Oakdale West Estate

Aboriginal Archaeological Survey Report

Report to Goodman

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EXECUTIVE SUMMARY

Goodman Group has engaged Artefact Heritage to prepare an Archaeological Survey Report (ASR) for the proposed development of Oakdale West Estate and the West North South Link Road as the primary access road. The aims of this report are to identify any Aboriginal sites which may be present within the study area, to assess the potential for as yet unidentified Aboriginal archaeology to be present within the study area and to provide recommendations for further investigation, if required.

The project area is approximately 164.5 hectares, consisting of land contained within Lot 11 DP1178389 and Lot 3031 DP1168407 within the Penrith City Council Local Government Area (LGA). The proposal involves the development of the Oakdale West Estate (Part A) and the West North South Link Road (Part B). The project is a separate but complimentary development to the Oakdale Central and Oakdale South Estates.

An Aboriginal Heritage Assessment was prepared by Godden Mackay Logan (GML) in 2007 for the Oakdale Concept Plan. The Aboriginal Heritage Assessment included a number of precincts that are part of the Oakdale Concept Plan; including Oakdale Central, Oakdale South and Oakdale West (current study area).

The Aboriginal Heritage Assessment concluded that there was potential for further intact cultural material to be located within surface and subsurface contexts along land bordering Ropes Creek. An Aboriginal archaeological sensitivity map was developed, based on proximity to Ropes Creek and its tributaries (GML 2007:55). Intensive surface survey and test excavations (dependant on the results of the survey) were recommended for areas identified as having archaeological sensitivity.

A survey of the Part A study area was conducted by Alexander Timms (Artefact Heritage), Claire Rayner (Artefact Heritage), Steven Randall (DLALC) and Steven Knight (DLALC) on 21 October 2015. A second survey was undertaken for the Part B study area by Duncan Jones (Artefact Heritage), Veronica Norman (Artefact Heritage), Steven Randall (DLALC) and Jamie Stewart (Fitzpatrick) on 29 March 2016. Both surveys were undertaken in accordance with the Office of Environment and Heritage (OEH) Code of Practice for Archaeological Investigation of Aboriginal Objects (Code of Practice).

Overview of Findings

The findings of the ASR are:

- Based on the Aboriginal Heritage Information Management System (AHIMS) data, previously recorded sites EV1 and EV4 appeared to be located within the study area. However, the original recording of these sites (AHMS 2005) indicates that the sites were located to the west and within the adjacent property. This error is consistent with the datum error that occurs between AGD and GDA coordinates. The archaeological survey confirmed that EV1 and EV 4 are located outside the study area.
- Five newly recorded Aboriginal sites were identified during the current survey: OW AS 1 (#45-5-4672), OW AS 2 (#45-5-4674), OW IF 1 (#45-5-4673), OW IF 2 (#45-5-4675) and OW IF 3 (#45-5-4676).
- Three previously recorded AHIMS sites are located within the study area: Oakdale Campsite 1 (#45-5-3382), Oakdale Campsