance of particular raw materials for flaked stone artefact manufacture, principally silcrete and silicified tuff but also quartz. An 'early' (i.e., Pre-Bondaian) emphasis on the procurement and reduction of silicified tuff, for example, appears to have given way to a 'later' (i.e., Bondaian) emphasis on silcrete. Quartz use, meanwhile, appears to have peaked in the late Holocene period. For the Cumberland Plain, these changes have been linked, in particular, to broader changes in settlement organisation, with a decline in levels of residential mobility over time prompting more intensive use of locally available stone (Jo McDonald CHM, 2005a).

In the north western portion of the Cumberland Plain, the Tertiary St Marys Formation has been singled out as a particularly important source of silcrete for flaked stone artefact manufacture. Mapped at various localities across the Mulgoa Creek, South Creek and Eastern Creek catchments, the best known and most intensively investigated outcrops of this formation occur on Plumpton Ridge, a low but locally prominent ridgeline separating the floodplains of Eastern and Bells Creek between the suburbs of Plumpton and Riverstone. The subject of numerous archaeological investigations since the early 1980s (e.g., Australian Museum Business Services, 2002; Baker, 1996; Barry, 2005; McDonald, 1986), Jo McDonald CHM's (2006c) large-scale archaeological salvage works across what is now Stonecutters Ridge Golf Club unequivocally identified Plumpton Ridge as a major Aboriginal quarry site. At the same time, they highlighted a number of important trends in relation to the procurement and reduction of silcrete obtained from this source. Trends in the relative frequencies of raw material types, artefact

[6] More recent research into the chronology of backed artefacts and points in Australia (e.g., Hiscock & Attenbrow 1998, 2004; Hiscock 1993b) has demonstrated a long history of production and use for these implement types, with both types now known to have been produced, albeit in small numbers, in the early Holocene and likely in the late Pleistocene as well.

types and the size of silcrete artefacts in local excavated assemblages, for example, were attributed to a process of 'distance-decay' (Jo McDonald CHM's 2006c: 61).

Procurement evidence at documented Aboriginal quarry sites across the Cumberland Plain, including Plumpton Ridge, has to date consisted of varying surface and/or subsurface densities of flaked stone artefacts in direct spatial association with naturally occurring Tertiary gravel deposits (silcrete dominant). Topographic indicators of 'open cut' mining activities, such as localised circular/semi-circular depressions or trenches (cf. Binns & McBryde, 1972; Jones & White, 1988; McBryde, 1973, 1984), have yet to be identified, though this is unsurprising given the nature of the lithic deposits being quarried. Alongside those from the 'ADI:EPI' and 'ADI-FF2' quarry sites within the former Australian Defence Industries (ADI) site (Jo McDonald CHM, 2006a, 2008a), excavated flaked stone artefact assemblages from the 'SA25' and 'SA26' sample areas on the upper eastern flank of Plumpton Ridge, detailed in Jo McDonald CHM, 2006c, have provided a robust technological 'signature' for Aboriginal quarry sites on the Cumberland Plain. Amongst other activities, such as limited tool production / discard and later stage core reduction, stone procurement / reduction activities at exploited stone sources appear to have included 'primary' or early stage clast reduction as well as deliberate heat treatment and fracturing (Jo McDonald CHM, 2006c).

Backed artefacts dominate the retouched components of the majority of dated and undated Bondaian assemblages from the Plain and, as such, the technology of their manufacture has received considerable analytical and interpretive attention. Studies by Jo McDonald CHM (2001, 2003, 2005a, 2006a, 2006b, 2007, 2009a, 2009b), in particular, have demonstrated that backed artefact manufacture on the Cumberland Plain was a highly structured or systematic activity involving a complex system of raw material procurement, transportation, preparation and reduction. Differences in the technological character of recovered cores across the region attest to a significant degree of variability in the methods used by Aboriginal knappers to produce flakes for backed artefact manufacture. However, certain techniques (e.g., asymmetric alternating flaking and Hiscock's (1993) 'tranchet technique') are particularly well represented. Evidence for the deliberate heat treatment of silcrete blanks, both as part of systematic backed artefact manufacture activities and other reduction activities, is abundant and widespread, with excavated and surface collected assemblages attesting to the use of heat at various points in the reduction process. As in other contexts (e.g., Hiscock 1993), the thermal alteration of Cumberland Plain silcrete appears to have significantly improved the flaking quality of the stone, increasing the lustre and smoothness of fracture surfaces.

5.2.3 Chronology of occupation

In common with the Sydney Region as a whole, evidence for late Pleistocene/early Holocene (i.e., Pre-Bondaian/Early Bondaian) Aboriginal occupation of the Cumberland Plain is sparse, with confirmed or potential evidence from these periods obtained from only a limited (<20) number of sites / landscapes. Well documented examples include Rouse Hill sites 'RH/CC2' (Jo McDonald CHM, 2001), 'RH/SC5' (Jo McDonald CHM, 2002b), 'RH/CD12' (Jo McDonald CHM, 2002a) and 'RHCD7' (Jo McDonald CHM, 2007); Richmond site 'RMI' (Jo McDonald CHM, 1997a); 'PT12' near Pitt Town (Williams *et al.*, 2012, 2014); Jamisons Creek, Emu Plains (Kohen *et al.*, 1984); Power Street Bridge 2, Doonside (McDonald, 1993), Regentville 'RS1, Regentville (Koettig & Hughes, 1995; McDonald *et al.,* 1996), the Parramatta CBD (AHMS 2013; Austral Archaeology, 2007; Jo McDonald CHM, 2005b, 2005c, 2006b) and the Windsor Museum site (Austral Archaeology, 2011; Williams *et al.* 2012; Williams *et al.* 2014). Claims of a *c*.40 thousand year old date for five 'flaked pebbles' recovered from a gravel pit associated with the Cranebrook Terrace near Penrith (Nanson *et al.* 1987) have been widely questioned, with concerns raised over the artefactual status of these pebbles, their provenance and association with available dates. For most sites, late Pleistocene/early Holocene occupation has been inferred on the basis of the technological and typological characteristics of recovered flaked stone artefact assemblages as opposed to radiometric dates.

At present, the oldest securely dated archaeological site on the Cumberland Plain is the 'PT12' site at Pitt Town, with compliance-based archaeological excavations across a source-bordering dune at this site, which overlooks the Hawkesbury River, producing a suite of Optically Stimulated Luminescence (OSL) dates suggestive of Aboriginal occupation from at least 36,000 years ago (Williams *et al.* 2012, 2014). Closer to the coast, Late Pleistocene/early Holocene occupation of a sandy fluvial terrace adjacent to the Parramatta River (i.e., the Parramatta Sand Sheet) has been by proposed by Jo McDonald CHM (2005b, 2005c, 2006b) and seems likely on the basis of available radiometric dates and assemblage characteristics.

In stark contrast to the late Pleistocene/early Holocene, evidence for mid-to-late Holocene (i.e., Middle to Late Bondaian) Aboriginal occupation of the Cumberland Plain abounds, with numerous excavated sites producing assemblages that can be confidently assigned to these periods on the basis of radiometric dates and/or their typological/technological profiles. Available radiometric dates indicate a steady increase in the number of sites occupied over the course of the Holocene, with a peak in the 2nd millennium BP (see, for example, Przywolnik 2007: 53, Fig. 4.6). Taken at face value, these data suggest a progressive increase in the Aboriginal population of the Cumberland Plain over the course of the Holocene. However, following Hiscock (2008: 230-233), it seems likely that the directional population growth suggested by such data is, to a certain extent at least, a product of differential site preservation, with younger sites better preserved than older ones. Other factors, such as the burial of older sites through sediment deposition and bias in the location of archaeological surveys and excavations, may also be relevant.

Critical to any discussion concerning the antiquity of Aboriginal occupation across the Cumberland Plain, are the well-documented difficulties surrounding the dating of open artefact sites with active 'biomantles' (*sensu* Paton et al. 1995; see Dean-Jones & Mitchell, 1993; Balek 2002; Hofman 1986; Johnson et al. 2005; Johnson 1989; Paton et al. 1995; Peacock & Fant 2002; Stein 1983). On the Cumberland Plain, the term biomantle is typically used as a collective descriptor for the 'A' soil horizons of the Plain's dominant texture contrast or duplex soil profiles[7], which tend to be relatively thin (<50 centimetres) and exhibit extensive evidence of bioturbation in the form of roots, open/infilled burrows, live insects and/or earthworms and stone lines[8]. However, it is noted that the uppermost portions of underlying 'B' soil horizons can also exhibit such evidence and form part of the biomantle (e.g., AECOM, 2015a). As highlighted by Dean-Jones & Mitchell (1993) and others (e.g., Balek, 2002; Johnson, 1989), excavated finds assemblages from archaeological sites with active biomantles are subject to a range of interpretive constraints, with intact depositional stratigraphy unlikely to be preserved and inset archaeological features (e.g., hearths and heat treatment pits) representing the only reliable means of dating (with any specificity) intercepted archaeological events (Mitchell, 2009: 4). Any stone artefacts discarded at the surface in landscapes with active biomantles are likely, over time, to have been incorporated into the soil profile through bioturbation, with depth of artefact burial ultimately corresponding to the base of major biological activity (i.e., the base of the biomantle). Where biomantles remain relatively undisturbed, horizontal patterns of artefact discard may be preserved. However, in heavily disturbed contexts, the preservation of such patterning is unlikely (Mitchell 2009: 4).

For archaeologists working on the Cumberland Plain, the analytical and interpretive constraints posed by intensive bioturbation have, in combination with a paucity of dateable features, led to a reliance on the dating of excavated archaeological finds assemblages through relative means, specifically, through consideration of the typological and technological composition of associated flaked stone artefact assemblages and reference to a modified version of McCarthy's (1967) ESR, the broad temporal parameters of which are now well established (Table 5-1). While offering a useful chronological framework within which to assess diachronic changes in stone artefact technologies and raw material use, the largely undated and palimpsest character of the Plain's lithic record represents a significant analytical and interpretive obstacle for period-specific reconstructions of Aboriginal mobility regimes (cf. Cowan, 1999). Well dated assemblages from sites retaining stratified deposit(s) are rare, with the most comprehensively dated sequences to date coming from deep sand bodies adjacent to the Hawkesbury and Parramatta Rivers (i.e., AHMS, 2013; Jo McDonald CHM, 2005c; Williams et al., 2012, 2014). While the preservation and dating potential offered by such bodies has been amply demonstrated, the same cannot be said of alluvial valley fill sequences outside of these major river valley contexts, with comparatively little research directed towards investigating the age, genesis or evolution of alluvial valley fill sequences within the Cumberland Plain's numerous 'interior' creek valleys, nor their potential for preserving at depth (i.e., within buried paleosols) Aboriginal archaeological materials of varying ages, including those of Late Pleistocene/Early Holocene antiquity (but see AHMS, 2015; Barham, 2005, 2007; Jo McDonald CHM, 2005a for notable exceptions). Nonetheless, the limited work that has been conducted in this regard suggests considerable research potential, particularly with respect to the

[7] These profiles are characterised by loamy topsoils and silty clay to clay subsoils, with boundaries between these two units typically clear to abrupt. Clayey subsoils have formed by *in situ* weathering of the parent material, while topsoils are derived from a combination of *in situ* weathering and the deposition of colluvially and/or fluvially transported materials.

[8] Stone lines, where present, typically occur at the interface between the A and B horizons.

development of chronological frameworks for contextualising and interpreting the flaked stone artefact assemblages recovered from such sequences.

5.2.4 Site distribution and occupation models

A number of Aboriginal site distribution and occupations models have been proposed for the Cumberland Plain over the past four decades, with early models (e.g., Kohen, 1986; Smith, 1989) based principally, or exclusively, on surface evidence and more recent models (e.g., AMBS, 2000; Jo McDonald CHM, 1997b) taking into account both surface and excavated evidence. Aboriginal site distribution on the Cumberland Plain has been linked to a variety of environmental factors, with proximity to water, stream order, landform and geology (including proximity to known stone sources) variously highlighted as key determinants (Table 5-2).

Table 5-2: Aboriginal site distribution and occupation models for the Cumberland Plain

Researcher(s)	Year	Summary of model
Dallas and Witter	1983	• Sites closer to silcrete and other raw material sources will tend to contain more cores and waste chips and less utilised material than sites which are located further away. They will also contain more block fractured pieces, a higher frequency of cortex, and the artefacts will generally be larger than those at sites not associated with raw material sources • In areas of raw material abundance, artefacts will be discarded earlier in the reduction sequence and will generally be larger and occur in a variety of forms • Raw material abundance, quality and size will influence assemblage variability • Sites located away from raw material sources will exhibit a wider variety of activities and a higher number of utilised pieces than those closer to them.
Kohen	1986	• Proximity to water and geological context key determinants for site location • Sites can be categorized as one of three types according to their function: - camping sites, which have a wide range of activities represented in the archaeological record - woodworking sites, where there is a high proportion of implements to debitage present - hunting sites, which contain a relatively small number of unworked flakes and are sometimes associated with backed blades • Greatest proportion of sites located on Wianamatta Shale substrates • Number of artefacts found at a site and site size more closely correlated to the nature and degree of disturbance at a site than any behavioural factors. The more disturbed the site, the greater the visibility and hence the greater quantity of artefacts recorded • Sites with high artefact densities tend to be found within 100 metres of permanent water sources.
Smith	1989	• Sites are most likely to occur in association with water sources. Permanency of the water source, however, is not a determining factor for site location, with a significant quantity of sites found along temporary creek lines • Sites on the Londonderry Clay/Rickabys Creek Formation are likely to be found in association with gravel exposures • Sites dominated by silcrete are less likely to be found west of Marsden Park and South Creek than east of those areas. Isolated finds in these areas are also less likely to be made from silcrete

Researcher(s)	Year	Summary of model
		• Sites east of South Creek are likely to be principally stone tool and silcrete manufacturing and processing sites • Sites in the northern Cumberland Plain are expected to have a lower frequency of implements than those in the south • Woodland areas will typically contain sites at lower densities than open forest areas • Surface sites appear to be more common than subsurface sites, and undisturbed stratified sites are rare due to the degree of disturbance • Sites with over 50 artefacts are rare, although very large sites (500+ artefacts) do occur. There is no apparent patterning to the occurrence of these large sites. The pattern of distribution of site size appears to be determined predominantly by visibility • Sites cannot be divided neatly into 'single use' categories, as most sites were the location of numerous activities.
Jo McDonald CHM	1997b	• Open sites with subsurface archaeological deposits are the most commonly occurring sites • Sites cannot be adequately characterized on the basis of surface evidence alone • Where open sites are found in stable and aggrading landscapes, many will be intact and have the potential for internal structural integrity, with sites in alluvium and other depositional environments containing the best potential for intact archaeological remains and stratification • Many sites contain extremely high artefact densities, with variability depending on the range of activity areas and site types present • Artefacts are not evenly distributed across the landscape. Site patterning can be related to gross environmental factors, with sites on permanent water being more complex than those situated on ephemeral or temporary water lines. However, there is not always a direct correlation between site location and the environment • Major confluences, particularly along major creeks, are prime site locations • Proximity to water and underlying geological units are key factors in site distribution. However, distribution can be further measured according to stream order, with sites located in close proximity to established, permanent, and resource rich drainage channels (e.g., third and fourth order creeks) are more likely to have higher artefact densities and a greater diversity of tools than sites associated with lower order water courses • Temporary water sources and minor gullies tend to have single-use or occasionally repeated visits and hence lower density sites • Locations between creeks, such as ridge-tops and spurs, may possibly contain archaeological evidence, which may vary according to proximity to water sources • Sites in close proximity to an identified stone source will contain a range of size and cortex characteristics in their assemblages. As distance increases from the source, artefact size and percentage of cortex in the assemblage will decrease.
AMBS	2000	• Spatial patterning in chipped stone artefact distributions adjacent to major creek lines can - in certain instances - be accommodated under a three-tiered model of 'Activity Overprint Zones' incorporating 'complex', 'dispersed' and 'sparse' zones:

Researcher(s)	Year	Summary of model
		- Complex zones will exhibit overlapping knapping floors and high-density concentrations of artefacts indicative of repeated, long-term occupation events - Dispersed zones may include knapping floors. However, these are typically spatially discrete due to less frequent occupation - Sparse zones will exhibit consistently low frequencies/densities of artefacts. Artefact discard in these zones is likely to have resulted from discard in the context of use or loss rather than manufacture • Flaked stone artefact production and maintenance will leave a more obtrusive archaeological signature than resource extraction (e.g., food collection and processing). These activities will also occur closer to the residential core while resource extraction will typically occur away from it.

White and McDonald's (2010) analysis of lithic artefact distribution in the Rouse Hill Development Area (RHDA) provides a suitably robust dataset for assessing the validity of some of the key predictions of the models outlined above. Based on the results of over a decade of intensive test excavation in the RHDA, this study remains the most comprehensive of its type currently available for the Cumberland Plain. As indicated, Aboriginal site distribution on the Cumberland Plain has been linked to a variety of environmental factors, with distance to water, stream order, landform and geology (including proximity to known stone sources) variously highlighted as important influences. White and McDonald's (2010) analysis both supports and negates various aspects of the postulated relationships between these factors and Aboriginal site patterning on the Cumberland Plain. Key findings can be summarised as follows:

- Artefact distributions do not, as implied by the models of Kohen (1986) and Smith (1989), form bounded 'sites' but rather 'landscapes'
- Artefact distribution does, as variably expressed by AMBS (2000), Kohen (1986), Jo McDonald CHM (1997b) and Smith (1989), appear to vary with proximity to water, albeit to different extents based on stream order
- Artefact density does, as suggested by Jo McDonald CHM (1997b), appear to vary significantly with stream order
- Artefact density does, as suggested by Jo McDonald CHM (1997b), appear to vary significantly with landform
- Aboriginal archaeological sites on the Cumberland Plain cannot, as proposed by Jo McDonald CHM (1997b), be adequately characterized on the basis of surface evidence alone. Most areas, regardless of surface indications, contain subsurface archaeological deposit(s)
- The orientation of open land surfaces appears to have influenced the selection of artefact discard locations in the lower portions of valleys, with generally higher densities on lower slopes facing north and north-east
- Distance from known silcrete sources does not, on present evidence at least, appear to have influenced intensity of artefact discard (cf. Dallas & Witter 1983)
- Trends in artefact density and distribution indicate long-term, large scale patterns. Short-term models of settlement organization are insufficient to account for these artefact distributions
- Social and/or symbolic factors may have influenced site selection along with the distributions of economic and other resources.

More recently, AHMS (2015), employing a comparable analytical methodology to White and McDonald (2010), undertook an analysis of lithic artefact distribution across sixteen north western Cumberland Plain landscapes subject to dispersed testing and/or targeted open area salvage excavations. The dataset for this analysis, which sought to identify patterns in artefact discard and, by extension, past

Aboriginal land use preferences, comprised 2,988 artefacts from 345 square metre dispersed test pits along multiple pipeline corridors. In common with White and McDonald (2010: 32-33), AHMS found that artefact distribution within their sampled landscapes varied significantly in relation to both stream order and landform, with mean artefact densities highest in third order landscapes (16.7 artefacts per square metre) and on terraces (16.9 artefacts per square metre). However, the mean artefact density for third order landscapes in AHMS's (2015) dataset (i.e., 16.7 artefacts per square metre) was found to exceed that for fourth order landscapes in the RHDA dataset (13.9 artefacts per square metre). The mean artefact density for creek flats in AHMS's dataset (7.8 artefacts per square metre) was likewise found to exceed its counterpart in the RHDA dataset (3.8 artefacts per square metre), suggesting that creek flats in AHMS's sampled landscapes may have been more favoured for occupation than those in the RHDA or, alternatively, that creek flats in the RHDA had been subject to more intensive flood-erosion (resulting in a greater loss of artefacts).

Regarding distance to water, in common with White and McDonald (2010: 34), AHMS found that in second order landscapes, artefact density was highest within 50 metres of water. Distance to water in fourth order landscapes was not assessed by AHMS. However, in a comparable finding to White and McDonald's (2010: 34, Table 9) fourth order dataset, AHMS found that in third order landscapes, artefact density was highest between 51 and 100 metres from water. Consideration of first and third order landscapes in combination likewise showed that mean artefact density was highest between 51 and 100 metres of water, suggesting, in combination with the above, that landform elements located at a slightly greater distance to creeks (and particularly larger creeks) were favoured for sustained/repeated occupation[9]. While limited to lower slopes, AHMS' analysis of artefact distribution in relation to slope aspect revealed both similarities and differences with the RHDA dataset, with south east-facing lower slopes in AHMS's sampled landscapes exhibiting the highest mean artefact density (as opposed to north/north east-facing slopes in the RHDA dataset), followed by north east-facing lower slopes. Finally, AHMS's analysis of artefact distribution in relation to distance to known silcrete sources produced an entirely different result to White and McDonald's (2010: 35, Table 12) analysis of the same relationship, with the latter revealing a pattern of increasing artefact density with increasing distance from known sources. In AHMS' dataset, artefact density was highest within 2-3 kilometres of known silcrete sources. However, outside of this finding, no clear patterning was evident, suggesting that distance to known silcrete sources likely had little influence over artefact discard rates.

5.3 Local Context

5.3.1 AHIMS database

The AHIMS database, administered by Heritage NSW, contains records of all Aboriginal objects reported to the Director General of the Department of Premier and Cabinet in accordance with Section 89A of the NPW Act. It also contains information about Aboriginal places, which have been declared by the Minister to have special significance with respect to Aboriginal culture. Previously recorded Aboriginal objects and declared Aboriginal places are known as 'Aboriginal sites'.

Searches of the AHIMS database on 21 July 2021 for a 500 metre buffer zone centred on the study area (AHIMS search area) returned 162 site entries (Table 5-3). As is typical for the Cumberland Plain, open artefact sites with and without associated areas of PAD are the most common site type represented within the AHIMS search area, accounting for 91.4 per cent (n = 148) of known sites. Other minor site types include PADs (n = 7, 4.3 per cent), rock art sites (n = 3, 1.9 per cent), scarred trees (n = 3, 1.9 per cent) and single contact site (the Blacktown Native Institution).

Registered centroid coordinates for previously recorded Aboriginal sites within the AHIMS search area place 40 sites within or immediately adjacent (i.e., within 50 metres) to the study area (Figure 5-1 to Figure 5-5). Removal of two duplicate entries for open artefact site Florence Street #1, recorded under 45-5-2322, 45-5-2379 and 45-5-3551 provides a revised total of 38 sites. Of these, eight sites, consisting of seven open artefact sites (45-5-0747, 45-5-2304, 45-5-2477, 45-5-2797, 45-5-2795, 45-5-2793) and one area of PAD (45-5-2974), have centroids that place them within the study area. Five are listed on the AHIMS database as 'valid' sites, with the remaining three listed as 'destroyed'. However, of the five sites listed as valid (45-5-0747, 45-5-2304, 45-5-2477, 45-5-2793, 45-5-2433), all but two (45-5-

[9] For the RHDA, White and McDonald (2010: 33) attributed a comparable finding to factors such as allowing animals to drink and catching a cool breeze

2433, 45-5-2793) should, in fact, be listed as destroyed. Open artefact site 'EC-OS-1' (45-5-2433) should be listed as partially destroyed, with survey undertaken for the current assessment confirming the destruction of that portion of the site within the fenced Westlink M7 lease area (including the study area). Open artefact site 'PAD-OS-4' (45-5-2793) should likewise be listed as partially destroyed, with that portion of the site located outside of the study area but within the Westlink M7 lease area remaining extant.

Further consideration of the location of AHIMS registered sites relative to the study area indicates that an additional five sites are located either partially within or directly adjacent to the study area. These comprise open artefact sites 'PAD-OS-5' (45-5-2723), 'PAD-OS-7' (45-5-2721), 'PAD-OS-9' (45-5-2719), 'PAD-OS-10' (45-5-2718) and 'MC-2' (45-5-0779).

Open artefact site 'PAD-OS-7' was identified as part of Mill's (2002) Aboriginal archaeological test excavation program for the approved project. Initially identified as an area of PAD, test excavation subsequently confirmed the presence of Aboriginal objects within the site. Reference to KNC's (2021) *Aboriginal Cultural Salvage Strategy* for the approved M12 Motorway project indicates that the 'PAD-OS-7' extends into Lot 14 on DP1021940 and thus is located partially within the study area (see Figure 5-6). KNC (2021: 8, Table 2) list the management strategy for 'PAD-OS-7' as one of 'passive avoidance', described as "*[n]o active protection measures required due to lack of direct impacts or low archaeological significance*".

Open artefact site 'MC-2' (45-5-0779) was recorded by Smith (1989) as part of an archaeological site survey and planning study for the Liverpool Release Areas. Smith identified three artefacts along the bulldozed Ash Road reserve, with a fourth artefact identified on a vehicle track running parallel to the reserve. The site was assessed at the time as having been severely disturbed. 'MC-2' is listed on the AHIMS database as a valid site. However, survey undertaken for the current assessment has confirmed that it should, in fact, be listed as destroyed (see **Section 7.0**). Impacts to 'MC-2' subsequent to its identification by Smith (1989) do not, on the basis of available evidence, appear to have been authorised under a NPWS Consent to Destroy or AHIP.

Open artefact sites PAD-OS-5 (45-5-2723), 'PAD-OS-9' (45-5-2719) and 'PAD-OS-10' (45-5-2718) directly abut the study area within the Westlink M7 lease area. As with 'PAD-OS-7' (45-5-2721), all were identified as part of Mill's (2002) Aboriginal archaeological test excavation program for the approved project. All three sites are listed on AHIMS as valid sites but should, in fact, be listed as partially destroyed, with those sections of these sites located within the study area destroyed as a result of the approved project under National Parks and Wildlife Service (NPWS) Section 90 Consent #1396.

Boundaries for sites 'PAD-OS-4' (45-5-2793), PAD-OS-5 (45-5-2723) and 'PAD-OS-9' (45-5-2719) are shown on Figure 5-7 (PAD-OS-4 and PAD-OS-5), Figure 5-8 (PAD-OS-9) and Figure 5-9 (PAD-OS-10).

Table 5-3: AHIMS search results

Site type	Site feature(s)	Number	%
Open artefact site	AFT; PAD	149	92.0
PAD	PAD	7	4.3
Rock art (pigment or engraved)	ART	2	1.2
Scarred tree	TRE; AFT	3	1.9
Contact site	ACD	1	0.6
Total	**-**	**162**	**100**

Table 5-4: AHIMS sites within 50 metres of study area (based on centroid coordinates)

AHIMS ID	Site name	MGAE	MGAN	Location relative to study area (Centroid)	LALC	Site type	AHIMS status (July 2021)	Validated status (Oct 2021)	NPWS Consent to Destroy Permit ID
45-5-0252	Rooty Hill Road North Plumpton	300654	6265199	Outside	Deerubbin	Open artefact site	Valid	Valid	n/a
45-5-0422	Blacktown Plumpton	300765	6265419	Outside	Deerubbin	Open artefact site	Valid	Destroyed	1596
45-5-0445	Woodstock open site Plumpton	300685	6262639	Outside	Deerubbin	Open artefact site	Valid	Destroyed	1398
45-5-0747	RH 1	300585	6262289	Within	Deerubbin	Open artefact site	Valid	Destroyed	1398
45-5-0779	MC-2 (Maxwells Creek)	303975	6242719	Outside	Gandangara	Open artefact site	Valid	Destroyed[2]	None available
45-5-0786	HP-1	300995	6246259	Outside	Gandangara	Open artefact site	Valid	Destroyed	None available
45-5-2304	P-CP4	301925	6244269	Within	Gandangara	Open artefact site	Valid	Destroyed	None available
45-5-2305	P-CP5	300975	6245859	Outside	Gandangara	Open artefact site	Valid	Destroyed	1398
45-5-2322	Florence ST #1;	300615	6264389	Outside	Deerubbin	Open artefact site	Valid	Destroyed	1398[1]
45-5-2379	Florence ST#1; Oakhurst;	300615	6264389	Outside	Deerubbin	Open artefact site	Valid	Destroyed	1398[1]
45-5-2433	EC-OS-1	300885	6261085	Within	Deerubbin	Open artefact site	Valid	Partially destroyed[2]	None available
45-5-2468	P-CP14	300405	6249269	Outside	Gandangara	Open artefact site	Valid	Destroyed	1398 & 1737
45-5-2471	IF3	302695	6243819	Outside	Gandangara	Open artefact site	Valid	Destroyed	1398
45-5-2472	IF4	302095	6244149	Outside	Gandangara	Open artefact site	Valid	Destroyed	1633
45-5-2473	IF5	301865	6244379	Outside	Gandangara	Open artefact site	Valid	Destroyed	None available

AHIMS ID	Site name	MGAE	MGAN	Location relative to study area (Centroid)	LALC	Site type	AHIMS status (July 2021)	Validated status (Oct 2021)	NPWS Consent to Destroy Permit ID
45-5-2476	IF10	300705	6249589	Outside	Deerubbin	Open artefact site	Valid	Valid	n/a
45-5-2477	IF11	300695	6249739	Within	Deerubbin	Open artefact site	Valid	Destroyed	1398
45-5-2565	IF2	301305	6257429	Outside	Deerubbin	Open artefact site	Valid	Valid	n/a
45-5-2588	HB1	302205	6244089	Outside	Gandangara	Open artefact site	Valid	Valid	n/a
45-5-2718	PAD-OS-10	300705	6262889	Outside	Deerubbin	Open artefact site	Valid	Partially Destroyed	1396
45-5-2720	PAD-OS-8	301255	6257839	Outside	Deerubbin	Open artefact site	Destroyed	Destroyed	1396
45-5-2722	PAD-OS-6	299890	6247679	Outside	Gandangara	Open artefact site	Valid	Destroyed	1396
45-5-2723	PAD-OS-5	299995	6247299	Outside	Gandangara	Open artefact site	Valid	Partially Destroyed	1396
45-5-2761	P-CP15	303855	6241879	Outside	Gandangara	Open artefact site	Valid	Destroyed	1398
45-5-2793	PAD-OS-4	300015	6247209	Within	Gandangara	Open artefact site	Valid	Partially Destroyed	1396
45-5-2795	WSO-IF-1	301135	6251869	Within	Deerubbin	Open artefact site	Destroyed	Destroyed	1398
45-5-2796	WSO-IF-2	301515	6255029	Outside	Deerubbin	Open artefact site	Valid	Destroyed	1398
45-5-2797	WSO-OS-8	301195	6256639	Within	Deerubbin	Open artefact site	Destroyed	Destroyed	1398
45-5-2800	MC9	303865	6242069	Outside	Gandangara	Open artefact site	Valid	Valid	n/a
45-5-2481	MC11	303825	6241789	Outside	Gandangara	Open artefact site	Valid	Destroyed	1398

AHIMS ID	Site name	MGAE	MGAN	Location relative to study area (Centroid)	LALC	Site type	AHIMS status (July 2021)	Validated status (Oct 2021)	NPWS Consent to Destroy Permit ID
45-5-2480	MC12	303805	6241889	Outside	Gandangara	Open artefact site	Valid	Valid	n/a
45-5-2849	SO-ST 2 (A; B; C; D & E)	301415	6258199	Outside	Deerubbin	Scarred tree	Destroyed	Destroyed	1597
45-5-2851	WSO-OS-10	301690	6259469	Outside	Deerubbin	Open artefact site	Valid	Destroyed	1637
45-5-2974	Lucan Park PAD	301195	6256855	Within	Deerubbin	PAD	Destroyed	Destroyed	1941
45-5-2976	SH4 formerly PAD 9 Hoxton Park	300605	6246689	Outside	Gandangara	PAD	Valid	Destroyed	1939, 2494 & 2707
45-5-3080	HPA-IF1	301105	6245399	Outside	Gandangara	Open artefact site	Valid	Valid	n/a
45-5-3297	PP-F2	301425	6260595	Outside	Deerubbin	Open artefact site	Valid	Destroyed	None available
45-5-3551	Florence St 1	300510	6264200	Outside	Deerubbin	Open artefact site	Valid	Destroyed	1398[1]
45-5-3698	Phillip Pwy	300600	6262120	Outside	Deerubbin	Open artefact site	Valid	Destroyed	None available
45-5-5182	Bungarribee Sportsfield Artefact Reburial 01 (BS AR 01)	301413	6260751	Outside	Deerubbin	Open artefact site	Valid	Valid	n/a

Notes:

[1] Note that, while approved for destruction under NPWS Consent to Destroy Permit 1398 (issued for the approved project), open artefact site Florence Street #1 (45-5-2322, 45-5-2379 and 45-5-3551) appears to have been destroyed as a result of a residential subdivision to the west of the Westlink M7. AHIMS coordinates for 45-5-2322 and 45-5-2379 place the site on the eastern side of the Westlink M7. However, the site was, in fact, located to the west of the Westlink M7, with mapping in Byrne (1995) placing the site at c.300489E 6264380N. Coordinates for 45-5-3551 are also incorrect, placing the site outside of Byrne's (1995) study area.

2 Current site status determined via this assessment; specifically, through desktop research and survey.

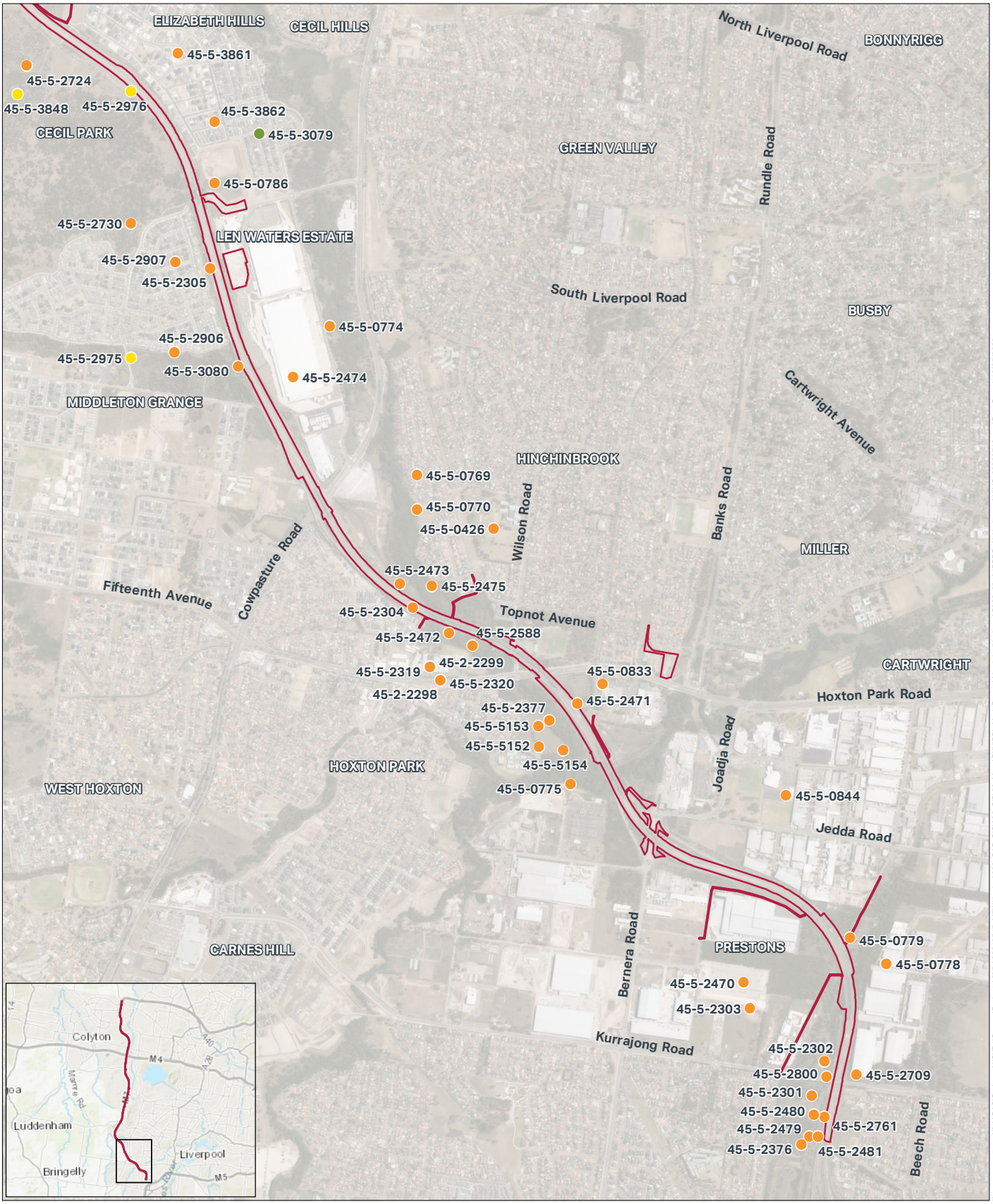

FIGURE 5-1: AHIMS REGISTERED SITES WITHIN AND SURROUNDING THE SUTDY AREA (SHEET 1 OF 5)

N

0 0.5 1 km

AECOM

Legend

Study area

AHIMS Sites

- Open artefact site
- PAD
- Rock art

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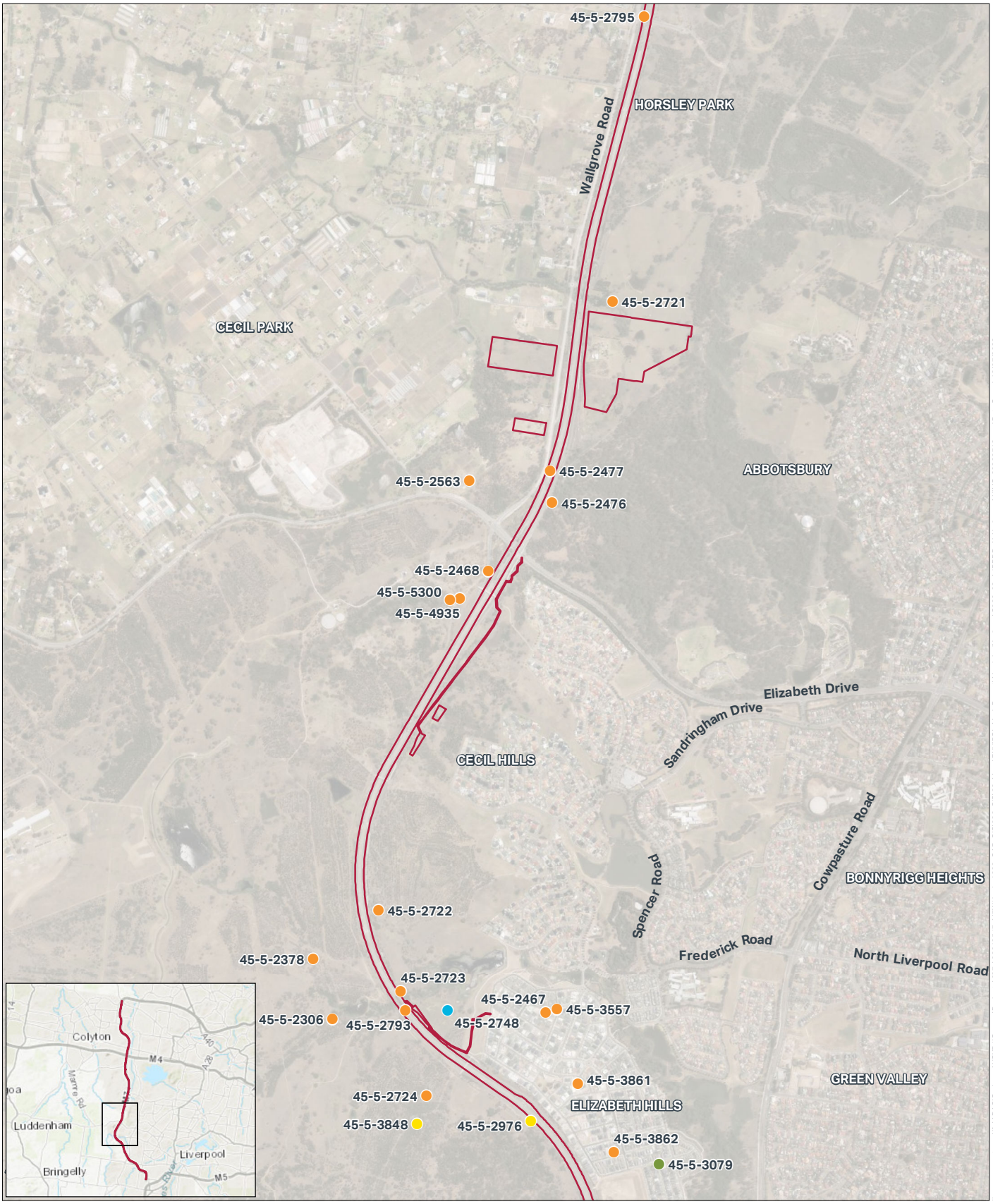

FIGURE 5-2: AHIMS REGISTERED SITES WITHIN AND SURROUNDING THE STUDY AREA (SHEET 2 OF 5)

N 0 0.5 1 km

AECOM

Legend

- Study area

AHIMS Sites

- Open artefact site
- PAD
- Rock art
- Scarred tree

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FIGURE 5-3: AHIMS REGISTERED SITES WITHIN AND SURROUNDING THE STUDY AREA (SHEET 3 OF 5)

N

0 0.5 1 km

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Legend

Study area

AHIMS Sites

Open artefact site

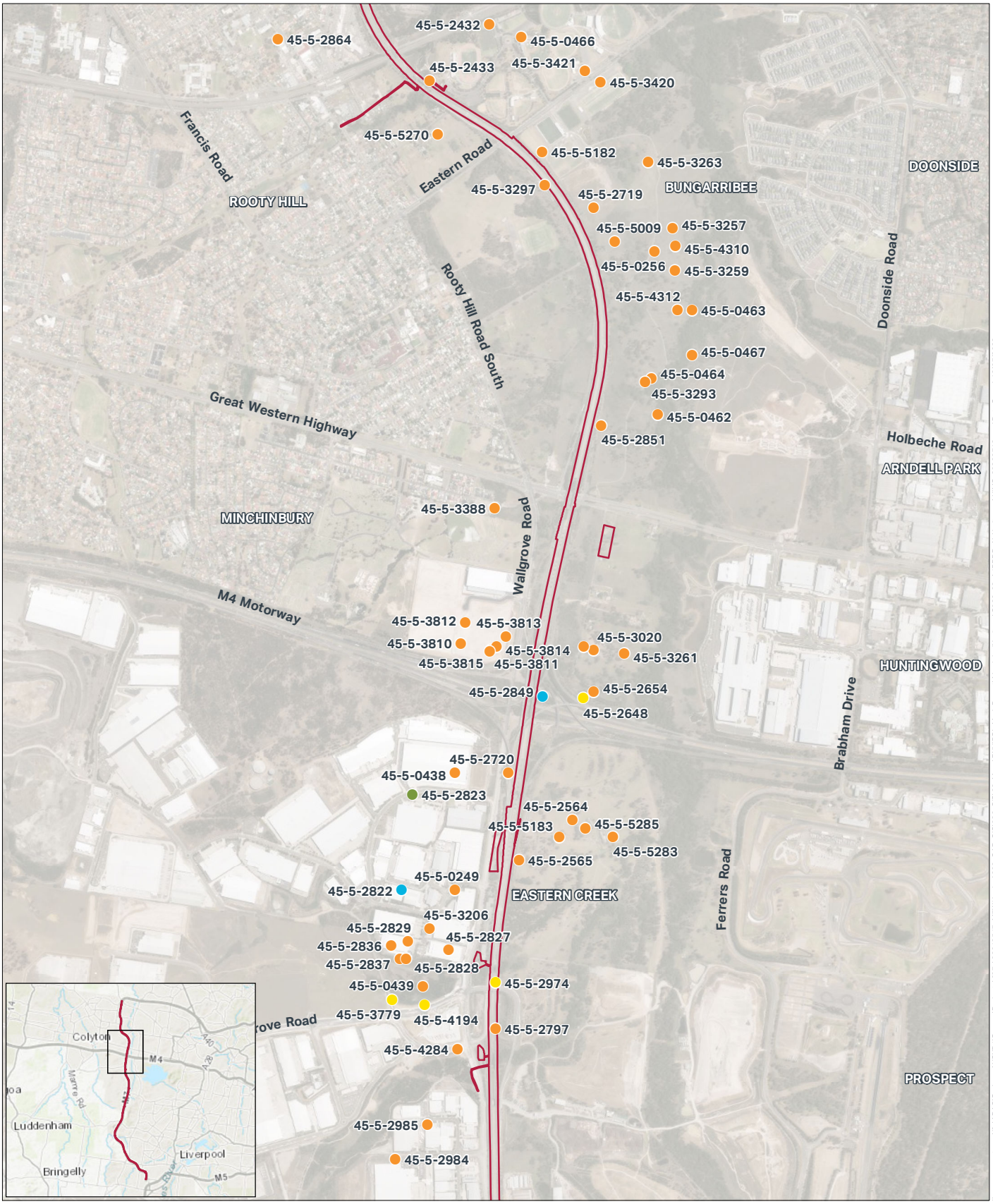

FIGURE 5-4: AHIMS REGISTERED SITES WITHIN AND SURROUNDING THE STUDY AREA (SHEET 4 OF 5)

N 0 0.5 1 km

AECOM

Legend

- Study area

AHIMS Sites

- Open artefact site
- PAD
- Rock art
- Scarred tree

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FIGURE 5-5: AHIMS REGISTERED SITES WITHIN AND SURROUNDING THE STUDY AREA (SHEET 5 OF 5)

N

0 0.5 1 km

AECOM

Legend

Study area

AHIMS Sites

- Contact site
- Open artefact site

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Figure 5-6: Location of previously recorded open artefact site 'PAD-OS-7' (45-5-2721) relative to study area and refined M12 construction footprint

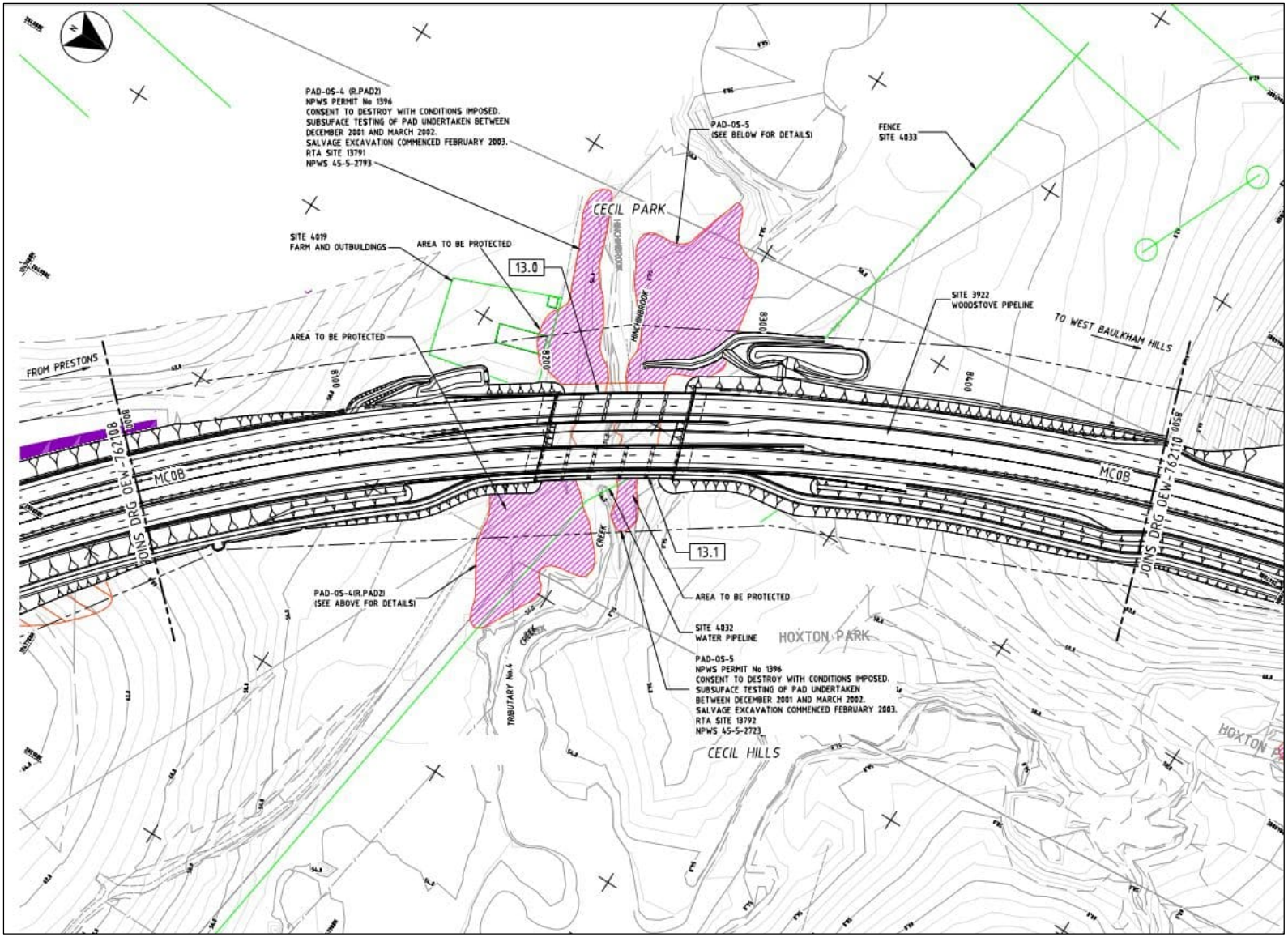

Figure 5-7: Location of previously recorded open artefact sites 'PAD-OS-4' (45-5-2793) and 'PAD-OS-5' (45-5-2773) relative to Westlink M7 lease area (Source: WSO Co)

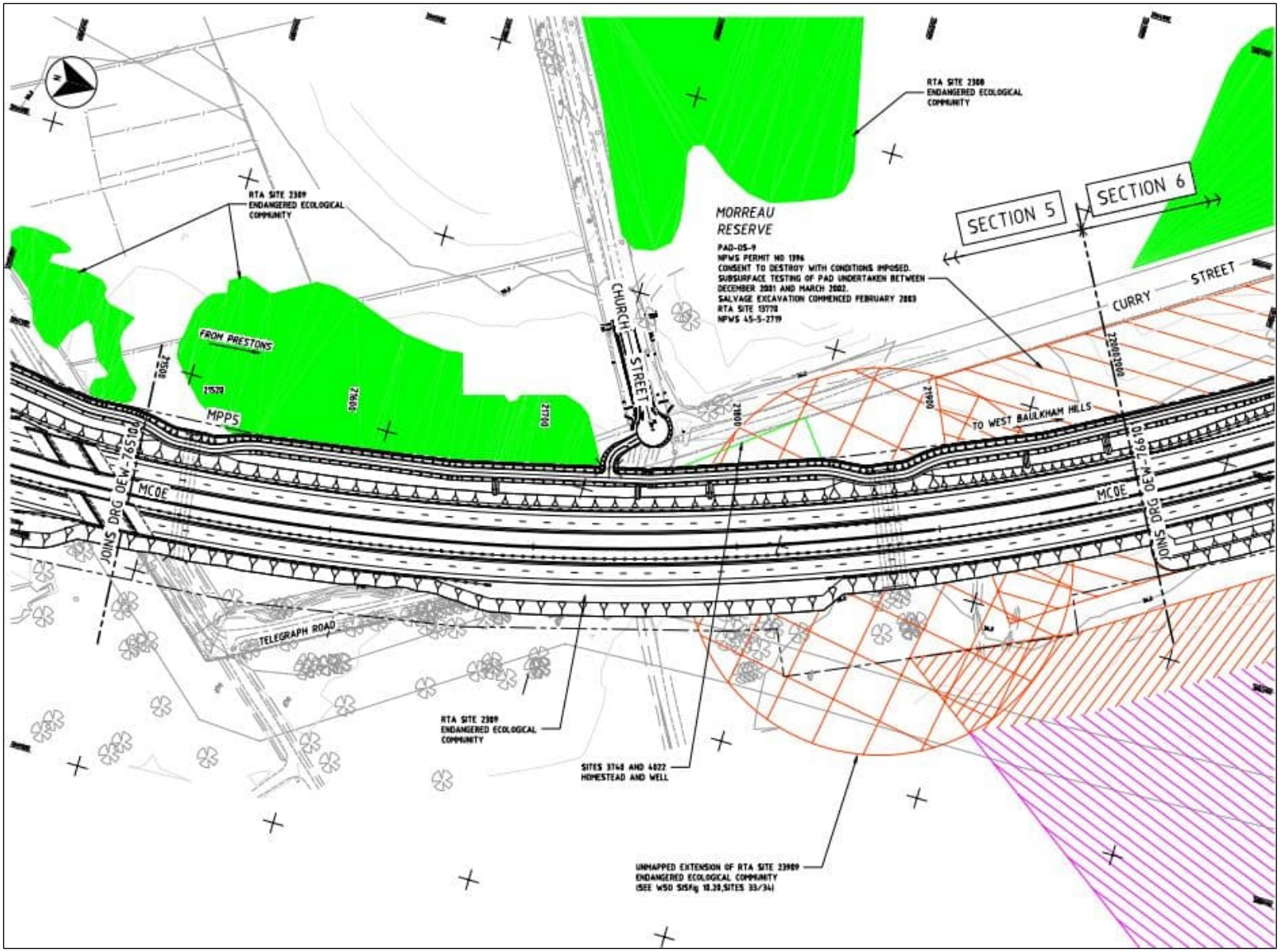

Figure 5-8: Location of previously recorded open artefact site 'PAD-OS-9' (45-5-2719) relative to Westlink M7 lease area (Source: WSO Co)

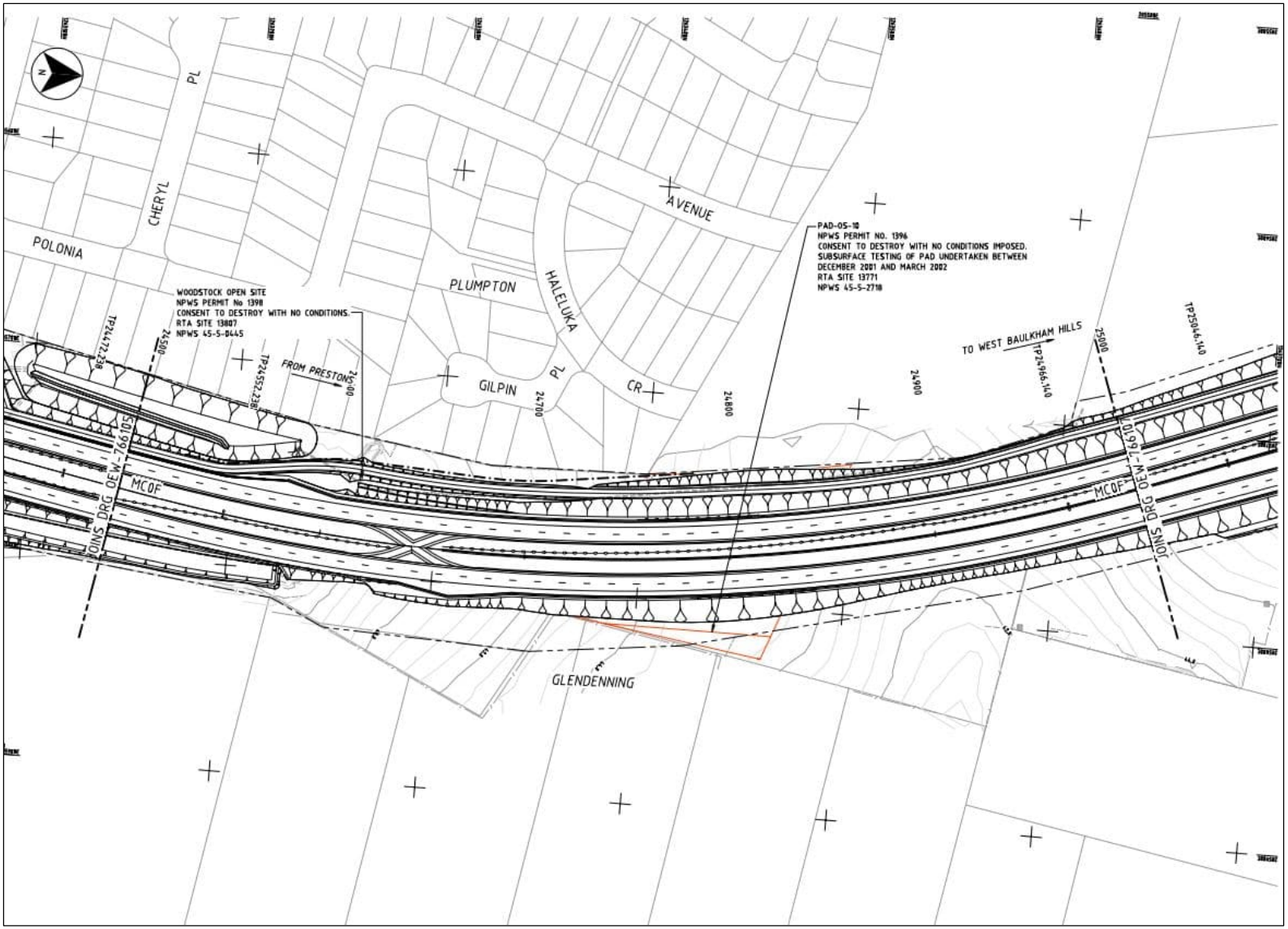

Figure 5-9: Location of previously recorded open artefact site 'PAD-OS-10' (45-5-2718) relative to Westlink M7 lease area (Source: WSO Co)

5.3.2 Westlink M7

Archaeological investigations completed as part of the EIS prepared for the Westlink M7 were undertaken in two parts, with the southern section of the proposed road corridor, between the M5 Motorway and Elizabeth Drive, surveyed by Robynne Mills (Mills, 1999) and the northern section, between Elizabeth Drive and the M2 Motorway at Baulkham Hills, surveyed by Helen Brayshaw and Elizabeth (Beth) White (Brayshaw & White, 1999). Investigations for the EIS also included a program of test excavation at Plumpton Ridge, undertaken by AMBS (1996) at the request of Mills. For contextual purposes, the results of these investigations, as well as several others undertaken as part of the Westlink M7 project, are summarised below.

Undertaken in stages between 1995 and 1999, Brayshaw and White's (1999) survey of the southern section of the WSO corridor ultimately resulted in the identification of 26 open artefact sites and six areas of PAD, with a further four sites, consisting exclusively of open artefact sites, identified by another consultant (Jo McDonald CHM, 1999) but incorporated into Brayshaw and White's (1999) EIS assessment. Of the 36 sites identified, 14 were located within the Maxwells Creek catchment, 18 in the Hinchinbrook Creek catchment, two in the Ropes Creek catchment, one in the Kemps Creek catchment and one on the watershed between the Hinchinbrook and Kemps Creek catchments. Most open artefact sites (n = 21), and all areas of PAD, were located in close proximity to watercourses, occurring in 'creek bank', 'creek flat' and 'floodplain' contexts. Recorded artefact scatters contained an average of 12.8 artefacts (range:2-53), with five sites containing over 20 artefacts. Within the Cecil Hills section of the corridor, artefact scatters 'P-CP7' and 'P-CP12', together with PADs 3 and 4, were described as forming "an archaeological complex within a rural landscape setting" (Brayshaw & White, 1999: 1). Further south, within the Prestons section of the corridor, artefact scatters 'P-CP1', 'P-CP10' and 'MC12' were likewise considered to comprise an archaeological complex on the floodplain of Maxwells Creek. Brayshaw and White (1999: 40, Table 5.2) report a total of 244 stone artefacts across the 30 open artefact sites identified, with silcrete the predominant raw material (n = 196, 80.3 per cent), followed by indurated mudstone/chert[10] (n = 24, 9.8 per cent), quartz (n= 21,8.6 per cent) and Igneous (n = 3, 1.2 per cent). Most of the assemblage consisted of flake and non-flake debitage items (83 per cent), with cores and tools making up the remaining 17 per cent. Recorded artefacts were generally small, with the majority (65.6 per cent) exhibiting a maximum linear dimension of less than or equal to two centimetres.

Mill's survey of the northern section of the WSO corridor was primarily completed in 1995, with some limited follow-up work occurring in 1996. The corridor surveyed by Mills was 28 kilometres long and approximately 80 to 100 metres wide. A total of 23 sites, consisting of 13 open artefact sites, six potential scarred trees and fours areas of PAD, were identified during the survey. Mills (1999: 28) reports identified open artefact sites as occurring on creek banks, gentle hillslopes adjacent to watercourses and low ridge lines. Reference to Mill's (1999: Table 6) site description table indicates that the number of artefacts recorded in individual scatters ranged from two to 20, with counts for sites 'SO-OS-1' (n = 20) and 'SO-OS-5' (n = 13) comprising sample recordings only. Artefact scatter 'SO-OS-13', located on a raised flat adjacent to a tributary of Caddies Creek in Parklea, was identified as a contact site on the basis of it containing both flaked stone and glass artefacts. Artefacts within identified open artefact sites were predominantly manufactured out of silcrete (70 per cent), with other, less common raw materials including mudstone (10.6 per cent), chert (8.8 per cent), quartz (2.6 per cent), sandstone (1.7 per cent) and glass (1.7 per cent). Of the four PADs identified during survey, 'PAD2', extending from Richmond Road to Symonds Road, comprised a section of Plumpton Ridge, a well-known source of silcrete for stone artefact manufacture and potential Aboriginal quarry.

At Mill's request, 'PAD2' was subject to test excavation by AMBS in 1996, with excavations aimed at determining the presence of subsurface deposit(s) and assessing the evidence for Aboriginal quarrying of locally occurring St Marys Formation gravels (AMBS, 1996). Together with field observations, background research by Mills indicated that subsurface testing of 'PAD2' was warranted given the high level of interest in Plumpton Ridge as an apparent "silcrete quarry". Testing involved the completion of two linear transects of 50 x 50 centimetre test pits (PT1 and PT2) across two "target areas", with a single pit in PT1 (TP70) subsequently expanded to one square metre. Transect PT1 comprised a total of 24 pits spaced at 10 metre intervals over a distance of 180 metres, with a 12 metre stretch along the transect incorporating pits at two metre intervals. 'PT2', located approximately 100 metres west of Symonds Road, comprised a total of 11 pits dug at 10 metre intervals over a distance of 60 metres, with

[10] Likely silicified tuff

a 10 metre stretch along the transect incorporating pits at two metre intervals. Pits excavated in PT1 revealed either Wianamatta shale soils or “red ridge gravels” containing silcrete cobbles and fragments. Those in PT2, meanwhile, “showed ambiguous indicators” as to whether they were ridge gravel or shale-based, with both silcrete fragments and rounded ironstone gravels present (AMBS, 1996: 10). For PT1, AMBS (1996: 12) report the recovery of a total of 40 artefacts from 13 pits, all of which of contained the red ridge gravels referenced above. Individual artefact counts for PT1 test pits ranged from one to 12, with TP70, which contained the highest number of artefacts (n = 12), subsequently expanded to four square metres (2 x 2 metres), yielding a further 51 artefacts. In contrast to PT1, excavations along PT2 yielded a total of only three artefacts, one from each of three pits. These comprised two small silcrete flakes and a broken silicified tuff flake. Raw materials represented in the combined subsurface artefact assemblage (n = 101) included silcrete, silicified tuff and petrified wood, with silcrete overwhelmingly dominant. Artefact types, meanwhile, included complete flakes (n = 64), broken flakes (n = 34), cores (n= 2) and a single retouched flake. Evidence from PT1 was interpreted by AMBS (1996) as representing “short term visitation and testing of smaller silcrete cobbles” for transport elsewhere, with PT1 ultimately classified as a “reduction site at a quarry” (Site PT1, AMBS, 1996: iii) and assigned high scientific significance. Transect PT2, designated as Site PT2, was assessed as being of low scientific significance.

Subsequent to the EIS investigations described above, modifications to the original route of the Westlink M7, as well as new construction-related infrastructure, prompted a series of supplementary field investigations incorporating both surveys and test excavations (i.e., AMBS, 2002; Central West Archaeological and Heritage Services, 2001c, 2001b, 2001a, 2002c, 2002a, 2002b, 2003). Key findings from these additional investigations included:

- The identification of a small, highly disturbed artefact scatter (‘PL-OS-1’, AHIMS ID #45-5-2648), as well as two areas of PAD, within a proposed works compound at Eastern Creek (Central West Archaeological and Heritage Services, 2001a)
- The identification of a localised area of high density subsurface deposit on the crest of Plumpton Ridge, southeast of AMBS’s (1996) PT1 test pits ((Australian Museum Business Services, 2002))
- The identification of low density subsurface deposit within a previously identified area of PAD on the western side of Maxwells Creek (i.e., Brayshaw and White’s (1999) ‘PAD6’) (Central West Archaeological and Heritage Services, 2003)
- The identification of high levels of ground disturbance, and correspondingly negligible archaeological potential, within existing road easements/corridors (e.g., Central West Archaeological and Heritage Services, 2001c, 2001b)
- The identification of reduced levels of archaeological potential in a number of major floodplain contexts due to past land disturbance and flooding (e.g., Central West Archaeological and Heritage Services, 2002c, 2002a).

Following public exhibition of the WSO EIS in January 2001, the NSW Roads and Traffic Authority (RTA), acting on a request from the NSW NPWS, commissioned Mills to prepare a consolidated Aboriginal heritage impact statement for the final WSO alignment. This statement, which was ultimately presented to the NPWS as part of the WSO Representations Report, was informed by a site visit and a review of the scientific and cultural significance of all sites identified during the original EIS surveys. Based on these activities, a list of sites and PADs located within the direct impact zone of WSO was compiled, with the NPWS subsequently requesting that archaeological test excavations be undertaken within all impacted PADs.

The test excavation program requested by NPWS was undertaken by Mills between December 2001 and March 2002 (Mills, 2002). Subsurface testing was carried out at 16 of the 19 PADs to be impacted by the WSO, with two of the remaining three PADs excluded on the grounds of disturbance, having been destroyed post-survey, and the third, on the basis of having been previously tested (i.e., Plumpton Ridge, AMBS, 1996). Test excavations at all PADs involved the mechanical excavation of a series of 500 millimetre auger pits across the PAD extent, with pits at all but one PAD (‘PAD19’) placed on a five metre offset grid. At ‘PAD19’, pits were placed on 2.5 metre offset grid due to the small size of the area to be tested. In the end, a total of 1,876 auger pits were completed across the 16 PADs selected for testing, with works at ‘PAD5’, situated on the northern side of Hinchinbrook Creek, also including a single, hand-excavated 2 x 2 metre expansion pit. All PADs were found to contain subsurface deposits,

with artefact type, density and distribution patterns found to vary both within and between PADs (Mills, 2002: 10). Mills (2002: 47) reports the recovery of a combined testing assemblage of 556 artefacts, with individual, PAD-based counts ranging from five to 140 artefacts (mean = 34.8 artefacts). Of the sixteen PADs subject to testing, artefact numbers from three - PADs 1 (n = 82), 5 (n = 140) and 9 (n = 83) - were considered indicative of more intensive use by Aboriginal people in the past.

Silcrete was the dominant raw material overall, accounting for 84.2 per cent of the combined assemblage, with silicified tuff the second most common material at 8.3 per cent (n = 46). Other, minor lithologies included chert (n = 24), quartz (n = 7), quartzite (n = 3) fine-grained volcanic (n = 5), jasper (n = 1) and ochre (n = 2). Typologically, the assemblage was dominated by flake and non-flake debitage items. However, cores and tools were also well represented, with latter category including 21 scrapers, 20 backed artefacts, a single edge-ground hatchet head and a hammerstone.

Based on the results of the WSO test excavation, Mills recommended that construction-related impacts to eight PADs (PADs 1, 4, 5, 7, 9, 13, 15 and 17) within the WSO corridor be mitigated through small, open area salvage excavations therein. In addition, it was recommended that all non-impacted areas of PAD located on RTA-owned land should be protected throughout the construction process. Mills concluded her report by noting that the WSO project was expected to directly impact 32 Aboriginal archaeological sites, 16 of which were identified through the subsurface testing program. It was noted that Consent to destroy applications for all 32 sites would be prepared for submission to the NPWS in two groups; the first for sites identified through subsurface testing and the second for sites at which no further work was recommended (Mills, 2002: 163).

As indicated in **Section 2.1.2.2**, an IHMSP for the approved project was finalised in June 2004 (Abigroup Leighton Joint Venture, 2004). Annexure A of the IHMSP provides summary information on all Aboriginal sites that were identified as having the potential to be affected by the approved project (n = 56), including associated management strategies and NPWS Consent to Destroy permit numbers (where applicable). Management strategies detailed in the IHMSP (n = 5) included:

- Protective fencing of sites located within the Westlink M7 (Strategy 1)
- Protective fencing of sites located outside of the Westlink M7 (Strategy 2)
- Archaeological monitoring and salvage of impacted sites in accordance with associated NPWS Consent to Destroy permits (Strategies 3 & 4)
- Actions to be taken in the event of the discovery of previously undetected Aboriginal cultural heritage material (Strategy 5).

Reference to section 4.3 of the IHMSP indicates that archaeological salvage works for the approved project commenced in February 2003. AECOM understands that these works were completed by May 2003, with salvage excavations ultimately undertaken at the following sites:

- PAD-OS-1 (45-5-2725)
- PAD-OS-4 (45-5-2793)
- PAD-OS-5 (45-5-2723)
- PAD-OS-7 (45-5-2721)
- PAD-OS-9 (45-5-2719)
- PAD-OS-13 (45-5-2717)
- PAD-OS-15 (45-5-2716)
- PAD-OS-17 (45-5-2714)
- PAD-OS-11 (Plumpton Ridge PAD) (45-5-245 / 45-5-2647).

Excluding PAD-OS-11, which was excavated separately by Australian Museum Business Services (AMBS), salvage excavations for the approved project were completed by archaeologists Robynne Mills and Jim Kelton. As reported by Barry (2005:56, Table 4.1), excavations by Mills and Kelton resulted in the recovery of a total of 3,860 Aboriginal objects, consisting exclusively of stone artefacts, with site-based artefact counts ranging from 12 to 1,756. Recovered artefacts, the overwhelming majority of

which were manufactured out of silcrete (n = 3,610, 93.5%), consisted primarily of complete and broken flakes (n = 2,995, 77.6%), with other less common artefact types including complete tools (n = 40, 1%), broken tools (n = 44, 1.1%), cores (n = 54, 1.4%) and 'blocks' (n = 727, 18.8%) (Barry, 2005: 87, Table 5.1). Silcified tuff was the second most common material (n = 202, 5.2%) in the combined salvage assemblage, followed by quartz (n = 20, 0.5), 'other' unidentified materials (n = 16, 0.4%) and an equal number of quartzite n = 6, 0.2%) and volcanic artefacts (n = 6, 0.2%).

5.3.3 M12 Motorway

As shown on Figure 5-10, a portion of the study area, both north and south of Elizabeth Drive, falls within the final, refined construction footprint for the approved M12 Motorway. Impacts to Aboriginal heritage within this area were assessed by Jacobs (Jacobs Group (Australia) Pty Ltd, 2019a, 2019b, 2020) as part of the M12 Motorway EIS and its associated Amendment Report. Survey and test excavation works completed for the EIS resulted in the identification of a total of 19 Aboriginal archaeological sites within the project's original construction footprint. Identified sites consisted exclusively of surface and/or subsurface open artefact sites. A further seven open artefact sites were identified within a broader 'detailed investigation area', with Jacobs (2019a, 2019b) ultimately recognising a total of five 'site complexes' within this broader area, four of which were associated with particular creek systems; namely, Cosgroves Creek, Badgerys Creek, South Creek and Kemps Creek. An assessment of the impacts of the M12 Motorway on identified sites found that all 19 sites located within the construction footprint, six of which were assessed as being of high overall heritage significance, would be significantly impacted by the project. Recommended management measures included protective fencing for 13 sites, salvage collection of nine sites and salvage excavations for eight sites.

Jacob's supplementary Aboriginal heritage assessment for the M12 Motorway's amended construction footprint, finalised in October 2020, determined the following:

- The number of Aboriginal heritage sites directly impacted by the construction of the M12 Motorway would remain as per the EIS (i.e., 19 sites)
- The boundaries of two Aboriginal sites – 'PAD-OS-7' (AHIMS site 45-5-2721) and 'KC/ED2' (AHIMS site 45-5-2310) - were refined as a result of additional survey works
- One additional Aboriginal site – 'PAD-OS-7' (AHIMS site 45-5-2721) - would be located within the amended construction footprint
- One Aboriginal site, 'KC/ED2' (AHIMS site 45-5-2310) with its refined boundary, would now be located outside of the amended construction footprint
- Active protection will be provided in the form of an exclusion zone and appropriate barrier/fencing along the portion of 'PAD-OS-7' that extends into the amended construction footprint, with visible signage notifying construction personnel to avoid impacts on this site
- Cumulative impacts resulting from the amended construction footprint remain consistent with those identified in the EIS, in which a moderate cumulative Aboriginal cultural heritage impact is anticipated
- Two new environmental management measures, AH08 and AH09, would be required to manage impacts on identified cultural deposits, in the form of exclusion zones, and archaeological test excavation and further consultation with project RAPs if impacts to 'PAD-OS-7' cannot be avoided.

Finalised in December 2020, the M12 Amendment Report Submissions Report contains a construction footprint for the M12 Motorway that differs from that presented in the Amendment Report. This 'refined construction footprint', shown on Figure 5-10, covers an area of approximately 440 hectares, which is about one hectare smaller than the construction footprint described in the Amendment Report. Sites located within the M12 Motorway's refined construction footprint are to be managed in accordance with the *Aboriginal Cultural Salvage Strategy* prepared by Kelleher Nightingale Consulting (2021).

5.4 Key observations

Key observations to be drawn from a review of the local and regional archaeological context of the study area are as follows:

- Available radiometric dates indicate that Aboriginal people have occupied the Sydney Region, including the Cumberland Plain, since the late Pleistocene. However, 'early' (i.e., late Pleistocene / early Holocene) occupational evidence remains rare, with the overwhelming majority of sites identified to date likely of mid-to-late Holocene antiquity
- Surface and subsurface distributions of stone artefacts (i.e., open artefact sites) are the most common and widely distributed form of Aboriginal archaeological site on the Cumberland Plain
- Existing archaeological survey data for the Cumberland Plain, including land within and surrounding the study area, indicate a strong trend for the presence of open artefact sites along watercourses, specifically, on creek banks and 'flats' (i.e., flood/drainage plains), terraces and bordering lower slopes
- Regional and local datasets indicate that assemblage size and complexity tend to vary significantly in relation to stream order and landform, with larger, more complex assemblages concentrated on elevated, low gradient landform elements adjacent to higher order watercourses
- Flaked stone artefact assemblages from excavated and surface collected/recorded open artefact sites on the Cumberland Plain attest to the exploitation of a diverse range of lithic raw materials. However, two rock types - silcrete and silicified tuff (also known as indurated mudstone) - dominate the region's existing stone artefact record
- Unless severely disturbed through historical or recent land use activities, all landform elements across the Cumberland Plain retain potential for the presence of Aboriginal archaeological materials, albeit of highly variable character and extent
- Searches of the AHIMS database on 21 July 2021 for a 500 metre buffer zone centred on the study area (AHIMS search area) returned 162 site entries. As is typical for the Cumberland Plain, open artefact sites with and without associated areas of Potential Archaeological Deposit (PAD) are the most common site type represented within the AHIMS search area, accounting for 91.4 per cent (n = 148) of known sites. Other minor site types include PADs (n = 7, 4.3 per cent), rock art sites (n = 3, 1.9 per cent), scarred trees (n = 3, 1.9 per cent) and single contact site (the Blacktown Native Institution)
- Registered centroid coordinates for previously recorded Aboriginal sites within the AHIMS search area place 38 sites within or immediately adjacent (i.e., within 50 metres) to the study area. Removal of two duplicate entries for open artefact site Florence Street #1, recorded under 45-5-2322, 45-5-2379 and 45-5-3551 provides a revised total of 36 sites. Of these, eight sites, consisting of seven open artefact sites (45-5-0747, 45-5-2304, 45-5-2477, 45-5-2797, 45-5-2795, 45-5-2793) and one area of PAD (45-5-2974), have centroids that place them within the study area. Five are listed on the AHIMS database as 'valid' sites, with the remaining three listed as 'destroyed'. However, of the five sites listed as valid (45-5-0747, 45-5-2304, 45-5-2477, 45-5-2793, 45-5-2433), all but two (45-5-2433, 45-5-2793) should, in fact, be listed as destroyed. Open artefact site 'EC-OS-1' (45-5-2433) should be listed as partially destroyed, with survey undertaken for the current assessment confirming the destruction of that portion of the site within the fenced Westlink M7 lease area (including the study area). Open artefact site 'PAD-OS-4' (45-5-2793) should likewise be listed as partially destroyed, with that portion of the site located outside of the study area but within the Westlink M7 lease area remaining extant.
- Further consideration of the location of AHIMS registered sites relative to the study area indicates that an additional five sites are located either partially within or directly adjacent to the study area. These comprise open artefact sites 'PAD-OS-5' (45-5-2723), 'PAD-OS-7' (45-5-2721), 'PAD-OS-9' (45-5-2719), 'PAD-OS-10' (45-5-2718) and 'MC-2' (45-5-0779).
- Open artefact site 'PAD-OS-7' was identified as part of Mill's (2002) Aboriginal archaeological test excavation program for the approved project. Initially identified as an area of PAD, test excavation subsequently confirmed the presence of Aboriginal objects within the site. Reference to KNC's (2021) *Aboriginal Cultural Salvage Strategy* for the approved M12 Motorway project indicates that

the 'PAD-OS-7' extends into Lot 14 on DP1021940 and thus is located partially within the study area. KNC (2021: 8, Table 2) list the management strategy for 'PAD-OS-7' as one of 'passive avoidance', described as "*[n]o active protection measures required due to lack of direct impacts or low archaeological significance*".

- Open artefact site 'MC-2' (45-5-0779) was recorded by Smith (1989) as part of an archaeological site survey and planning study for the Liverpool Release Areas. Smith identified three artefacts along the bulldozed Ash Road reserve, with a fourth artefact identified on a vehicle track running parallel to the reserve. The site was assessed at the time as having been severely disturbed. 'MC-2' is listed on the AHIMS database as a valid site. However, survey undertaken for the current assessment has confirmed that it should, in fact, be listed as destroyed. Impacts to 'MC-2' subsequent to its identification by Smith (1989) do not, on the basis of available evidence, appear to have been authorised under a NPWS Consent to Destroy or AHIP.

5.5 Archaeological predictions

Taking into consideration the environmental context of the study area (**Section 4.0**), as well as the archaeological data summarised in this chapter, the following predictions are made regarding the Aboriginal archaeological record of this area:

- Historical and recent ground disturbance activities within the study area will have destroyed all but a fraction of its associated Aboriginal archaeological record
- Any Aboriginal archaeological deposits that may once have existed within areas of severely disturbed terrain associated with the construction of the Westlink M7 and adjoining residential/light industrial development, will have been destroyed
- If present, remaining archaeological deposits within the study area will consist of surface and/or subsurface distributions of stone artefacts and be restricted to areas of minimally or moderately disturbed terrain
- Other archaeological site types with *limited* potential to occur within the study area include scarred trees and stone quarries
- Flaked stone artefact assemblages will be dominated by artefacts manufactured out of silcrete and will consist principally of flake debitage
- The complexity of any extant deposits will vary in relation to landform and stream order, with larger, more complex deposits occurring in association with higher order creeks.

FIGURE 5-10: REFINED CONSTRUCTION FOOTPRINT FOR APPROVED M12 MOTORWAY PROJECT

N

0 1 2 km

AECOM

Legend

- Study area
- M12 refined construction footprint

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6.0 Ethnohistoric context

Section 5.0 described the archaeological context of the study area on a regional and local scale. This section builds on that foundation and summarises relevant ethnohistoric information for the study area. As in other parts of NSW and Australia more broadly, non-Aboriginal people occupying the Sydney Region began to document Aboriginal culture from first contact, with explorers, missionaries, settlers and the like recording their observations of Aboriginal people and/or their material culture in letters, journals and official reports. Many of these accounts are overtly Eurocentric in tone and the content and veracity of some is, at best, questionable. Nonetheless, taken together, they form an important source of information on Aboriginal lifeways at the time of British colonisation and can, in conjunction with available archaeological data, be used to generate working predictive models of prehistoric Aboriginal land use.

Key sources, both primary and secondary, for the languages and lifeways of the Aboriginal people occupying the Sydney Region at and following British colonisation include: Attenbrow (2010b); Barrallier (1802 [1975]); Bradley (1792 [1961]); Brook & Kohen (1991); Collins (1798 [1975], 1802 [1971]; Dawes (1790a, 1790b); Flynn (1994, 1995a, 1995b); Hunter (1793 [1968]); Irish (2017); Kohen (1985, 1986, 1988, 1993); Kohen and Lampert (1987); Kohen et al. (1999); Matthews (1903); McDonald (2008); Phillip (1789 [1970], 1791[1963]); Tench (1793 [1979]); Troy (1994); White (1790 [1962]) and Worgan (1788). While a detailed review of these sources is beyond the scope of this report, salient information is summarised in the following sections.

6.1 The Darug language and people

Available sources indicate that the study area is located within the traditional country of the Darug people, who spoke the Darug (also spelt Dhaŕ-rook, Dharrook, Dhaŕook, Dharruk and Dharug) language (Figure 6-1). Darug is believed to have been spoken from the Hawkesbury River in the north, to Appin in the south, and from the coast west across the Cumberland Plain into the Blue Mountains. Historical reference materials indicate that two distinct dialects of Darug were spoken at the time of European contact, a coastal dialect, spoken on the Sydney peninsula and the country to the north of Port Jackson, and a hinterland dialect, spoken on the Cumberland Plain from Appin in the south to the Hawkesbury River in the north (Attenbrow 2010: 34). This linguistic division is thought to correspond to a broader economic division between ‘coastal’ and ‘hinterland’ Darug-speaking peoples, with several early sources drawing a distinction between the diets, subsistence patterns and material culture repertoires of coastal and hinterland peoples (e.g., Collins 1798; Tench 1793; Phillip 1788 in Attenbrow 2010: 63). The accounts of early observers such as Collins (1798) and Tench (1793), for example, suggest that the diets of those living along the coast were heavily biased towards marine resources while those of hinterland groups were based chiefly on the exploitation of land mammals and plant foods. Notably, early sources (e.g., Collins 1798, 1802; Tench 1793) suggest little contact between coastal and hinterland groups.

Some idea of population size for the coastal Darug at contact is provided by Attenbrow (2010), who suggests that the area around Port Jackson likely supported a minimum population density of 0.75 persons per one square kilometre (i.e., 1 person per 1.3 square kilometre). Attenbrow’s estimate is based Governor Phillip’s own estimate of the Aboriginal population of this area, made in 1788. Phillip, reporting to Lord Sydney on 15 May 1788, estimated a total population of not “less than one thousand five hundred” (Phillip 1788 in Attenbrow 2010: 17). Population densities for the hinterland Darug were perceived by early colonial observers to have been lower than along the coast. More recently, Kohen (1995) has estimated a minimum overall density of around 0.5 persons per square kilometre for the hinterland zone.

In common with other regions of New South Wales (e.g., Attenbrow 2010) and Australia more broadly (Peterson, 1976), available historical records suggest that the primary units of social organisation amongst the Darug were the clan and band. Kohen (1993:15) equates the term ‘clan’ with ‘band’, defining both as “groups of people who lived together and hunted together”. However, Attenbrow (2010) draws a distinction between the two, with clans comprising local descent groups and bands, land-using

groups who, though not necessarily all of the same clan[11], camped together and cooperated daily in hunting, fishing and gathering activities. Individual bands will have habitually occupied and exploited the resources of particular tracts of land within the overall territory of their clan. However, the territorial boundaries of each band will have been permeable or elastic in the sense of complex kinship ties facilitating inter-band territorial movements and the reciprocal use and/or exchange of resources.

The size of the individual bands occupying the Cumberland Plain at contact was no doubt activity and season dependent. However, an upper limit of around 50 individuals, consisting of several nuclear families, has been suggested (Kohen 1988: 239). Individual band sizes notwithstanding, much larger groups of Aboriginal people, numbering in the hundreds, are known to have come together for events such as corroborees, ritual combats and feasts. Unlike many Australian Aboriginal groups, social organisation amongst the Darug did not comprise a class system based on moieties or sections but rather was based on clan membership attained through patrilineal descent (Attenbrow 2010: 57; Kohen 1993: 35). Totemic affiliations were inherited from a person's father and, along with clan membership, were the basis upon which marriages were arranged and initiations carried out.

Available historical records indicate that a wide range of marine and freshwater fauna were exploited by Darug-speaking peoples for food and other resources (for a detailed discussion see Attenbrow 2010: 62-84). Along the coast, an emphasis on the exploitation of marine resources, principally fish and shellfish, is attested in the writings of several early observers (e.g., Collins 1798: 461-2; Phillip 1788 in Attenbrow 2010: 63; Tench 1793). Further inland, historical records suggest an emphasis on the hunting of land mammals, with kangaroos, wallabies, possums, gliders, fruit bats (i.e., flying foxes), dingos, koalas and wombats variously reported as having been either hunted and/or eaten. Possums, in particular, appear to have been major food source in the hinterland, with a number of early accounts remarking on the tree climbing skills of the 'woods people' (Barrallier 1802; Collins 1798; Hunter 1793; Tench 1793) and detailing procurement techniques. Freshwater fish, shellfish and eels are also known to have been exploited by hinterland groups (Attenbrow 2010: 70).

Compared with their faunal counterparts, the plant food resources of coastal and hinterland Darug-speaking peoples are poorly represented in the writings of early colonial observers. Nonetheless, available descriptions do suggest that plants formed a regular part of the diets of groups in both areas (see Attenbrow 2010: 77-8). Away from the coast, a "vegetable catalogue" consisting of "a few berries, the yam and fern root, the flowers of the different Banksia, and at times some honey" has been reported (Collins (1798 [1975]: 461-2). Kohen (1988: 239), citing Hunter (1793), has suggested that "plant foods were particularly important along the Nepean and Hawkesbury Rivers, where 'yams' provided the staple diet, at least seasonally".

A wide range of hunting and gathering 'gear' was employed by Darug speaking peoples, with distinctive repertoires for men and women (McDonald 2008: 24). Men's gear included several different forms of spears (variously barbed), spear throwers, clubs, 'swords', boomerangs, shields and hafted stone hatchets known as *mogo*. Women's toolkits, in contrast, included fishing hooks, lines and sinkers, digging sticks and various containers (shell and wood). Net bags made from plaited wood fibre appear to have been used by both men and women (see Attenbrow 2010: 91). Bark canoes were also widely used (Attenbrow 2010: 87).

Two major forms of shelter appear to have been utilised by Darug speaking peoples at the time of European contact: rockshelters and small huts built from sheets of bark, branches and bushes (Barrington 1802; Collins 1798, 1802; Tench 1793). In keeping with the linguistic division of the Darug language into coastal and hinterland dialects, differences in the nature of huts built along the coast and in the hinterland are attested in early colonial writings, with the former reportedly larger and "formed of pieces of bark from several trees put together in the form of an oven with an entrance…large enough to hold six to eight people" (e.g., Collins 1798 [1975]: 460). Unlike those living along the coast, Darug-speaking peoples occupying the Cumberland Plain appear to have relied heavily on bark huts. Regarding settlement duration, as Attenbrow (2010:54) has observed, "there is little direct historical evidence for the length of time people stayed at any one campsite (be it a rockshelter or bark hut), how often they moved, or what motivated them to move to another campsite". Kohen and Lampert (1987), for their part, have argued that "some bands probably lived at one campsite for months of each year

[11] Some individuals may have been related through marriage.

and regularly returned to it". However, this argument is not universally accepted (e.g., Attenbrow 2010: 55; McDonald 2008).

Evidence for ceremonial or ritual behaviour amongst Darug-speaking peoples can be found in the writings of a number early observers (e.g., Collins 1798; Phillip 1788 in Hunter 1793 [1968]: 500; Tench 1793), with documented 'ceremonial' activities including corroborees, male initiation ceremonies, ritual combats and various burial, body adornment and personal decoration practices. Although very little information on the subject exists, spiritual authority amongst Aboriginal language groups in the Sydney Region, including the Darug, appears to have been vested in a number of supernatural beings, chief amongst which was Baiame (see Attenbrow 2010: 127).

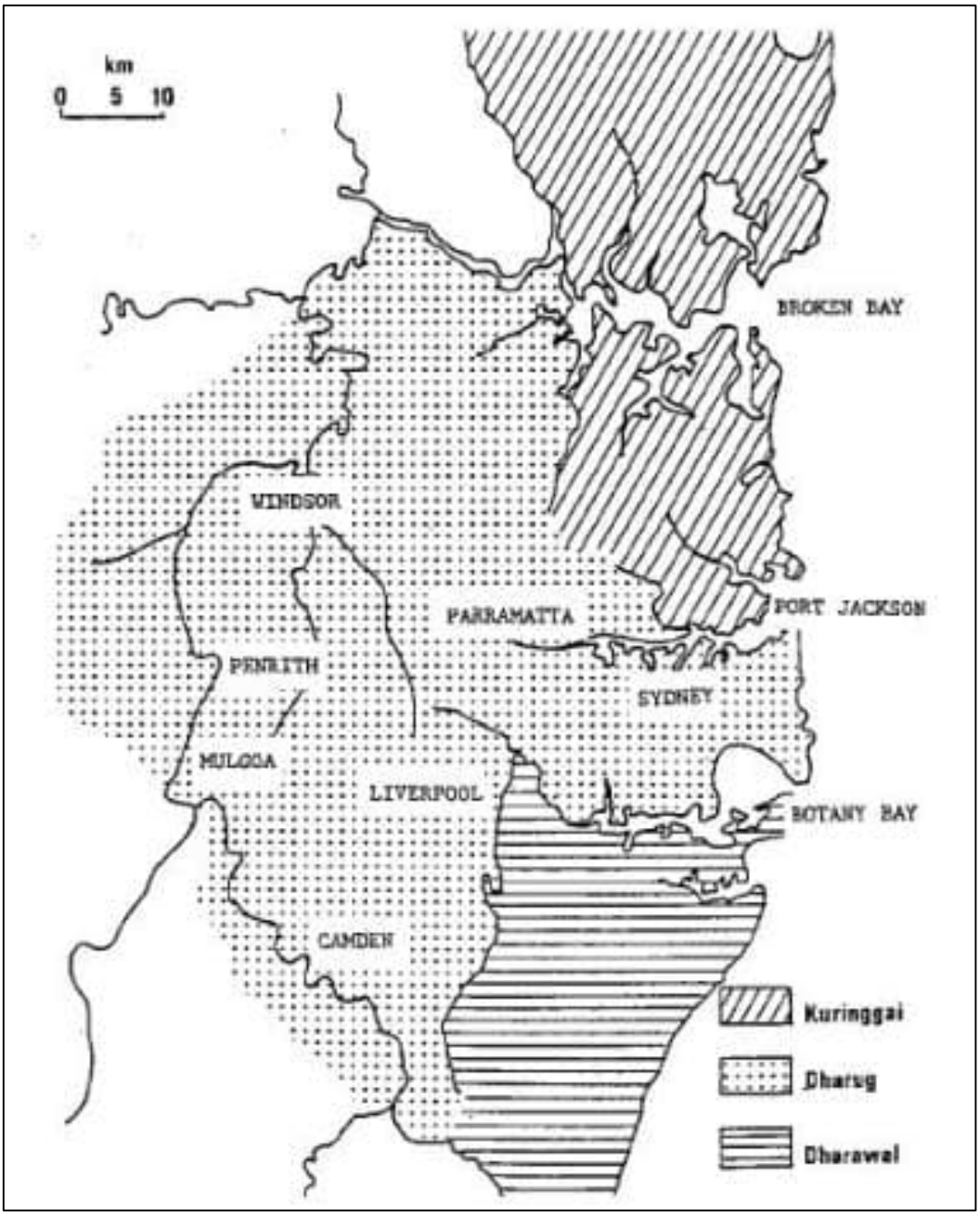

Figure 6-1: Aboriginal language group boundaries in the Sydney Region (from Kohen 1993: 241, Fig. 1)

6.2 Post-contact history

In common with other parts of NSW and Australia more generally, the post-contact history of Aboriginal peoples of the Sydney Region is primarily one of dispossession and loss, with groups alienated from their traditional hunting, gathering and camping grounds, populations decimated by a combination of introduced diseases[12] and frontier violence (Attenbrow 2010: 14-15, 21-22) and surviving groups subject to various colonial initiatives aimed at assimilating them into an ostensibly superior European way of life. Nonetheless, active resistance and friendly relations are also attested in available records.

While the various clans of the Cumberland Plain were undoubtedly observing them, most of the early colonial expeditions away from the coast - including Governor Phillip's Expedition to Belle Vue (Prospect Hill) in April 1788 - did not encounter any Aboriginal people. Traces of their presence, however, including huts, camp fires, burning trees and partially-eaten food, were encountered “at every step” (Tench 1791 [1979: 154]; see also Phillip 1789 [1970: 55]). That Aboriginal people were clearly occupying the “inland” came as a surprise to the exploring colonists, as the prevailing opinion at the time was that this area was uninhabited or, at best, had a very low Aboriginal population density. Once made, initial contacts between Aboriginal people and the exploring colonists appear to have been friendly in nature, “with exchange of gifts and a general atmosphere of co-operation” (Kohen, 1985).

Establishment of the settlement at Rose Hill (Parramatta) in November 1788 did not, at least initially, result in the loss of the goodwill that characterised the region’s earliest Aboriginal-European contacts, with Collins 1798 [1975:137], for example, reporting the existence at Parramatta of a barter system in which local Aboriginal people (including Bolloderree (Ballederry)) and resident military officers exchanged fish for small amounts of bread and salt beef. Relations, however, appear to have soured quickly, with the aforementioned barter system at Parramatta ending abruptly in mid-1791 as a result of the unprovoked destruction of Bolloderree’s canoe, an act that led to the retaliatory spearing (by Bolloderree) of a settler at ‘The Flats’ (near Kissing Point) and his subsequent banishment from Parramatta by Governor Phillip.

Together with the growth of Parramatta township itself, the early (1791) establishment of “out-settlements” at Prospect and Toongabbie, and subsequent establishment of farms along the Hawkesbury River, restricted Aboriginal peoples’ access to their traditional lands and food resources and precipitated what Kohen (1993) has referred to as the “First Australian War”. Along the Hawkesbury River, the widespread destruction[13] of traditional yam beds, which provided a dietary staple for inland clans, has been identified as a significant contributing factor to the particularly violent conflict that characterised Aboriginal-settler relations in this part of the Sydney Region from the mid-1790s to early-1800s (Kohen 1993: 63). Here, as in other parts of the Sydney Region, loss of access to traditional hunting and gathering grounds was one of a number of sources of Aboriginal settler-conflict, with unprovoked murders, the abduction and rape of Aboriginal women and unfair work conditions on farms also contributing to poor relations and/or directly resulting in armed conflict (Kohen, 1993: 62-67).

While numerous acts of Aboriginal resistance to the spread of European settlement across the Sydney Region can be identified in available historical records, the guerrilla war waged by Pemulwuy, a Bidjigal man from the George’s River area, is undoubtedly the best known. Between 1791 and his death in 1802, Pemulwuy, who first came to the attention of Europeans in December 1790 when he speared Governor Phillip’s gamekeeper McIntire, is believed to have organised numerous raids on settler farms around present-day Parramatta, Toongabbie, Prospect and Ryde, and to have speared many travellers around Botany Bay and the Georges River (Flynn, 1995b: 135). In March 1797, Pemulwuy was involved in an armed confrontation on the streets of Parramatta, which resulted in him being severely wounded and taken to Parramatta hospital, where he was chained by his ankle. Despite his wounds and ankle chain, Pemulwuy managed to escape from hospital and was soon after observed at the mouth of the Georges River “…having perfectly recovered from his wounds” (Collins, 1798 [1975:70]. Widely known and respected in his community due to his various acts of resistance and evasion, many Aboriginal people believed Pemulwuy to be invincible. Nonetheless, on 2 June 1802, while still at large, Pemulwuy was shot dead and decapitated, his head subsequently preserved in spirits and sent to England. After

[12] As highlighted by Attenbrow (2010: 21-22), a major initial cause of depopulation amongst the Darug was the April 1789 smallpox epidemic, which “hit the local [Aboriginal] population horrific effect” and is estimated to have killed “well over half” of Sydney’s Aboriginal population (Attenbrow 2010: 21).
[13] I.e., as a result of vegetation clearance and the planting of crops

his death, Governor King acknowledged Pemulwuy as “an active, daring leader of his people” and “brave and independent character” (King to Hobart, 30 October 1802; King to Banks 5 June 1802). Pemulwuy’s resistance activities in the greater Parramatta area were continued by his son Tedbury, who was arrested in 1805 and 1809 for robberies and was shot (non-fatally) by Edward Luttrell at Parramatta in February 1810 (Flynn, 1995b: 63).

Aboriginal-European relations across the Cumberland Plain are reported to have “entered a new phase” from 1816 onward, with the massacre of 14 Aboriginal men, women and children at Appin in April of that year, undertaken as part of a government sanctioned ‘punitive expedition’, all but putting an end to regional hostilities (Kohen, 1993: 68). With populations decimated by introduced diseases and frontier violence, and many clans alienated from their traditional country, Aboriginal people increasingly turned to Europeans to meet their basic needs (Kohen, 1993: 68). While traditional practices continued in many areas, many survivors began to congregate on the estates of Europeans sympathetic to their plight, with the ‘Mulgoa Tribe’, for example, congregating on the estate of William Cox in the Mulgoa Valley, and the ‘South Creek Tribe’ residing on Charles Marsden’s estate close to the junction of South and Eastern Creeks.

Governmental initiatives to ‘civilise’ the Cumberland Plain’s remaining Aboriginal population can also be traced to this period, with Governor Macquarie, the fifth and last autocratic Governor of New South Wales (1810-1821), pursuing a policy of assimilation aimed at encouraging Aboriginal people “to become regular Settlers” and conciliating “them as much as possible to our Government and Manners” (Macquarie 1816 in Brook & Kohen, 1991: 44; Macquarie 1811 in Kohen et al., 1999: 78). Macquarie’s key initiatives to this end were the Parramatta Native Institution, established in December 1814, and the annual Native “Conference” or “Feast”, with the latter serving the “dual purpose of “conciliating the Aboriginal people of the settled areas and encouraging them to give up their children for placement in the Institution” (Flynn, 1995b: 90). Held annually[14] until 1833, when judged ineffective by then Governor, Sir Richard Bourke, the Native Feasts were also “designed to facilitate the imposition of administrative structures on the surviving clans” (Flynn, 1995b: 96), namely, the division of attendees into their respective “tribes” and the election, amongst each “tribe”, of a “chief” that could be held responsible for the behaviour of the members of his group and act as a “conduit for any grievances they had” (Flynn, 1995b: 96). Post-1833, it was Governor Bourke[15] who initiated the distribution of blankets through local magistrates, with the resulting “Returns of Natives”, taken between 1834 and 1843, providing “a kind of Aboriginal census for these years” (Flynn, 1995b: 107) and confirming the presence of several hundred Aboriginal people within the Sydney Region into the 1840s.

Established in the context of a series of frontier skirmishes in mid-1814, the Parramatta Native Institution, which was in operation from 1814 to 1822, functioned as a school for teaching Aboriginal children reading, writing, arithmetic and Christian religion, as well as manual labour and agriculture (boys only) and needlework, knitting and spinning (girls only) (Brook & Kohen, 1991). Fluctuating pupil numbers over the life of the institution have been attributed to a range of factors, with many Aboriginal children, for example, running away from the school to re-join their families (Brook & Kohen, 1991: 70; Kohen et al., 1999: 83). In 1823, the Native Institution was moved by Governor Brisbane to a parcel of land adjoining what was then known as the ‘Black Town’, a community of Aboriginal people living on and around Governor Macquarie’s 30-acre land grant to Colebee and Nurragingy

6.2.1 The Blacktown Native Institution

The Blacktown Native Institution (BNI), the former site of which is located in the immediate vicinity of the study area (Figure 6-2), was a colonial initiative aimed at assimilating Sydney’s Aboriginal population into an ostensibly British way of life. The subject of numerous investigations since the early 1980s, both archaeological and historical in nature (e.g., Austral Archaeology, 2005; Bickford, 1981; Biosis, 2010; Brook & Kohen, 1991; GML, 2010; Lydon, 2005; Jo McDonald CHM, 2010; Navin Officer, 2007), the BNI was a successor to The Native Institution established by Governor Macquarie at Parramatta in 1814 in the context of increasingly violent conflict between settlers and Aboriginal people across the Sydney Region. As with its predecessor, the BNI functioned as both a school and agricultural farm, with enrolled pupils instructed on Christianity, reading, writing, arithmetic and, dependent on sex, agriculture (boys only) and needlework (girls only). Today, the Institution site comprises a more-or-less vacant

[14] No feast was held in 1815 due to drought
[15] Bourke was in office from 1831-37

block of land. However, at the height of its operation, the Institution featured a schoolhouse, which doubled as a residence, a kitchen, a coach house, stables, gardens and a stockyard (Figure 6-3). Drinking water was obtained on-site from Bells Creek, then known as Gidley Chain of Ponds. Subsequent to its closure in 1829 as a result of rising costs and difficulties surrounding both the acquisition and retention of students, the Institution reserve and its associated buildings were bought and sold several times, with prominent colonial figure Sydney Burdekin a notable owner between 1877 and his death in 1899. Changes in ownership notwithstanding, land in the vicinity of the BNI is known to have remained a focal area for Aboriginal activity/occupation throughout the 19th century.

Formal archaeological investigations within the BNI site include those undertaken by Bickford (1981), Austral Archaeology (2005) and Biosis (2010). Bickford's (1981) early investigation, carried out as part of a larger study of contact period sites on the Cumberland Plain, involved a combination of documentary research and archaeological survey. A notable archaeological outcome of Bickford's investigation was the identification of a contact period artefact scatter on the north-western side of Bells Creek. This comprised a low-density scatter of stone artefacts, early-to-mid 19th century pottery and pieces of convict brick spread "over a wide area" (Bickford 1981: 15). Bickford (1981) argued that the contents and location of this site were consistent with available historical records for the Institute, which indicate that Aboriginal adults, presumably parents and/or relatives of pupils, were living in the vicinity of the schoolhouse. A scarred tree was also identified further along Bells Creek, northwest of the contact site. Structural evidence in the area of the schoolhouse was limited to sandstone footings belonging to 'Lloydhurst', the country residence of post-BNI owner Sydney Burkedin.

More recent archaeological investigations within the BNI site have included sub-surface testing. In 2005, Austral Archaeology undertook a cultural monitoring and salvage excavation program in southernmost portion of the BNI site in response to the widening of an existing drain under Rooty Hill Road North for the Westlink M7 project (Austral Archaeology, 2005). As part of this program, six trenches covering a total area of 30 square metres were opened. Extant soil profiles were found to be highly disturbed, with modern rubbish encountered in lower spits. No Aboriginal stone artefacts were recovered during excavation. However, large quantities of non-artefactual silcrete were retrieved. In common with Austral Archaeology's findings, Biosis' (2010) program of test excavation in the northern end of the BNI site, which included 35 shovel test pits (5.6 square metres in total), found extant soil profiles to be disturbed. Excavated finds consisted of one Aboriginal artefact and 71 pieces of modern and historical material, with historical artefacts consisting predominantly of bottle fragments of late 19th to early 20th century date.

The Blacktown Native Institution has been recognised as being of State heritage significance because of its combination of historic, social and archaeological values, described as follows in its SHR listing:

> *The Blacktown Native Institution played a key role in the history of colonial assimilation policies and race relations. The site is notable for the range of associations it possesses with prominent colonial figures including: Governor Macquarie, Governor Brisbane, Samuel Marsden, William Walker and Sydney Burdekin. The Blacktown Native Institution site is valued by the contemporary Aboriginal community and the wider Australian community as a landmark in the history of cross-cultural engagement in Australia. For Aboriginal people in particular, it represents a key historical site symbolising dispossession and child removal. The site is also important to the Sydney Maori community as an early tangible link with colonial history of trans-Tasman cultural relations and with the history of children removed by missionaries. The Blacktown Native Institution is a rare site reflecting early 19th century missionary activity. The site has the potential to reveal evidence that may not be available from other sources about the lives of the children who lived at the school and the customs and management of the earliest Aboriginal school in the colony. The site also has the potential to contain archaeological evidence relating to later phases of land use, including the period the property was owned by Sydney Burdekin. In addition, the site may contain evidence of Aboriginal camps which may provide information about how Aboriginal people, accustomed to a traditional way of life, responded to the changes prompted by colonisation* (NSW SHR 2013).

6.2.2 Colebee and Nurragingy Land Grant

The Colebee and Nurragingy Land Grant, located on the eastern side of Richmond Road, immediately northeast of the BNI, was a 30 acre (12 hectare) parcel of land jointly granted to Darug men Nurragingy (Creek Jemmy) and Colebee by Governor Macquarie in 1816. Colebee and Nurragingy were awarded

the grant by Governor Macquarie in recognition of their involvement, as guides, in a series of punitive military expeditions to capture or kill Aboriginal people involved in disputes with white settlers around Appin, Cowpastures, Windsor, Parramatta and along the banks of the Hawkesbury-Nepean River. These expeditions were Governor Macquarie's response to increasing violence between settlers and Aboriginal people over limited resources. Governor Macquarie also presented Nurragingy with a "brass gorget" or breast plate inscribed with his name and the title 'Chief of the South Creek Tribe' (Lachlan, 1818). Although the land grant was verbally granted to both men, as attested in Macquarie's own journal (Lachlan, 1818), the grant was registered in Colebee's name only (Brook & Kohen 1991:38-39) (Figure 6-4). Colebee is reported to have stayed only briefly on the grant whereas Nurragingy and his wife Mary appear to have lived there more-or-less permanently until around 1827 (Brook & Kohen, 1991: 40). Cited reasons for the selection of the grant by Colebee and Nurragingy include the site's proximity to Plumpton Ridge, a major Aboriginal quarry site, the presence of a semi-reliable supply of drinking water in the form of Bells Creek, and the fact that the area formed part of the traditional land of Nurragingy's clan (Brook & Kohen, 1991: 45; GML, 2010).

During Nurragingy and Colebee's tenure, land within the grant was utilised for growing crops and rearing livestock. A bark and log hut with a chimney, built by ex-convict Sylvanus Williams in 1819 under Governor Macquarie's commission, served as Nurragingy and his wife's residence. A subsequent improvement to the property comprised it's fencing, at government expense, in 1823 (Brook & Kohen, 1991: 41). Following the death of Nurragingy and Colebee, the property is known to have passed to Colebee's younger sister, Maria Locke (1843). Maria was a student at the Parramatta Native Institution from 1815 and her marriage to ex-convict Robert Locke in 1824 was the first such officially sanctioned union. Maria, accompanied by her husband and ten children, took up residence on the site in 1843–44 . The family subsequently acquired an adjacent 30 acre land parcel, encompassing the former Native Institution, which had been originally granted to Sylvanus Williams. Subsequent to Maria's death in 1878, the 60 acres owned by the Locke family was divided into nine lots, one for each of her surviving children. The Locke family lived on land grant site until around 1917 when the Aborigines Protection Board (APB) acquired the land.

Today the land is owned in part by Transport and encompasses both undeveloped rural land and residential properties (GML, 2010). Part of the original land grant site has been destroyed through residential development, with impacts to the northern portion of the site authorised under AHIP#1130995, which was issued to M Smith and Sons Pty Ltd on 16 October 2012.

To date, no archaeological excavations have been undertaken within the boundaries of the Colebee and Nurragingy Land Grant site, with previous field assessments limited to surface survey. Excavations undertaken in the vicinity include those carried out by Austral Archaeology (2005) and Biosis (2010) within the BNI site and Biosis' (2010) program of test excavation within the boundaries of a previously identified area of PAD ('WSPAD3') to the south of the grant site. Excavations within 'WSPAD3' resulted in the recovery of 32 silcrete artefacts from a total of 74 shovel probes, with large quantities of naturally-occurring silcrete also recovered.

As with the BNI site, the Colebee and Nurragingy Land Grant has been recognised as being of State heritage significance, and was listed on the State Heritage Register in 2012. The listing identifies that the land grant is:

> *is a site of state heritage significance because of its combination of historical, social and cultural values. The site was the first land grant ever given to Aboriginal people in Australia. The land grant is associated with two significant Aboriginal figures from the early colonial period-Nurragingy and Colebee-to whom the land was jointly granted in 1816. The location of the land grant is significant because it was an Aboriginal choice, being on land belonging to Nurragingy's clan. The land grant is valued by the contemporary Aboriginal community and the wider Australian community as a landmark in the history of cross-cultural engagement in Australia. For Aboriginal people, in particular, it represents a key historical site symbolising Aboriginal resilience and enduring links to the land* (NSW SHR, 2013).

It is noted that the SHR listing for the land grant encompasses only four of the nine lots owned by the Locke family at Colebee, with the grant site located at the northern end of their 60 acre land holding.

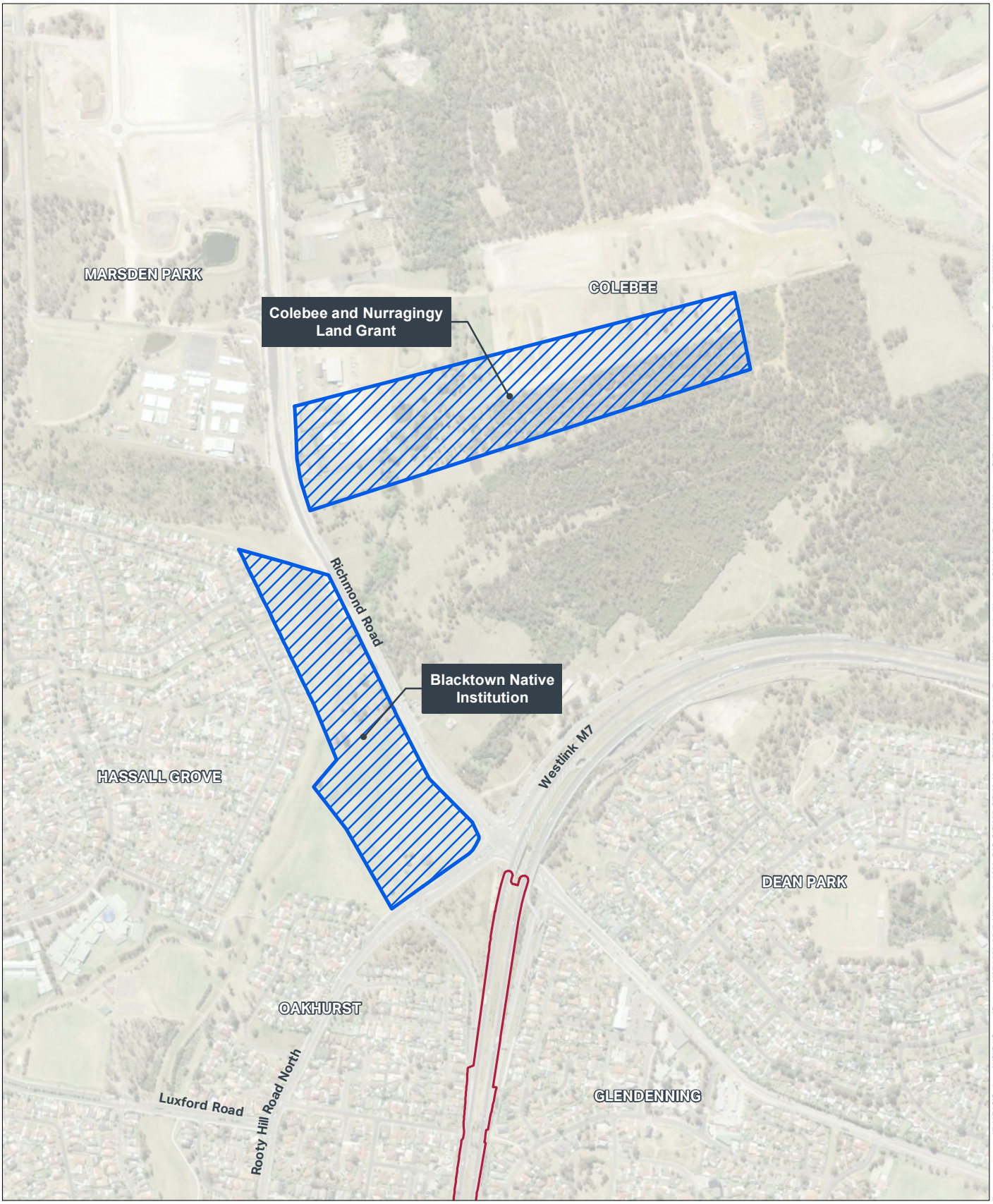

FIGURE 6-2: LOCATION OF THE SHR-LISTED BLACKTOWN INSTITUTION AND COLEBEE AND NURRAGINGY LAND GRANT RELATIVE TO STUDY AREA

N 0 100 200 m

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Legend

- Study area
- SHR Curtilage

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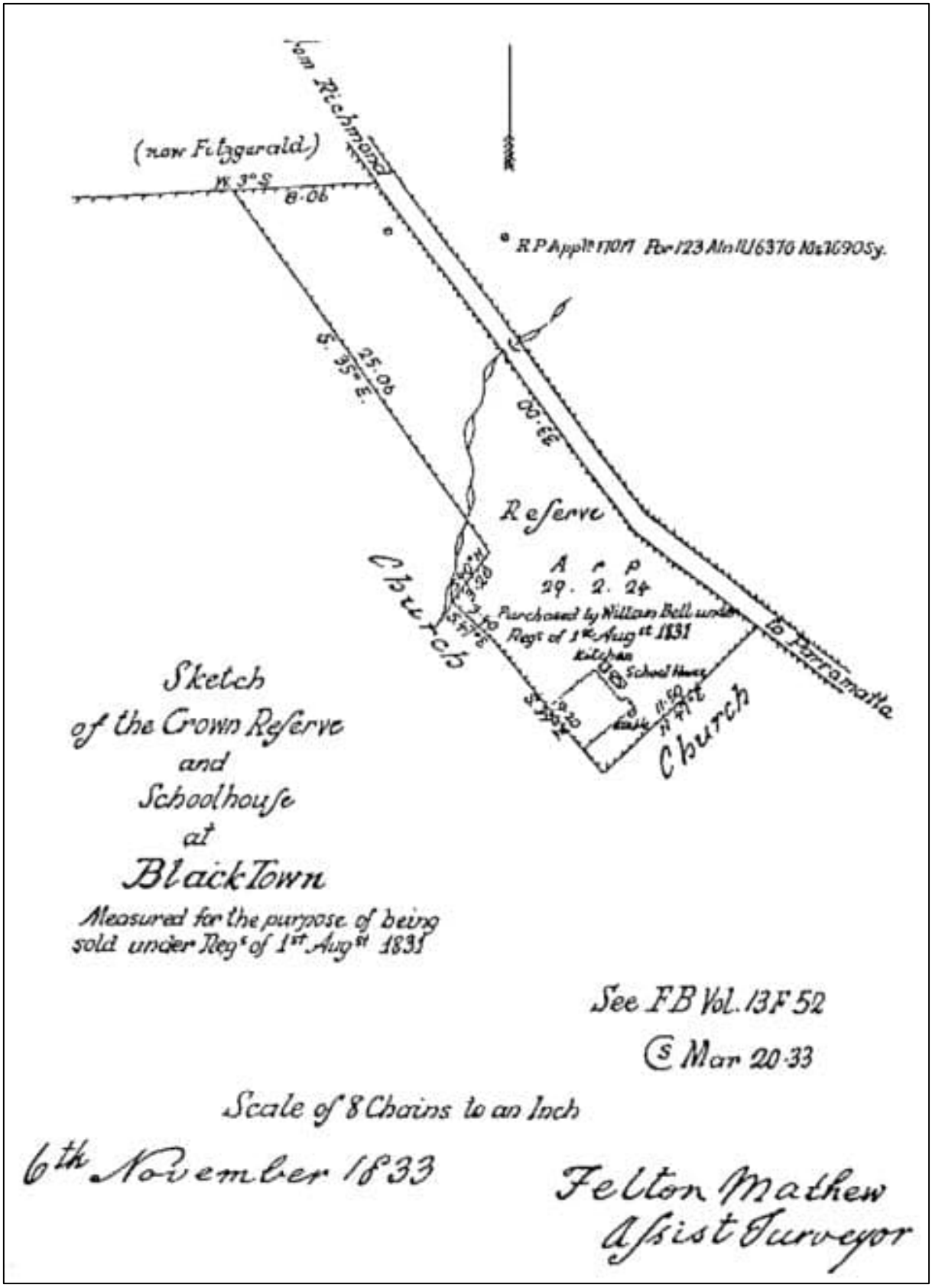
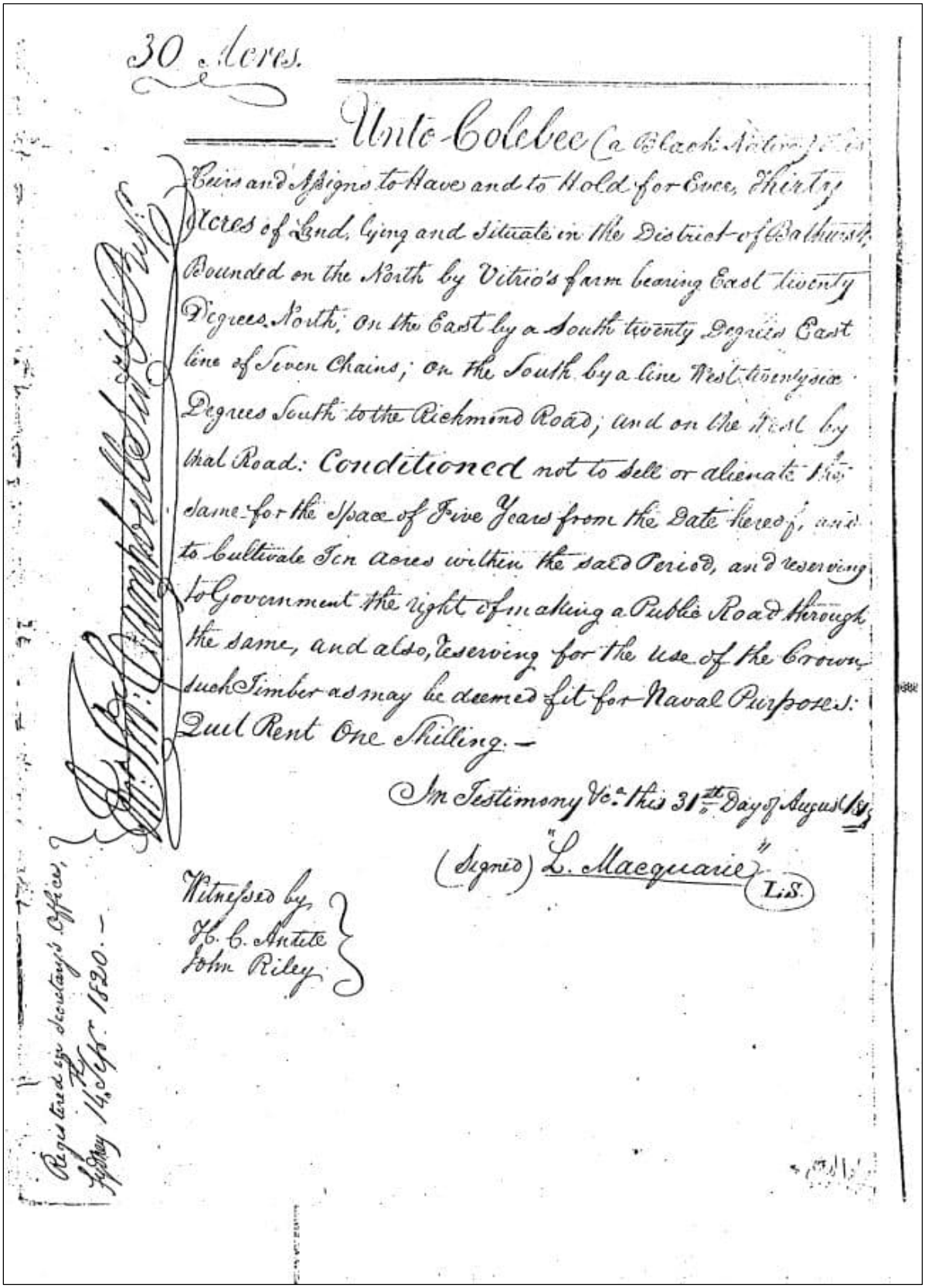


Figure 6-3: 1833 sketch plan of the Blacktown Native Institution Reserve (from Jo McDonald CHM, 2010: 19, Figure 5)


30 Acres.

Unto Colebee (a Black Native) his
Heirs and Assigns to Have and to Hold for Ever, Thirty
Acres of Land, lying and Situate in the District of Baulkham Hills
Bounded on the North by Vitrio's farm bearing East twenty
Degrees North; on the East by a South twenty Degrees East
line of Seven Chains; on the South by a line West twenty six
Degrees South to the Richmond Road; and on the West by
that Road: Conditioned not to Sell or alienate the
same for the Space of Five Years from the Date hereof, and
to Cultivate Ten Acres within the said Period, and reserving
to Government the right of making a Public Road through
the same, and also, reserving for the use of the Crown
such Timber as may be deemed fit for Naval Purposes:
Quit Rent One Shilling. —

In Testimony Vc. this 31st. Day of August 18

(Signed) "L. Macquarie" L.S.

Witnessed by
H. C. Antill
John Riley

Regd. Land Secretary's Office,
Sydney 14th Sept. 1820. —

Figure 6-4: Signed land grant to Colebee

7.0 Archaeological survey

7.1 Aims

The aims of the archaeological survey undertaken to support this assessment were as follows:

- To identify and record any existing surface evidence of past Aboriginal activity within those portions of the study area retaining reasonable potential for the presence of such evidence
- To physically reassess previously recorded artefact scatter sites 'MC-2' (45-5-0779) and 'EC-OS-1' (45-5-2433)[16]
- To identify areas that, irrespective of the presence or absence of surface artefacts, are likely to contain subsurface archaeological deposit (i.e., areas of PAD)
- To ground truth levels of past ground disturbance within surveyed areas
- To generate data pertinent to the development of appropriate management and/or mitigation measures for the identified Aboriginal heritage values of the study area.

7.2 Sampling strategy

The sampling strategy developed for current survey was informed by the following factors:

- Near-universally high levels of past ground disturbance across the study area, with the overwhelming majority of land therein assessed pre-survey as retaining negligible potential for the presence of Aboriginal objects in surface and/or subsurface contexts due to severe disturbance
- A critical, desktop-based review of existing AHIMS data for the study area
- The final, refined construction footprint for the approved M12 Motorway (Figure 5-10), with all land within this area excluded from assessment on the basis of having been recently assessed for its Aboriginal heritage values[17].

Ultimately, in consideration of the above, it was decided that the current survey would be restricted to the following portions of the study area, outside of the refined approved M12 Motorway construction footprint:

- Proposed construction compounds assessed as retaining, either in whole or in part, reasonable potential for the presence of Aboriginal objects in surface and/or subsurface contexts, as determined through historical aerial imagery analysis and existing archaeological datasets for the study area and environs
- Those sections of proposed construction compound access tracks associated with AHIMS registered sites whose status could not be definitively determined pre-survey (i.e., potentially valid sites).

Areas selected for survey, designated as Survey Units 1 to 6, are listed in Table 7-1, with locations shown on Figure 7-1. As previously indicated, Survey Units 1& 2 (Richmond Road and Pikes Lane) were removed from the proposed modification scope post-survey. However, for completeness, the results of survey within these areas are included here.

7.3 Field team and methods

The archaeological survey was conducted over two days in August and October 2021 (31 August and 15 October 2021). As per Table 7-1, a total of six areas were subject to survey, four north of Elizabeth Drive, within the boundaries of the Deerubbin LALC, and two south of Elizabeth Drive, within the boundaries of the Gandangara LALC. Each survey unit was surveyed by a field team consisting of one

[16] Note that no attempt was made to relocate or reassess previously recorded open artefact site 'PAD-OS-7' (45-5-2721), located partially within the study area, as Lot 14 DP1021940 would not be used as part of the proposed modification.
[17] Note that those portions of Lot 24 DP1152887 and Lot 14 DP1021940 not covered by the refined M12 construction footprint were likewise excluded from assessment. These areas would not be used as part of the proposed modification, with construction activities in this portion of the study area to be restricted to the refined M12 construction footprint.

AECOM archaeologist (Dr Andrew McLaren) and one relevant LALC site officer, with Steve Randall attending for the Deerubbin LALC and Darren Duncan for the Gandangara LALC. All survey was undertaken on foot, with each survey unit comprehensively surveyed using one or more linear transects. All spatial data was captured using a handheld differential GPS unit. All survey units were photographed during survey.

Table 7-1: Survey units

Survey unit	Size (ha)	Proposed modification element(s)	LALC area	Approximate chainage	Reason for selection
1	3.46	Nil (was previously a potential compound ancillary facility site, which has been removed from proposed modification scope post-survey)	Deerubbin	27800	• Proximity to BNI and Plumpton Ridge • Presence of first order watercourse (albeit modified) • Potential for one or small 'pockets' of intact/relatively intact land
2	0.73	Nil (was previously a potential compound ancillary facility site, which has been removed from proposed modification scope post-survey)	Deerubbin	20645	• Proximity to first order watercourse and Eastern Creek Potential for intact/relatively intact landform elements
3	0.25	Construction compound (access route)	Deerubbin	23115	• Association with previously recorded artefact scatter with PAD site 'EC-OS-1' (45-5-2433)
4	0.04	Construction compound	Deerubbin	15350	• Proximity to first order watercourse • Potential for intact/relatively intact landform elements
5	0.41	Construction compound (access route)	Gandangara	2105	• Association with previously recorded artefact scatter site 'MC-2' (45-5-0779)
6	0.44	Construction compound	Gandangara	1880	• Proximity to Maxwells Creek • Potential for intact/relatively intact landform elements

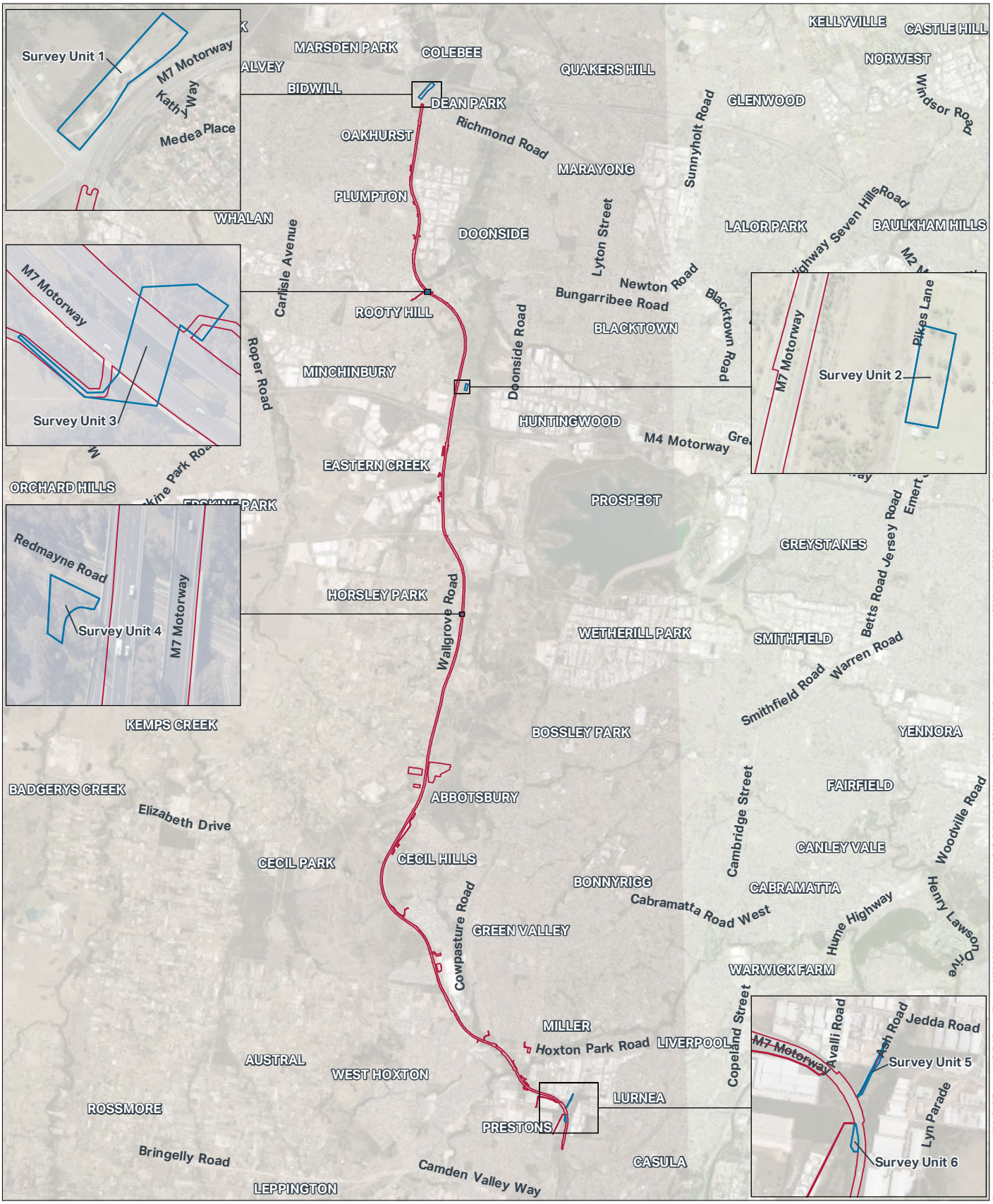


FIGURE 7-1: LOCATION OF SURVEY UNITS ACROSS STUDY AREA

N 0 1 2 km

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Legend

- Study area
- Survey unit

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7.4 Results

The results of the survey undertaken, including coverage data, are presented in Table 7-2. As indicated, a single Aboriginal site, consisting of an area of PAD, was identified during survey. Located within Survey Unit 2 in Eastern Creek, this PAD has been designated as 'Pikes Lane PAD' and is described in **Section 7.4.1**. It has been registered on the AHIMS database and assigned the AHIMS ID #45-5-5548.

Consistent with available historical aerials, field observations suggest that the section of registered artefact scatter with PAD site 'EC-OS-1' (45-5-2433) located within the fenced Westlink M7 lease area, including the study area, was destroyed as a result of the construction of the approved project.

Registered artefact scatter site 'MC-2' (45-5-0779), formerly located within the Ash Road reserve in Prestons, inside the study area, is similarly considered to have been destroyed, with field observations confirming severe ground disturbance at the site's former location.

7.4.1 Pikes Lane PAD

Site type: PAD **GPS coordinates:** GDA Zone 56 301737E 6258922N

Date recorded: 15 October 2021 **1:25,000 topographic map:** Prospect 9030-2N

Site area: 5,449 square metres **Landform unit(s):** Floodplain (Eastern Creek)

Vegetation: Cumberland shale plains woodland (low condition)

Slope: Level to very gently inclined **GSV (%):** 0-40 **Ground integrity:** Moderate to high

Disturbance factors: Native vegetation clearance, ploughing

Distance to nearest mapped watercourse (name, order): *c*.22 metres (unnamed, first order)

Site description:

Pikes Lane PAD consists of an irregularly-shaped area of PAD on the left bank floodplain of Eastern Creek within Lot 7 on DP545017 (Figure 7-2).

Topographically, the PAD, which is approximately 0.5 hectares in size, encompasses a slight but perceptible rise on the floodplain, with land to the immediate northwest of the rise, associated with an unnamed first order drainage depression, swampy and lower-lying. Obtaining a maximum elevation of around 41 metres AHD, the Pikes Lane PAD rise currently supports a stand of regenerating Shale Plains Woodland, with available historical aerial photographs indicating the retention of at least a partial woodland cover since the late 1940s. Ground surface visibility (GSV) within the PAD is generally very poor to grass cover. Ground integrity (GI), meanwhile, is assessed as moderate to high, with no obvious ground disturbance noted during survey. Prior to their demolition post-1982, the PAD was bordered to the south by a residential dwelling and its associated outbuildings. At its closest point, the current channel of Eastern Creek is located around 165 metres to the east of the PAD. Soils within Pikes Lane PAD have been mapped as part of the South Creek soil landscape and are likely to be alluvial in nature.

Table 7-2: Survey results

Survey unit	Landform unit(s) (pre-disturbance)	Area (m^2)	Visibility (%)	Exposure (%)	Effective Coverage (m^2)	Effective coverage (%)	Disturbance rating (observed)	Aboriginal site(s) identified	Plates
1	Hillslope; drainage depression	34,615	60	40	8,308	24	High	None	**Plate 1**, **Plate 2** and **Plate 3**
2	Floodplain	7,266	40	10	291	4	Low to moderate	Single area of PAD, designated as, 'Pikes Lane PAD' identified (see **Section 7.4.1**). PAD extends outside of study area.	**Plate 4**, **Plate 5** and **Plate 6**
3	Hillslope; floodplain	2,458	40	20	197	8	High	None. Consistent with historical aerial photographs, field observations suggest that the section of 'EC-OS-1' (45-5-2433) located within the fenced Westlink M7 lease area (including the study area) has been destroyed.	**Plate 7** and **Plate 8**
4	Hillslope; drainage depression	351	10	5	2	0.5	Moderate to high	None	**Plate 9** and **Plate 10**
5	Floodplain	4,092	80	30	982	24	High	None. Consistent with historical aerial photographs, field observations suggest that 'MC-2' (45-5-0779) has been destroyed.	**Plate 11**, **Plate 12**, **Plate 13** and **Plate 14**
6	Floodplain	4,358	40	20	349	8	High	None	**Plate 15**, **Plate 16** and **Plate 17**

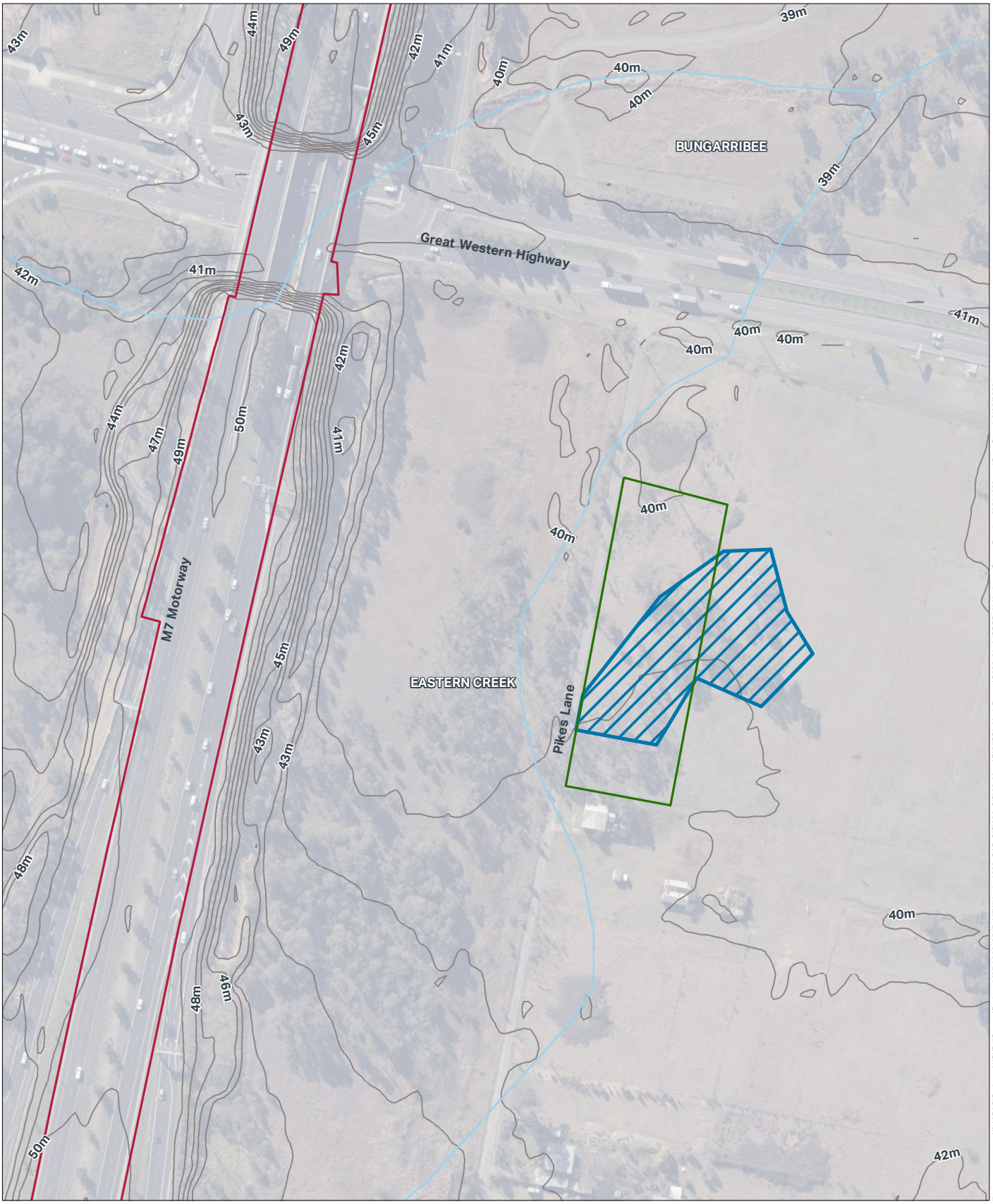

FIGURE 7-2: NEWLY IDENTIFIED PAD SITE 'PIKES LANE' PAD

N

0 25 50 m

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Legend

- Study area
- Survey Unit 2
- Pikes Lane PAD
- Drainage line
- 1m contour

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Plate 1: Survey Unit 1 - vehicle track and adjoining fenced compound (on left)

Plate 2: Survey Unit 1 - highly modified first order stream in southernmost portion of unit

Plate 3: Survey Unit 1 - view across northernmost section of unit

Plate 4: Survey Unit 2 - view toward Eastern Creek at southern end of unit

Plate 5: Survey Unit 2 - view across unit, facing north

Plate 6: Survey Unit 2 - view across newly identified PAD site 'Pikes Lane PAD', facing north east

Plate 7: Survey Unit 3 – view across unit. Note channelised section of Angus Creek in foreground

Plate 8: Survey Unit 3 – view east from right hand bank of Angus Creek. Artefact scatter with PAD site 'EC-OS-1' (45-5-2433) formerly located at rear in treeline

Plate 9: Survey Unit 4 - view across unit, facing north

Plate 10: Survey Unit 4 - view east down drainage channel, north eastern corner of unit

Plate 11: Survey Unit 5 - view south from northernmost extent of unit

Plate 12: Survey Unit 5 - View south, central portion of unit

Plate 13: Survey Unit 5 - View across former location of artefact scatter 'MC-2' (45-5-0779), facing south-south east

Plate 14: Survey Unit 5 - View across former location of artefact scatter 'MC-2' (45-5-0779), facing north

Plate 15: Survey Unit 6 – view across northernmost extent of unit, Westlink M7 at rear. Note flood debris in foreground

Plate 16: Survey Unit 6 – northern portion of unit, looking towards Maxwells Creek

Plate 17: Survey Unit 6 - view across Maxwells Creek, looking north east

8.0 Significance assessment

8.1 Principles of assessment

Heritage sites hold value for different communities in a variety of different ways. All sites are not equally significant and thus not equally worthy of conservation and management (Pearson & Sullivan, 1995: 17). One of the primary responsibilities of cultural heritage practitioners, therefore, is to determine which sites are worthy of preservation and management (and why) and, conversely, which are not (and why) (Smith & Burke, 2007: 227). This process is known as the assessment of cultural significance and, as highlighted by Pearson and Sullivan (1995: 127), incorporates two interrelated and interdependent components. The first involves identifying, through documentary, physical or oral evidence, the elements that make a heritage site significant, as well as the type(s) of significance it manifests. The second involves determining the degree of value that the site holds for society (i.e., its cultural significance) (Pearson & Sullivan, 1995: 126).

In Australia, the primary guide to the assessment of cultural significance is the Australian International Council on Monuments and Sites (ICOMOS) *Charter for Places of Cultural Significance* (2013), informally known as *The Burra Charter*, which defines cultural significance as the "aesthetic, historic, scientific, social or spiritual value for past, present or future generations" of a site or place (ICOMOS Australia, 2013: 2). Under the Burra Charter model, the cultural significance of a heritage site or place is assessed in terms of its aesthetic, historic, scientific, social and spiritual values, none of which are mutually exclusive (Table 8-1). Establishing cultural significance under the Burra Charter model involves assessing all information relevant to an understanding of the site and its fabric (i.e., its physical make-up). The assessment of cultural significance and the preparation of a statement of cultural significance are critical prerequisites to making decisions about the management of any heritage site or place.

Table 8-1: Values relevant to determining cultural significance, as defined by The Burra Charter

Value	Definition
Aesthetic	"Aesthetic value refers to the sensory and perceptual experience of a place-that is, how we respond to visual and non-visual aspects such as sounds, smells and other factors having a strong impact on human thoughts, feelings and attitudes. Aesthetic qualities may include the concept of beauty and formal aesthetic ideals" (Australia ICOMOS, 2013: 3)
Historic	"Historic value is intended to encompass all aspects of history…A place may have historic value because it has influenced, or has been influenced by, an historic event, phase, movement or activity, person or group of people. It may be the site of an important event. For any place the significance will be greater where the evidence of the association or event survives at the place, or where the setting is substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of such change or absence of evidence" (Australia ICOMOS, 2013: 3)
Scientific	"Scientific value refers to the information content of a place and its ability to reveal more about an aspect of the past through examination or investigation of the place, including the use of archaeological techniques. The relative scientific value of a place is likely to depend on the importance of the information or data involved, on its rarity, quality or representativeness, and its potential to contribute further important information about the place itself or a type or class of place or to address important research questions" (Australia ICOMOS, 2013: 4)
Social	"Social value refers to the associations that a place has for a particular community or cultural group and the social or cultural meanings that it holds for them" (Australia ICOMOS, 2013: 4)
Spiritual	"Spiritual value refers to the intangible values and meanings embodied in or evoked by a place which give it importance in the spiritual identity, or the traditional knowledge, art and practices of a cultural group. Spiritual value may also be reflected in the intensity of aesthetic and emotional responses or community associations, and be expressed through cultural practices and related places" (Australia ICOMOS, 2013: 4)

8.2 Scientific values

Scientific value or significance refers to the importance of a place in terms of its rarity, representativeness and the extent to which it may contribute further information (i.e., its research potential) (OEH, 2011: 9).

8.2.1 Rarity and representativeness

Rarity and representativeness are related concepts. Rarity refers to the relative uniqueness of a site within its local and regional context. The scientific significance of a site is assessed as higher if it is unique or rare within either context. Conversely, it is considered to be of lower significance if it is common in one or both. The concept of representativeness, meanwhile, refers to the question of whether or not a site is "a good example of its type, illustrating clearly the attributes of its significance" (Burke & Smith 2004: 247). Representativeness is an important criterion as one of the primary goals of cultural heritage management is to preserve for future generations a representative sample of all archaeological site types in their full range of environmental contexts.

8.2.2 Research potential

Research potential can be defined as the potential of an archaeological site to address what Bowdler (1981: 129) has referred to as "timely and specific research questions". These questions may relate to any number of issues concerning past human lifeways and environments and, as suggested by Bowdler's quote, will inevitably reflect current trends or problems in academic research (Burke & Smith, 2004: 249). For their part, Bowdler and Bickford (1984: 23-4) suggest that the research potential of an archaeological site can be determined by answering the following series of questions:

1. Can the site contribute knowledge which no other resource can?
2. Can the site contribute knowledge which no other such site can?
3. Is this knowledge relevant to general questions about human history or other substantiative subjects?

Several criteria can be used to assess the research potential of an archaeological site. Particularly important in the context of Aboriginal archaeology are the intactness or integrity of the site in question, its complexity and its potential for archaeological deposit (NPWS, 1997: 7). The connectedness of the site to other sites or natural landscape features may also be relevant, as may its educational potential and aesthetic qualities.

Integrity refers to the extent to which a site has been disturbed by natural and/or anthropogenic phenomena and includes both the state of preservation of particular remains (eg, animal bones, plant remains) and, where applicable, stratigraphic integrity. Assessments of archaeological integrity are predicated on the notion that undisturbed or minimally disturbed sites are likely to yield higher quality archaeological and/or environmental data than those whose integrity has been significantly compromised by natural and/or anthropogenic phenomena. Establishing levels of preservation or integrity in the context of a surface survey is difficult. Nonetheless, useful rating schemes are available for open artefact sites (Coutts & Witter, 1977: 34) and scarred trees (Long, 2003).

The *complexity* of a site refers primarily to the nature or character of the artefactual materials or features that constitute it but also includes site structure (e.g., the physical size of the site, spatial patterning in observed cultural materials). In the case of open artefact sites, the principal criteria used to assess complexity are the site's size (i.e., number of artefacts and/or spatial extent), the presence, range and frequency of artefact and raw material types, and the presence of features such as hearths.

Potential for archaeological deposit refers to the potential of a site to contain subsurface archaeological evidence which may, through controlled excavation and analysis, assist in answering questions that are of contemporary archaeological interest. Assessing subsurface potential in the absence of subsurface investigation is difficult. Nonetheless, consideration of a range of factors, including the integrity of the site, the complexity of extant surface evidence, local geomorphic conditions (as established through surface observations and documentary research) and the results of previous archaeological excavations in the area, help inform assessment of this criterion.

Connectedness concerns the relationship between archaeological sites within a given area and may be expressed through a combination of factors such as site location, type and contents. It may, for

example, be possible to establish a connection between a stone quarry and discarded edge-ground hatchet head found nearby. Demonstrating connectedness archaeologically, however, is far from straightforward, especially when dealing with surface evidence alone. Ultimately, this difficulty rests with the need to demonstrate contemporaneity between sites that may have been created hundreds, if not thousands, of years apart. As Shiner (2008: 13) has observed with respect to surface sites, “much of the surface archaeological record documents the accumulation of materials from multiple behavioural episodes occurring over long periods of discontinuous time”. Contemporaneity, then, needs to be demonstrated not assumed.

8.2.3 Identification process and known values

Information on the scientific values of the study area (i.e., with respect to Aboriginal cultural heritage) has been obtained through a desktop review of existing environmental, archaeological and ethnohistorical data for the study area and its environs, as well as archaeological survey.

Desktop research and archaeological survey have identified two valid Aboriginal sites within the study area and four sites directly adjacent to it. Sites located within the study area include previously recorded open artefact site ‘PAD-OS-7’ (45-5-2721) and newly recorded PAD site ‘Pikes Lane PAD’. Both sites are located partially within the study area, but outside the proposed construction footprint, and would not be impacted by the proposed modification. ‘PAD-OS-7’ has been previously assessed as being of high scientific significance (see Mills, 2002: 95)

Newly identified PAD site ‘Pikes Lane PAD’ (45-5-5548) is similarly located outside the construction footprint for the proposed modification. In the absence of any data concerning the nature and extent of subsurface Aboriginal objects within it, any assessment of the archaeological or scientific significance of newly identified PAD site ‘Pikes Lane PAD’ must necessarily be an *assessment of potential significance.* As highlighted in **Section 5.0**, existing archaeological datasets for the Cumberland Plain, including land within and surrounding the study area, indicate that subsurface artefact distributions across this physiographic region tend to vary significantly in relation to both stream order and landform, with larger, more complex deposits occurring on elevated, low gradient landform elements adjacent to higher order watercourses.

Pikes Lane PAD encompasses a slight but perceptible rise on the left bank floodplain of Eastern Creek, a regionally significant perennial watercourse. Elevated above the surrounding floodplain by around one metre and offering ready access to floral and faunal resources of Eastern Creek, the rise associated with this PAD is likely to have attracted Aboriginal occupation in the past. Together with field observations, historical aerial imagery analysis suggests that land within Pikes Lane PAD retains, at a minimum, a moderate degree of integrity and, by extension, the potential for relatively intact to intact subsurface deposits. Situated around 165 metres to the west of Eastern Creek, the effects of flooding on any subsurface deposits within Pikes Lane PAD is expected to have been minor.

A further four previously recorded open artefacts sites - ‘PAD-OS-4’ (45-5-2793), ‘PAD-OS-5’ (45-5-2723), ‘PAD-OS-9’ (45-5-2719) and ‘PAD-OS-10’ (45-5-2718) – directly abut the study area but are located outside of the proposed construction footprint and would also not be impacted by the proposed modification. All construction activities in the vicinity of these sites would be restricted to the construction footprint for the proposed modification. Previously assessed levels of scientific significance for these sites range from low to high (see Mills, 2002).

9.0 Impact assessment

This section provides an assessment of construction and operation impacts from the proposed modification.

9.1 Overview of construction activities

Construction of the proposed widening would generally include the key activities listed in Table 9-1. It is expected that many of these construction activities would occur at the same time and consecutively across different locations within the construction footprint.

Table 9-1: Key construction activities occurring within the construction footprint for the proposed modification

Component	Typical activities
Site establishment and enabling works	• Site investigations (environmental and utilities as required) • Installation of site offices and crib rooms • Vegetation clearing and removal • Traffic management measures • Potential temporary diversions to property access • Installation of safety and environmental controls • Installation of site fencing and hoarding • Establishment of temporary noise attenuation measures • Temporary removal of some areas of the Light Horse Interchange artwork • Establishment of construction ancillary facilities and access • Supply of utilities to construction ancillary facilities as required • Establishment of temporary pedestrian and cyclist diversions as required • Temporary adjustments to controlled access fencing along the Westlink M7 • Demolition of existing buildings and structures, where required. This may also be undertaken in subsequent construction stages, subject to detailed construction planning
Utility works	• Site investigations to identify and mark up utilities requiring relocation and protection • Utility relocation and protection
Earthworks	• Topsoil stripping • Excavation of cut areas and placement to fill areas • Construction of required retaining structures • Establishment and stabilisation of new ground levels
Bridge works	• Construction of piers and abutments • Installation of girders/beams • Construction of bridge decks, slabs and associated barriers
Drainage works	• Construction of new pits and pipes where required along road carriageway • Connection of new drainage to existing network • Adjustments to existing drainage infrastructure to tie into new drainage infrastructure • Demolition and removal of redundant drainage
Pavement works	• Placement of selected material zone and pavement layers • Installation of road pavement surfacing • Construction of pavement drainage

Component	Typical activities
Finishing works	• Line markings on new road surfaces • Erection of directional and other signage and other roadside furniture • Carry out earthworks at disturbed areas to establish the finished landform • Carry out landscape reinstatement, including plantings • Reinstatement of Light Horse Interchange artwork • Construction of new noise walls and adjustments to existing noise walls • Reinstatement of cyclist and pedestrian facilities, property access and fencing • Site demobilisation and rehabilitation and preparation of the site for a future use.

9.1.1 Impacts to Aboriginal heritage (construction)

Aboriginal sites identified within and directly adjacent to the study area include previously recorded open artefact sites ‘PAD-OS-4’ (45-5-2793), ‘PAD-OS-5’ (45-5-2723), ‘PAD-OS-7’ (45-5-2721), ‘PAD-OS-9’ (45-5-2719), ‘PAD-OS-10’ (45-5-2718) and newly recorded PAD site ‘Pikes Lane PAD’ (45-5-5548).

As previously indicated, none of these sites would not be impacted by the proposed modification. All construction activities in their vicinity would be restricted to the construction footprint for the proposed modification and/or the refined construction footprint for the approved M12 Motorway project.

9.2 Operational features

The operational footprint of the proposed modification includes areas required for both operation and maintenance. Existing key operational features impacted by the proposed modification would include:

- Main road alignment, including median and bridge areas
- Interchanges, tie-ins and entry/exit ramps
- Fill embankments and cuttings
- Culverts and drainage structures
- Water quality control measures, including basins
- Landscaping
- Existing public art and landscaping at the M4 (Light Horse) Interchange
- Maintenance access
- Security fencing
- Noise barriers
- Shared path
- Other associated elements required during operation (for example, intelligent transport systems (ITS), utilities and variable message signs (VMS)).

The operational footprint of the proposed modification would be contained within the existing Westlink M7 lease area and includes areas required for both operation and maintenance.

9.2.1 Impacts to Aboriginal heritage (operation)

No impacts to Aboriginal heritage are expected as a result of the operation of the proposed modification.

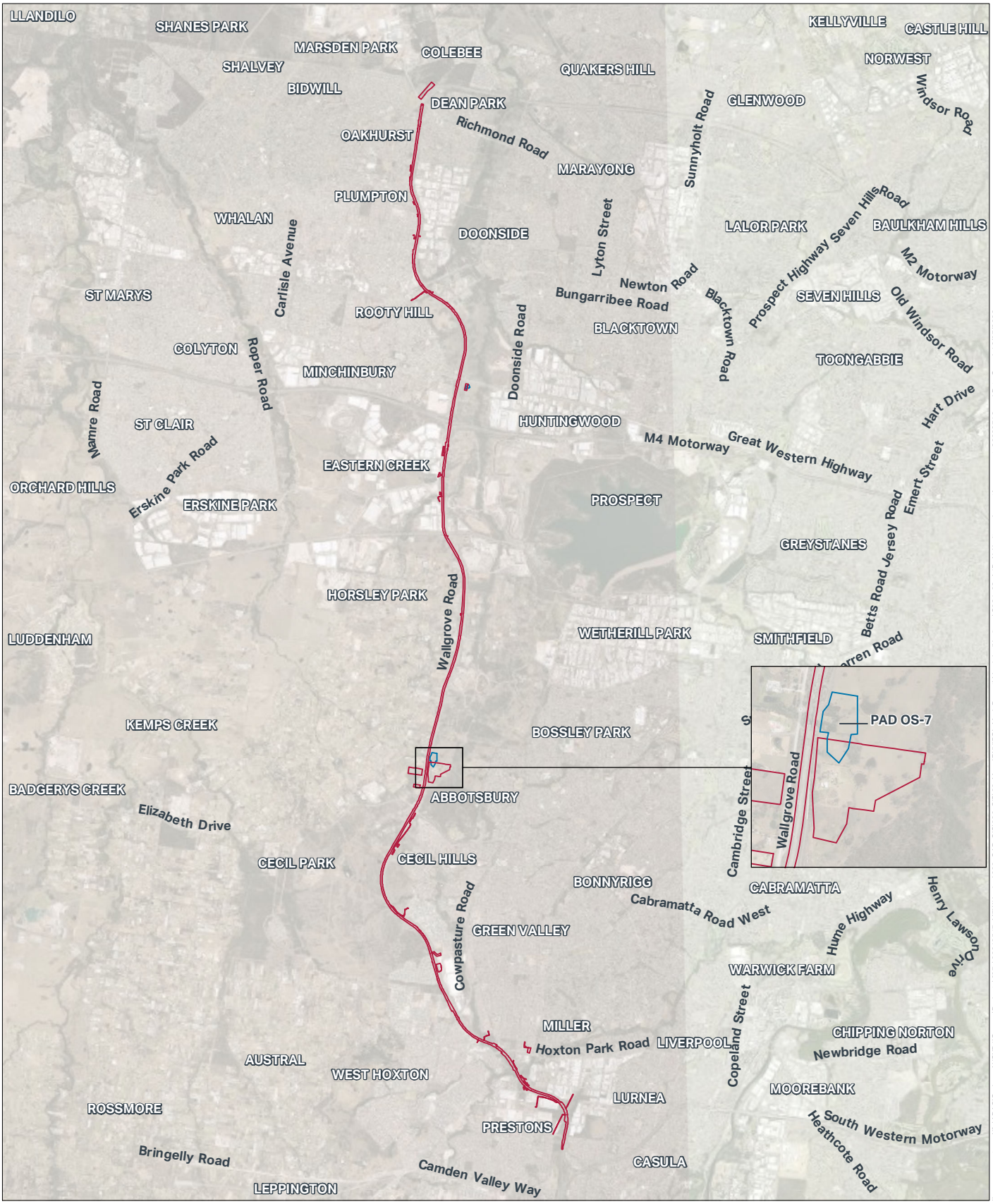

FIGURE 9-1: IMPACT ASSESSMENT

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AECOM

Legend

- Study area
- Aboriginal site

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10.0 Mitigation and management measures

Subject to Transport's implementation of the management measures presented in Table 10-1 , it is recommended that the proposed modification proceed without the requirement for further Aboriginal heritage investigation works under the PACHCI or an ACHAR.

Table 10-1: Management measures for Aboriginal heritage

Reference	Management measure	Responsibility	Timing
AH1	Aboriginal Site Impact Recording (ASIR) forms will be submitted to the AHIMS Registrar for all Aboriginal sites known to have been destroyed or partially destroyed as a result of the approved project (as indicated in the final approved IHMSP).	Construction contractor's Aboriginal Cultural Heritage Advisor	Pre-construction
AH2	An Aboriginal Site Impact Recording (ASIR) form will be submitted to the AHIMS Registrar for Aboriginal site 'MC-2' (45-5-0779), indicating that the site has been destroyed.	Construction contractor's Aboriginal Cultural Heritage Advisor	Pre-construction
AH3	An Aboriginal Cultural Heritage Management Plan (ACHMP), to be included in the Construction Environmental Management Plan (CEMP), shall be prepared prior to construction of the proposed modification. An unexpected Aboriginal heritage finds procedure will be included in the ACHMP.	Construction contractor	Construction
AH4	All standard environment site inductions prepared for the proposed modification will include an Aboriginal heritage component. At a minimum, this will outline current protocols and responsibilities with respect to the management of Aboriginal heritage within the construction footprint (including unexpected finds) and provide an overview of the diagnostic features of potential Aboriginal site types/objects.	Construction contractor	Construction
AH5	Aboriginal sites located outside of the construction footprint, but directly adjacent to it, will be actively protected during construction via temporary fencing. Fencing is to be installed along relevant sections of the construction footprint and remain in place for the duration of construction works in the vicinity. Where fencing is to be installed along the construction footprint, individual fencing lengths will be determined by a qualified archaeologist on the basis of both a visual inspection of the registered AHIMS site location and critical review of relevant existing data sources (e.g. associated site cards and assessment reports). All relevant staff and contractors are to be made aware of the nature and locations of these sites as part of standard site inductions. All sites will be identified on relevant site plans	Construction contractor	Construction

Reference	Management measure	Responsibility	Timing
AH6	Stakeholder consultation would occur prior to construction in order to: • Identify key cultural values or features within the study area • Document stories that belong to the Deerubbin and Gandangara community and with permission, may be used educate Transport's personnel and contractors Inform an environmental impact assessment under the *Environmental Planning & Assessment Act 1979.*	Transport	Prior to construction

11.0 Conclusion

This Stage 2 PACHCI Archaeological Survey Report (ASR) has been prepared to support the modification report and to address the relevant SEARs issued for the proposed modification. Specifically, this report has been prepared to assess the potential impacts of construction and operation of the proposed modification on Aboriginal cultural heritage and to identify appropriate mitigation and management measures to address the impacts identified.

Desktop research and archaeological survey have identified two valid Aboriginal sites within the study area and four sites directly adjacent to it. Sites located within the study area include previously recorded open artefact site ‘PAD-OS-7’ (45-5-2721) and newly recorded PAD site ‘Pikes Lane PAD’. Both sites are located partially within the study area, but outside the construction footprint and would not be impacted by the proposed modification.

A further four previously recorded open artefacts sites - ‘PAD-OS-4’ (45-5-2793), ‘PAD-OS-5’ (45-5-2723), ‘PAD-OS-9’ (45-5-2719) and ‘PAD-OS-10’ (45-5-2718) - directly abut the study area but are located outside of the construction footprint for the proposed modification and would likewise not be impacted. All construction activities in the vicinity of these four sites, as well as ‘PAD-OS-7’ (45-5-2721), would be restricted to the construction footprint for the proposed modification and/or refined construction footprint for the approved M12 Motorway project.

Subject to Transport’s implementation of the management measures presented in **Section 10.0** of this report, it is concluded that there is no trigger to proceed to Stage 3 of the PACHCI process and no further impact assessment is warranted for the proposed modification..

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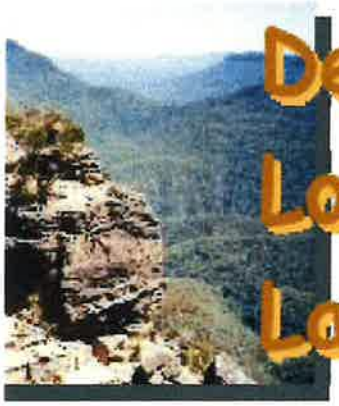
Appendix A - Cultural Heritage Survey Reports (Deerubbin & Gandangara LALCs)



Deerubbin Local Aboriginal Land Council

Level 1, Suite3
291-295 High Street
PENRITH NSW 2750
PO Box 40
PENRITH BC
NSW 2751 AUSTRALIA

ABN: 41 303 129 586
T: (02) 4724 5600
F: (02) 4722 9713
E: reception@deerubbin.org.au
W: http://www.deerubbin.org.au

Transport for NSW

Level 3, 27 Argyle Street

PARRAMATTA NSW 2123

Our Ref: 3299

12 November 2021

PROTECTION OF ABORIGINAL CULTURAL HERITAGE

Proposed M7 Widening Project

Dean Park, Rooty Hill and Eastern Creek.

Attention: – Anthony W Eland, Project Liaison Officer

A representative of Deerubbin Local Aboriginal Land Council inspected the properties along M7 of the future upgrade at Blacktown Sports Park, Eastern Rd, Rooty Hill & Redmayne Street, Horsley Park on Tuesday, 31st August 2021. Also TfNSW properties, Richmond Rd, Rooty Hill and Pikes Lane, Eastern Creek on Friday 15th October 2021. An Aboriginal cultural heritage assessment was undertaken to evaluate the likely impact the proposed upgrade has on the cultural heritage of the land.

No aboriginal cultural heritage materials (in the form of stone artefacts, for example) were located during the Aboriginal cultural heritage assessment of the above properties.

Deerubbin Local Aboriginal Land Council therefore, has no objections to the proposed M7 Widening Rooty Hill & Eastern Creek.

Yours Faithfully,

S Randall

Steven Randall

(Senior Aboriginal Cultural Heritage Officer)

C.c. Andrew McLaren – Project Archaeologist, AECOM

Transport
Roads & Maritime
Services

PROJECT NAME

Aboriginal stakeholder cultural heritage survey report

STAGE 2 – ROADS AND MARITIME SERVICES PROCEDURE FOR ABORIGINAL CULTURAL HERITAGE CONSULTATION AND INVESTIGATION (RESOURCE 7)

MONTH YEAR

8 July 2022

Aboriginal stakeholder cultural heritage survey report

1. Purpose of this assessment

This assessment forms part of the Stage 2 assessment of the Roads and Maritime Services (RMS) *Procedure for Aboriginal Cultural Heritage Consultation and Investigation*. Its purpose is to determine whether any features of Aboriginal cultural significance occur within the study area for this project, and whether they would be affected by the project. This assessment will be used to assist the RMS in determining whether further assessment and consultation is required for this project.

2. Project details: (provide the following information)

a) Project title: M7.

b) Location of study area: corner of Ash and Tedda Road (SE part) along Maxwellcreek in Prestons, NSW. 00.

c) Name of Aboriginal site officer(s) completing this assessment: Darren Duncan.

d) Name of Aboriginal organisation(s) represented by this survey: Gandangara Aboriginal land Council.

e) Name of site officer(s) who undertook site survey: Darren Duncan.

f) Date of survey: 24/08/21

Executive summary

An original report was completed on the 14 June 2022 based on the survey reports supplied by the two surveyors Darren Duncan (GLALC) and Andrew McLaren (AECOM). Based on further enquiry, a second report was completed on the 8 July 2022 [this report].

Given that NSW Government – Aboriginal Affairs has confirmed that the AHIMS database is outdated, GLALC prefers that another survey within the proposed areas of impact **(Figure 1 and 2, Appendix A)** i.e. the service track and Maxwell Creek, is completed.

Previous works were likely to have loosened and scattered possible artefacts which, with flooding, would have been deposited in the creek where the Construction Hub is proposed. For the sake of posterity and the preservation of First People's heritage, artefacts and the endangered vegetation directly linked to the Aboriginal Culture, also needs to be protected.

3. Methodology:

a) Approximately how much of the total project area was surveyed (eg 10%-100%) and why? (Eg Certain areas were heavily disturbed, properties were inaccessible, ground visibility was poor, difficult weather conditions, etc.)

All of the site that we did had bad visibility was poor, and the site was very disturbed
100% of site surveyed. Visibility impaired by gravel and rubbish dumped onsite, reported by surveyor. Surveyors walked approx 200m along the track and determined that the area had no heritage value.
DD.

As per email sent 19 June 2022 7:33 AM, Andrew McClaren clarified a discrepancy that the entirety of the site was inspected, but that the track was walked. His reply to this query was he "traversed in 'zig zag' fashion" from the walking track to the proposed service track. The concern is that the service track, being the area of primary interest should be meticulously surveyed.

b) How was the survey undertaken? (Eg On foot, by car, individually, in groups, other? If other people were involved in the survey, please provide their names and name of their organisation, if relevant)

The survey was done by foot. The survey was performed by Darren Duncan (GLALC) and Andrew ~~McCloud~~ McLaren (Aecom).
DD.

As stated above in an email, the surveyors walked along the walking path and Andrew zig zagged into the service track.

4. Results:

a) Please provide a description of the area surveyed. Include a description of the total area covered, landforms, built areas, etc. Where appropriate, survey areas should be identified on a map/plan.

43/47 Lya Parade, Prestons

most of it was done next to the motor way and drain ways and on land next to factorys where there was a lot of dumbed rubbish The area in question was approx 8ha from Ash Road southwards toward the M7. The area consists of turf at the Northern end of Ash Road that transitions into a mixed strata of native and exotic vegetation. The green belt along Maxwell Creek is surrounded by developed lots and closed in by the M7 motorway to the Southwest. The visual inspection revealed no heritage features. After walking Zoom, the surveyors agreed that excessive dumping and vegetative cover obscured visibility but the area had no heritage value and required no further investigation.

DD.

The zig zag approach may not have adequately covered the area in question. It is possible that possible artefacts could be moved or destroyed, however the uncertainty remains. As stated by NSW Government – Aboriginal Affairs, that *"The AHIMS database is outdated and is not meeting current or future needs".* GLALC prefers that a survey within the proposed areas of impact (**Figure 1 and 2, Appendix A)** is necessary.

https://www.aboriginalaffairs.nsw.gov.au/media/website_pages/aboriginal-cultural-heritage/CS1140-Factsheet_V6.pdf

b) Were any of the following features identified during the survey? (Please tick as required)

☐ stone tools or flakes	☐ hearths	☐ shell middens
☐ scarred trees	☐ shelters	☐ art sites
☐ bora circles	☐ significant spiritual or social areas	
☐ totems	☐ significant cultural landscape features	
☐ other – please state:		

If any of the above items were ticked, please provide a description including the location, quantity, size, condition and significance of the feature, if known. Where considered appropriate, this information should be identified on a map/plan).

none. "The visual inspection revealed no heritage artefacts on the surface", ~~was~~ reported by surveyor.

DD

Based on further query, it is uncertain that the correct area was adequately surveyed. A second survey specific to the areas of impact will be required.

c) Is it likely that any of the above features may be present in the study area, despite not being positively identified during the survey?
No. Yes. (If yes, where are they considered likely to occur?)

"no", as reported by surveyor. It is possible though that heritage value may exist within vegetation on the surface and in lower substrates. The proximity to Maxwells Creek also makes it difficult to completely eliminate the possibility of heritage value.

DD.

d) If known, please provide a description of the natural resources used by Aboriginal people that are, or would have been, available within the study area. Please describe the significance of these resources to past and present Aboriginal communities.

Maxwell Creek (and the riparian area flanking) it is a natural area on the whole that First People would have utilised.

DD.

Waterways contain and attract all kinds of life – many of which would have been resources to First people. Since NSW Aboriginal Affairs has established that AHIM's are outdated, and given the proximity to Maxwell Creek, it is possible that the proposed impacted areas may contain more evidence that the AHIM's have on record. In order to eliminate the possibility completely, a search outside of the proposed impacted areas needs to be done in case evidence along Maxwell Creek reveals a wider area of significance that includes the proposed study area.

e) Please provide a description of past disturbances to the study area, if known, and how this may have affected Aboriginal cultural heritage features.

"Just a lot of dumped Rubbish in the area." reported by surveyor. As per 2022 image, scattered instances of rubbish can be seen along the walkway. The vegetated area is not accessible to dumpers because it is too dense. The cleared bush, non turf, appox 1000m², would be an area most affected due to mowing, clearing and vehicle activity. D.D.

Previous construction includes the installation of two rows of poles. The service track falls between these parallel rows. It is therefore possible that unrecorded artefacts may be scattered, however, a meticulous inspection of the service track and Construction Hub area (Maxwell Creek) on foot will be required.

5. **Conclusion:**

Is the project likely to affect any significant known or potential Aboriginal cultural heritage features as identified by the survey?

☑ No.

☐ Yes. (If yes, please describe the features and how they would be affected).

"none," as reported by survey.
If no activity is planned in this area, no risk exists. A call to Andrew Mclaren confirmed that no construction huts or construction would take place in the area during this project. [call made at 16h30 Monday 6 June 2022]
D.D.

Given that it was later established that activity will take place in the area and a Construction Hub will be built across Maxwell Creek (ascertained after the original report was sent), a new survey is required to cover the areas of impact given the unreliability of AHIMS (NSW Aboriginal Affairs, 2022) and that the surveyors' primary focus was the walking track and not the service track. A wider survey of the creek in relation to the proposed areas of impact will also be required.

Maxwell Creek would be the obvious depository of scattered and loosed artefacts, and thus, prior to any development of the Construction Hub, a survey needs to be completed in this area.

Furthermore, the removal of mature endangered PCT's and construction across Maxwell Creek (Conservation Area "C2@B9817") has been raised in an email sent Wednesday, 15 June 2022 6:19 PM and Tuesday, 5 July 2022 10:53 AM. It has been stated that vegetation is not included in the scope of the study, however Aboriginal Culture and spirituality is interdependent with landform, waterways, vegetation and wildlife. Since the PCT's are severely diminished by development and thus endangered, the natural values cannot be ignored.

This assessment has been completed by:

Name: Darren Duncan / Shaun Pillai
Provide name *Provide signature*

Position title: Culture & Heritage officer / Project Manager - Ecologist
Provide title

Organisation name: Gandangara Aboriginal land Council.
Provide name of Aboriginal organisation

On the following date: 2/06/2022.
Insert date

Revised report done: 8 July 2022

Appendix A

Figure 1: Service Road using 2007 image supplied by AECOM

The service track was the priority of the inspection; however the track became the priority of the inspection instead. The 2007 map was provided by Andrew via email on Wed 15/06/2022 12:37 PM. The 2022 map alongside with service track redrawn shows the difference between the two areas. Andrew Mclaren stated on Wed 6/07/2022 9:16 AM that he walked the walking track and *"traversed in a 'zig zag' fashion (during both legs) to cover the area off"*. The proposed service track needs to be the priority.

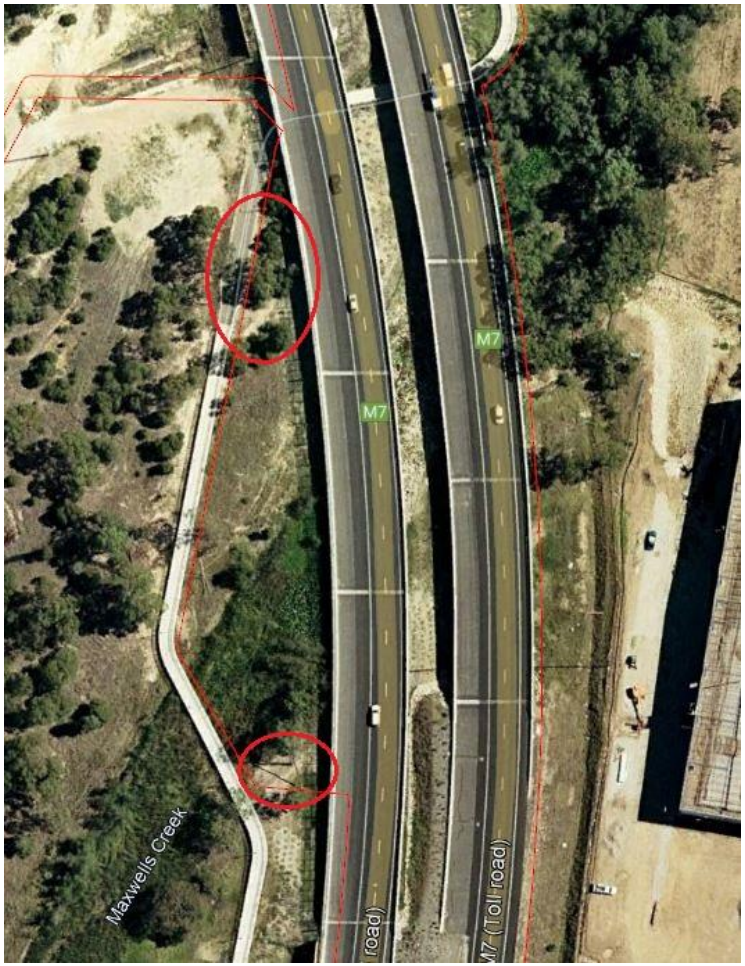


Figure 2: Construction Pad location and immature regrown vegetation circled

Andrew McClaren's map (using 2007 image) provided by Andrew via email on Wed 15/06/2022 12:37 PM vs. photos below (taken 16 June 2022) show pristine and mature native canopy along the track.

Large northern oval in Figure 2

Small southern oval in Figure 2

Mature, pristine canopy exists within the two red ovals on Figure 2

Appendix B – AHIMS search results

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : M7 Upgrade

Client Service ID : 608149

AECOM Australia Pty Ltd - Sydney

Level 21 420 George Street
SYDNEY New South Wales 2000

Attention: Andrew Peter Mclaren

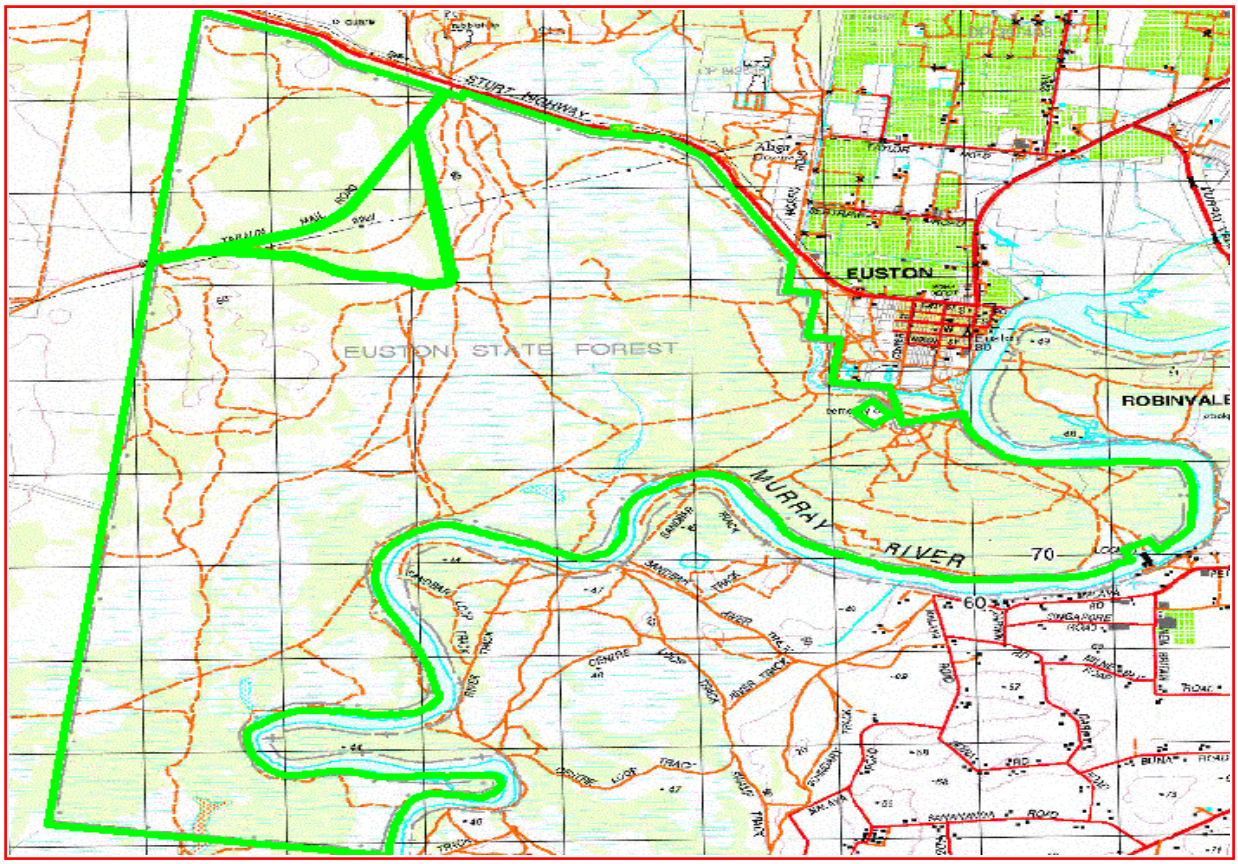
Email: andrew.mclaren@aecom.com

Date: 21 July 2021

Dear Sir or Madam:

AHIMS Web Service search for the following area at Search using shape-file AHIMS_McLaren_2_2021_07_21.SHP with a buffer of 0 meters. Additional Info : Arch Assessment, conducted by Andrew Peter Mclaren on 21 July 2021.

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



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

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

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

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

Important information about your AHIMS search

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

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : M7 Upgrade

Client Service ID : 608149

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2588	HB1	AGD	56	302100	6243900	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
Contact		Recorders	Unknown Author					Permits		
45-5-2563	DLC2	AGD	56	300211	6249504	Open site	Valid	Artefact : -	Isolated Find	103366
Contact		Recorders	Annie Nicholson					Permits		
45-5-2479	IF 1 (isolated find)	AGD	56	303680	6241600	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
Contact		Recorders	Ms.Elizabeth White					Permits		
45-5-2481	Maxwells Creek 11 (MC11)	AGD	56	303720	6241600	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
Contact		Recorders	Ms.Elizabeth White					Permits	1398	
45-5-2467	P-CP13	AGD	56	300570	6247010	Open site	Valid	Artefact : -	Open Camp Site	
Contact		Recorders	Helen Brayshaw					Permits		
45-5-2468	P-CP14	AGD	56	300300	6249080	Open site	Valid	Artefact : -	Open Camp Site	
Contact		Recorders	Helen Brayshaw					Permits	1398,1737	
45-5-2470	IF2	AGD	56	303370	6242320	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
Contact		Recorders	Helen Brayshaw					Permits		
45-5-2471	IF3	AGD	56	302590	6243630	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
Contact		Recorders	Helen Brayshaw					Permits	1398,1564	
45-5-2472	IF4	AGD	56	301990	6243960	Open site	Valid	Artefact : -, Ochre Quarry : -	Isolated Find	98369,98370,98371,98443,98739
Contact		Recorders	Helen Brayshaw					Permits	1633	
45-5-2473	IF5	AGD	56	301760	6244190	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98443,98739
Contact		Recorders	Helen Brayshaw					Permits		
45-5-2474	IF6	AGD	56	301260	6245160	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,100509
Contact		Recorders	Helen Brayshaw					Permits	1600	

Report generated by AHIMS Web Service on 21/07/2021 for Andrew Peter Mclaren for the following area at Search using shape-file AHIMS_McLaren_2_2021_07_21.SHP with a buffer of 0 meters. Additional Info : Arch Assessment. Number of Aboriginal sites and Aboriginal objects found is 65

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : M7 Upgrade

Client Service ID : 608149

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2475	IF7&8	AGD	56	301910	6244180	Open site	Valid	Artefact : -	Isolated Find	98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-5-2476	IF10	AGD	56	300600	6249400	Open site	Valid	Artefact : -	Isolated Find	103366
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-5-2477	IF11	AGD	56	300590	6249550	Open site	Valid	Artefact : -	Isolated Find	103366
	Contact	**Recorders**	Helen Brayshaw					**Permits**	1398	
45-5-2301	P-CP1	AGD	56	303690	6241790	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-5-2302	GP-CP2;	AGD	56	303750	6241950	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443
	Contact	**Recorders**	Helen Brayshaw					**Permits**	850	
45-5-2303	P-CP3	AGD	56	303400	6242200	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-5-2305	P-CP5	AGD	56	300870	6245670	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443
	Contact	**Recorders**	Helen Brayshaw					**Permits**	1398	
45-5-2306	P-CP7	AGD	56	299570	6246980	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-5-2319	HPC 1;	AGD	56	301900	6243800	Open site	Valid	Artefact : -	Isolated Find	3374,3529,98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	846,1053	
45-5-2320	HPC 2; HPR1	AGD	56	301950	6243740	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -	Open Camp Site	3374,98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	846,2897,3007	
45-5-0844	Prestons 1;	AGD	56	303570	6243200	Open site	Valid	Artefact : -	Open Camp Site	2165,98369,98370,98371,98443,98739
	Contact	**Recorders**	Kerry Navin					**Permits**	311	
45-5-2376	P-CP10	AGD	56	303640	6241560	Open site	Valid	Artefact : -	Open Camp Site	3726,98369,98370,98371,98443,98739

Report generated by AHIMS Web Service on 21/07/2021 for Andrew Peter Mclaren for the following area at Search using shape-file AHIMS_McLaren_2_2021_07_21.SHP with a buffer of 0 meters. Additional Info : Arch Assessment. Number of Aboriginal sites and Aboriginal objects found is 65

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Helen Brayshaw,Elizabeth Rich					**Permits**	1564	
45-5-2377	P-CP11	AGD	56	302460	6243550	Open site	Valid	Artefact : -	Open Camp Site	3726,98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw,Elizabeth Rich					**Permits**	4675	
45-5-2378	P-CP12	AGD	56	299480	6247260	Open site	Valid	Artefact : -	Open Camp Site	3726
	Contact	**Recorders**	Helen Brayshaw,Elizabeth Rich					**Permits**		
45-5-0426	Cowpasture Road 1	AGD	56	302200	6244450	Open site	Valid	Artefact : -	Open Camp Site	371,521,1018,98369,98370,98371,98443,98739
	Contact	**Recorders**	Ms.Bronwyn Conyers					**Permits**	638	
45-2-2298	HPC2;	AGD	56	301950	6243740	Open site	Valid	Artefact : -	Open Camp Site	3374,98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**		
45-2-2299	HPC1	AGD	56	301900	6243800	Open site	Valid	Artefact : -	Isolated Find	3374,98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	1316	
45-5-0833	Hoxton Park 2;	AGD	56	302710	6243720	Open site	Valid	Artefact : -	Open Camp Site	2118,98369,98370,98371,98443,98739
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-5-0769	HC-1 (Hinchinbrook Creek)	AGD	56	301840	6244700	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**	638	
45-5-0770	HC-2 (Hinchinbrook Creek)	AGD	56	301840	6244540	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**	638	
45-5-0774	HC-6 (Hinchinbrook Creek)	AGD	56	301430	6245400	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		
45-5-0775	CC-1 (Cabramatta Creek)	AGD	56	302560	6243250	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith					**Permits**		

Report generated by AHIMS Web Service on 21/07/2021 for Andrew Peter Mclaren for the following area at Search using shape-file AHIMS_McLaren_2_2021_07_21.SHP with a buffer of 0 meters. Additional Info : Arch Assessment. Number of Aboriginal sites and Aboriginal objects found is 65

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-0778	MC-1 (Maxwells Creek)	AGD	56	304040	6242410	Open site	Valid	Artefact : -	Open Camp Site	1727,97544
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith						**Permits**	1025
45-5-0779	MC-2 (Maxwells Creek)	AGD	56	303870	6242530	Open site	Valid	Artefact : -	Open Camp Site	1727,98369,98370,98371,98443,98739
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith						**Permits**	
45-5-0786	HP-1	AGD	56	300890	6246070	Open site	Valid	Artefact : -	Open Camp Site	1727,101066
	Contact	**Recorders**	Alice Gorman,Laura-Jane Smith						**Permits**	
45-5-2730	SHMP 2	AGD	56	300500	6245880	Open site	Valid	Artefact : -		98369,98370,98371,98443,100565
	Contact	**Recorders**	Doctor.Jo McDonald,Ms.Elizabeth White,Colin Gale						**Permits**	1939,2707
45-5-2721	PAD-OS-7	GDA	56	300988	6250533	Open site	Valid	Artefact : -		103366
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA),Mrs.Robynne Mills,Ms.Tamika Gow						**Permits**	1396,1872
45-5-2723	PAD-OS-5	AGD	56	299890	6247110	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills						**Permits**	1396
45-5-2724	PAD-OS-3	AGD	56	300010	6246620	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills						**Permits**	
45-5-2725	PAD-OS-1	AGD	56	303720	6241200	Open site	Valid	Artefact : -		98369,98370,98371,98443,98739
	Contact	**Recorders**	Mrs.Robynne Mills						**Permits**	1396
45-5-2793	PAD-OS-4	AGD	56	299910	6247020	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills						**Permits**	1396
45-5-2795	WSO-IF-1	AGD	56	301030	6251680	Open site	Destroyed	Artefact : -		103366
	Contact	**Recorders**	Mrs.Robynne Mills						**Permits**	1398
45-5-2800	MC9	AGD	56	303760	6241880	Open site	Valid	Art (Pigment or Engraved) : -		98369,98370,98371,98443,98739
	Contact	**Recorders**	Mr.Neville Baker						**Permits**	
45-5-2709	P-CP16	AGD	56	303900	6241890	Open site	Valid	Artefact : -		3726,98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw,Ms.Elizabeth White						**Permits**	1637
45-5-2761	P-CP15	AGD	56	303750	6241690	Open site	Valid	Artefact : -		3726,98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw,Ms.Elizabeth White						**Permits**	1398

Report generated by AHIMS Web Service on 21/07/2021 for Andrew Peter Mclaren for the following area at Search using shape-file AHIMS_McLaren_2_2021_07_21.SHP with a buffer of 0 meters. Additional Info : Arch Assessment. Number of Aboriginal sites and Aboriginal objects found is 65

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : M7 Upgrade

Client Service ID : 608149

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2748	CH-ST-1	AGD	56	300110	6247020	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**		
45-5-2906	SH1	AGD	56	300703	6245277	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Ms.Mary-Jean Sutton					**Permits**		
45-5-2907	SH2	AGD	56	300707	6245699	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Ms.Mary-Jean Sutton					**Permits**	2707	
45-5-2975	Hoxton Park PAD 1	AGD	56	300500	6245250	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1939	
45-5-2976	SH4 formerly PAD 9 Hoxton Park	AGD	56	300500	6246500	Open site	Valid	Potential Archaeological Deposit (PAD) : -		100565
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1939,2494,2707	
45-5-3079	HPA-1	AGD	56	301100	6246300	Open site	Valid	Art (Pigment or Engraved) : 1		
	Contact T Russell	**Recorders**	Huw Barton					**Permits**	3456	
45-5-3080	HPA-IF1	AGD	56	301000	6245210	Open site	Valid	Artefact : 1		
	Contact T Russell	**Recorders**	Huw Barton					**Permits**		
45-5-2304	P-CP4	AGD	56	301820	6244080	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-5-2480	Maxwells Creek 12 (MC12)	AGD	56	303700	6241700	Open site	Valid	Artefact : -	Open Camp Site	98369,98370,98371,98443,98739
	Contact	**Recorders**	Ms.Elizabeth White					**Permits**		
45-5-2722	PAD-OS-6	GDA	56	299890	6247679	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills,Mr.Matthew Kelleher,Kelleher Nightingale Consulting Pty Ltd (C					**Permits**		
45-5-3557	CH05 (Mirvac)	GDA	56	300727	6247214	Open site	Valid	Artefact : -		101066
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : M7 Upgrade

Client Service ID : 608149

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-3848	PAD1 (Liverpool)	GDA	56	300072	6246677	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		
45-5-3861	PAD1 Elizabeth Hills	AGD	56	300720	6246677	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**	3283,3367,3408	
45-5-3862	PAD 2 Elizabeth Hills	AGD	56	300890	6246355	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**	3283,3408	
45-5-4935	M12-AS-03	GDA	56	300273	6249140	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Neville Baker,Sydney Water-Parramatta					**Permits**		
45-5-5152	HP-AS-001	GDA	56	302516	6243616	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Miss.Meg Walker					**Permits**	4675	
45-5-5153	HP-IF-001	GDA	56	302513	6243712	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Miss.Meg Walker					**Permits**	4675	
45-5-5154	HP-IF-002	GDA	56	302631	6243599	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Miss.Meg Walker					**Permits**	4675	
45-5-5300	Cecil Hill Ridge Place (CHRP) PAD	GDA	56	300225	6249135	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Andrew Costello,Jacobs Group (Australia) Pty Ltd - North Sydney					**Permits**		

Report generated by AHIMS Web Service on 21/07/2021 for Andrew Peter Mclaren for the following area at Search using shape-file AHIMS_McLaren_2_2021_07_21.SHP with a buffer of 0 meters. Additional Info : Arch Assessment. Number of Aboriginal sites and Aboriginal objects found is 65

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AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : M7 Upgrade

Client Service ID : 608147

AECOM Australia Pty Ltd - Sydney

Level 21 420 George Street
SYDNEY New South Wales 2000

Attention: Andrew Peter Mclaren

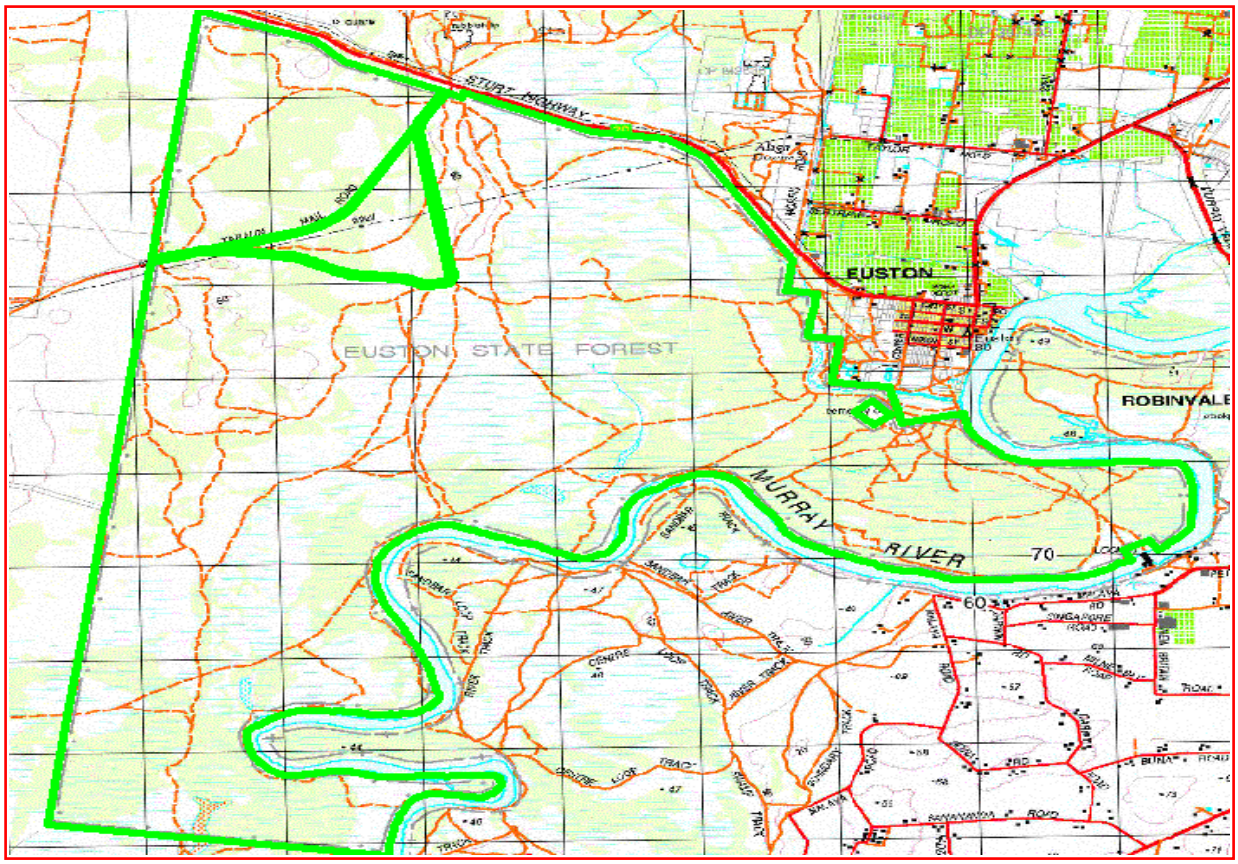
Email: andrew.mclaren@aecom.com

Date: 21 July 2021

Dear Sir or Madam:

AHIMS Web Service search for the following area at Search using shape-file AHIMS_McLaren_1_2021_07_21.SHP with a buffer of 0 meters. Additional Info : Arch Assessment, conducted by Andrew Peter Mclaren on 21 July 2021.

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



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Important information about your AHIMS search

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- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : M7 Upgrade

Client Service ID : 608147

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2582	EC8,	AGD	56	301240	6255480	Open site	Valid	Artefact : -	Isolated Find	98435
	Contact	**Recorders**	Mr.Kelvin Officer					**Permits**	1444	
45-5-2564	IF1	AGD	56	301450	6257430	Open site	Valid	Artefact : -	Isolated Find	98435
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer					**Permits**		
45-5-2565	IF2	AGD	56	301200	6257240	Open site	Valid	Artefact : -	Isolated Find	98435
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer					**Permits**		
45-5-2432	EC-OS-2	AGD	56	301060	6261160	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**		
45-5-2433	EC-OS-1	AGD	56	300780	6260896	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**	3856	
45-5-0466	Doonside 4 (Doonside)	AGD	56	301210	6261100	Open site	Valid	Artefact : -	Open Camp Site	1018,4188
	Contact	**Recorders**	Jim Kohen					**Permits**		
45-5-0467	Bungarribee 17 Blacktown	AGD	56	302010	6259610	Open site	Valid	Artefact : -	Open Camp Site	1018
	Contact	**Recorders**	Jim Kohen					**Permits**		
45-5-0398	Blacktown Native Institution	GDA	56	300510	6265335	Open site	Valid	Aboriginal Ceremony and Dreaming : -		77,1018,10250 0,103729
	Contact	**Recorders**	Annie Bickford					**Permits**	2163,3515	
45-5-0419	Bells Creek_4 A, B & C	AGD	56	300080	6264930	Open site	Valid	Artefact : -	Open Camp Site	413,1018,2622
	Contact	**Recorders**	G Happ					**Permits**		
45-5-0420	Bells Creek 2	AGD	56	300090	6264930	Open site	Valid	Artefact : -	Open Camp Site	413,1018,2622
	Contact	**Recorders**	G Happ					**Permits**		
45-5-0421	Bells Creek_3	AGD	56	300090	6264940	Open site	Valid	Artefact : -	Open Camp Site	413,1018,2622
	Contact	**Recorders**	G Happ					**Permits**		
45-5-0422	Blacktown Plumpton	AGD	56	300660	6265230	Open site	Valid	Artefact : -	Open Camp Site	521,755,1018,9 8279,98280
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1596	
45-5-2322	Florence ST #1;	AGD	56	300510	6264200	Open site	Valid	Artefact : -	Open Camp Site	3095
	Contact	**Recorders**	Denis Byrne,Tony Kondek					**Permits**	793,1082,1398	
45-5-0256	Wallgrove	AGD	56	301834	6260095	Open site	Valid	Artefact : -	Open Camp Site	367,1018
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
45-5-1100	Cannery Road;	AGD	56	299940	6263000	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-5-0464	Bungarribee19 Blacktown	AGD	56	301820	6259500	Open site	Valid	Artefact : -	Open Camp Site	1018
	Contact	**Recorders**	Jim Kohen					**Permits**	2635	
45-5-2374	Florence Street 2	AGD	56	300420	6264340	Open site	Valid	Artefact : -	Open Camp Site	3566

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Denis Byrne					**Permits**	1082	
45-5-2375	Florence St Isolated Find 3	AGD	56	300350	6264270	Open site	Valid	Artefact : -	Isolated Find	3566
	Contact	**Recorders**	Denis Byrne					**Permits**	1082	
45-5-2379	Florence ST#1;Oakhurst;	AGD	56	300510	6264200	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Denis Byrne,Tony Kondek					**Permits**	1398	
45-5-0438	Eastern Creek W2	AGD	56	300900	6257650	Open site	Valid	Artefact : -	Open Camp Site	1018,98435
	Contact	**Recorders**	Doctor.Susan (left ahms) Mcintyre-Tamwoy					**Permits**	2569	
45-5-0439	Eastern Creek W1	AGD	56	300750	6256650	Open site	Valid	Artefact : -	Open Camp Site	1018,98435
	Contact	**Recorders**	Doctor.Susan (left ahms) Mcintyre-Tamwoy					**Permits**		
45-5-0441	Bells Creek_1	AGD	56	300100	6264780	Open site	Valid	Artefact : -	Open Camp Site	413,1018,2622
	Contact	**Recorders**	G Happ					**Permits**		
45-5-0445	Woodstock open site Plumpton	AGD	56	300580	6262450	Open site	Valid	Artefact : -	Open Camp Site	1018
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**	1398	
45-5-0456	South East Plumpton 5	AGD	56	300990	6262090	Open site	Valid	Artefact : -	Open Camp Site	947,1018,4600
	Contact	**Recorders**	Jim Kohen					**Permits**	942,994,1424	
45-5-0462	Bungarribee 21 Blacktown	AGD	56	301850	6259330	Open site	Valid	Artefact : -	Open Camp Site	1018
	Contact	**Recorders**	Jim Kohen					**Permits**	3772	
45-5-0463	Bungarribee 20 Blacktown	AGD	56	302010	6259820	Open site	Valid	Artefact : -	Open Camp Site	1018
	Contact	**Recorders**	Jim Kohen					**Permits**		
45-5-0249	Wallgrove Wallgrove Road	AGD	56	300900	6257100	Open site	Valid	Artefact : -	Open Camp Site	367,1018,9843 5,98444,98677
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**	1573,1609	
45-5-0252	Rooty Hill Road North Plumpton	AGD	56	300549	6265010	Open site	Valid	Artefact : -	Open Camp Site	367,1018
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
45-5-0747	RH 1	AGD	56	300480	6262100	Open site	Valid	Artefact : -	Open Camp Site	1547
	Contact	**Recorders**	Margrit Koettig					**Permits**	1398	
45-5-0483	Southeast Plumpton 6 Rooty Hill	AGD	56	300850	6262100	Open site	Valid	Artefact : -	Open Camp Site	1018
	Contact	**Recorders**	Jim Kohen					**Permits**	940	
45-5-0486	Bells Creek A (Rooty Hill)	AGD	56	300180	6265200	Open site	Valid	Artefact : -	Open Camp Site	1006,1018,262 2
	Contact	**Recorders**	Jim Kohen					**Permits**		
45-5-2651	Richmond Road 1	AGD	56	300445	6265435	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Michael Therin					**Permits**	1364,1874,1977	
45-5-2707	GDI	AGD	56	301000	6262750	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Deerubbin LALC					**Permits**		

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2648	Eastern Creek PAD 20	AGD	56	301500	6258000	Open site	Destroyed	Potential Archaeological Deposit (PAD) : -		103782
	Contact	**Recorders**	Australian Museum Consulting (AM Consulting)					**Permits**	1317,1566	
45-5-2718	PAD-OS-10	AGD	56	300600	6262700	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**		
45-5-2719	PAD-OS-9	AGD	56	301550	6260300	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**	1396	
45-5-2796	WSO-IF-2	AGD	56	301410	6254840	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**		
45-5-2797	WSO-OS-8	AGD	56	301090	6256450	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**	1398	
45-5-2803	Shaughnessy Street IF 1	AGD	56	300218	6264010	Open site	Valid	Artefact : -		98188
	Contact	**Recorders**	Megan Mebberson					**Permits**	1407	
45-5-2836	IF:7	AGD	56	300600	6256840	Open site	Valid	Artefact : -		4599,98444,100449
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1573,1609,2470	
45-5-2837	IF:8	AGD	56	300640	6256780	Open site	Valid	Artefact : -		4599,100449
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	2470	
45-5-2804	Shaughnessy & Lamb Streets Oakhurst NSW	AGD	56	300373	6264057	Open site	Destroyed	Artefact : 11		98188
	Contact	**Recorders**	Megan Mebberson,Mrs.Jenna Weston					**Permits**	1407,3659	
45-5-2776	Glendenning rd 1	AGD	56	300950	6262120	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**		
45-5-2777	South East Plumpton 6.5	AGD	56	300800	6262210	Open site	Partially Destroyed	Artefact : -		100446
	Contact	**Recorders**	Andrew Knight					**Permits**	1391,2646	
45-5-2654	PL-05-1	AGD	56	301550	6258030	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Central West Archaeological and Heritage Services Pty Ltd					**Permits**		
45-5-2822	WBP 1	AGD	56	300650	6257100	Open site	Valid	Modified Tree (Carved or Scarred) : -		98444
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1573,1609	
45-5-2823	AWL 8	AGD	56	300700	6257550	Open site	Valid	Art (Pigment or Engraved) : -		98444
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1573,1609	
45-5-2827	AWL 4	AGD	56	300870	6256820	Open site	Valid	Artefact : -		4599,98444
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1573,1609	

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2828	AWL 6	AGD	56	300670	6256780	Open site	Valid	Artefact : -		4599,98444,100449
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1573,1609,2470	
45-5-2829	AWL 7	AGD	56	300680	6256860	Open site	Valid	Artefact : -		4599,98444,100449
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1573,1609,2470	
45-5-2849	SO-ST 2 (A, B, C, D & E)	AGD	56	301310	6258010	Open site	Destroyed	Modified Tree (Carved or Scarred) : -		4015,98084
	Contact	**Recorders**	Australian Museum Consulting (AM Consulting),Megan Mebberson					**Permits**	1597	
45-5-2851	WSO-OS-10	AGD	56	301585	6259280	Open site	Valid	Artefact : 4		
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**	1637	
45-5-2864	Kellogg Road 1	AGD	56	300070	6261090	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Doctor.Jillian Comber					**Permits**	2050	
45-5-2974	Lucan Park PAD	AGD	56	301090	6256666	Open site	Destroyed	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Megan Mebberson					**Permits**	1941	
45-5-2984	Austral 2	AGD	56	300620	6255840	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1994	
45-5-2985	Austral 3	AGD	56	300770	6256000	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1994	
45-5-3057	Rooty Hill Road North	AGD	56	300070	6264320	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	2221	
45-5-3020	EC_AMBS_04	GDA	56	301654	6258414	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Matthew Kelleher,Niche Environment and Heritage,Miss.Layne Holloway					**Permits**	2150	
45-5-3104	Sept2000/A	AGD	56	300750	6262230	Open site	Valid	Artefact : 1		
	Contact T Russell	**Recorders**	Andrew Knight					**Permits**		
45-5-3105	Sept2000/B	AGD	56	300750	6262200	Open site	Valid	Artefact : 1		
	Contact T Russell	**Recorders**	Andrew Knight					**Permits**		
45-5-3206	ISF11	AGD	56	300780	6256920	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		
45-5-3257	WSP 11	GDA	56	302025	6260394	Open site	Valid	Artefact : 1		100103
	Contact S Scanlon	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**	3772	
45-5-3293	PP-2	GDA	56	301895	6259673	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**	2635	

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-3297	PP-F2	GDA	56	301425	6260595	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Mark Rawson					**Permits**	2635	
45-5-3259	WSP 12	GDA	56	302036	6260194	Open site	Valid	Artefact : 1		100103
	Contact S Scanlon	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		
45-5-3261	WSP 14	GDA	56	301798	6258400	Open site	Valid	Artefact : 1		100103
	Contact S Scanlon	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		
45-5-3263	WSP 16	GDA	56	301910	6260703	Open site	Valid	Artefact : 1		100103
	Contact S Scanlon	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		
45-5-3388	Eskdale Street 1 (ES 1)	GDA	56	301190	6259080	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd					**Permits**	2837	
45-5-2720	PAD-OS-8	AGD	56	301150	6257650	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Mrs.Robynne Mills					**Permits**		
45-5-3420	bop2	GDA	56	301687	6261080	Open site	Valid	Artefact : 30		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2973	
45-5-3421	bop1	GDA	56	301613	6261131	Open site	Valid	Artefact : 30		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	2973	
45-5-3551	Florence St 1	GDA	56	300510	6264200	Open site	Valid	Artefact : -		3658
	Contact	**Recorders**	Denis Byrne					**Permits**		
45-5-3698	Phillip Pwy	GDA	56	300600	6262120	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Michael Guider					**Permits**		
45-5-3699	Glen Trib	GDA	56	300800	6262130	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Michael Guider					**Permits**		
45-5-3779	Link Road PAD	GDA	56	300711	6256775	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Oliver Brown					**Permits**	3206	
45-5-3810	Q1 (Prospect)	GDA	56	301032	6258446	Open site	Valid	Artefact : 1		101797
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		
45-5-3811	Q2 (Prospect)	GDA	56	301173	6258417	Open site	Valid	Artefact : 1		101797
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		
45-5-3812	Q3 (Prospect)	GDA	56	301053	6258543	Open site	Valid	Artefact : 1		101797
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**		
45-5-3813	Q4 (Prospect)	GDA	56	301243	6258480	Open site	Valid	Artefact : 1		101797
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML,Kelleher Nightingale Consulti					**Permits**		
45-5-3814	Q5 (Prospect)	GDA	56	301198	6258432	Open site	Valid	Artefact : 1		101797

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML,Kelleher Nightingale Consulti					**Permits**		
45-5-3815	Q6 (Prospect)	GDA	56	301168	6258410	Open site	Valid	Artefact : 1		101797
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML,Kelleher Nightingale Consulti					**Permits**		
45-5-4310	Bungarribee Precinct Artefact Scatter 4 (BP AS4)	GDA	56	302038	6260308	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		
45-5-4312	Bungarribee Precinct Isolated Find 1 (BP IF1)	GDA	56	302048	6260010	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		
45-5-4284	Erskine Park Link Road 2	GDA	56	301017	6256543	Open site	Destroyed	Artefact : 1		
	Contact	**Recorders**	Doctor.Alan Williams					**Permits**	3625	
45-5-4194	CONSERVATION AREA PAD	GDA	56	300863	6256750	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Doctor.Alan Williams					**Permits**	3625	
45-5-4531	Bells Creek E	GDA	56	300405	6265595	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Matthew Kelleher					**Permits**		
45-5-4679	The Horsely Drive AFT 7	GDA	56	301999	6253303	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,Mr.Tyler Beebe					**Permits**		
45-5-4681	The Horsley Drive AFT 1	GDA	56	301769	6253302	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,Mr.Benjamin Anderson					**Permits**		
45-5-4682	The Horsley Drive AFT 2	GDA	56	301943	6253227	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,Mr.Benjamin Anderson					**Permits**		
45-5-5009	BSF AS 01	GDA	56	301753	6260331	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Miss.Julia McLachlan					**Permits**	4297	
45-5-5182	Bungarribee Sportsfield Artefact Reburial 01 (BS AR 01)	GDA	56	301413	6260751	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Pyrmont,Ms.Alyce Haast					**Permits**		
45-5-5183	LIBH AS1	GDA	56	301494	6257538	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Extent Heritage Pty Ltd - Pyrmont - Individual users,Mrs.Laressa Barry					**Permits**		
45-5-5270	Dunsmore Av IF-01	GDA	56	300924	6260833	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Urbis Pty Ltd - Angel Place L8 123 Pitt Street,Miss.Meggan Walker					**Permits**		
45-5-5283	LHIBH Eskdale Creek terrace	GDA	56	301746	6257539	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Extent Heritage Pty Ltd - Pyrmont - Individual users,Extent Heritage Pty Ltd - Pyrm					**Permits**		
45-5-5285	LHIBH BS	GDA	56	301616	6257579	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Extent Heritage Pty Ltd - Pyrmont - Individual users,Extent Heritage Pty Ltd - Pyrm					**Permits**		
45-5-5329	Pikes Lane AS1	GDA	56	301607	6258430	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : M7 Upgrade

Client Service ID : 608147

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-5471	Richmond Road Bells Creek AFT 1	GDA	56	300454	6265607	Open site	Valid	Artefact : -		

Contact **Recorders** Mr.Matthew Kelleher,Kelleher Nightingale Consulting Pty Ltd (Generic users) **Permits**

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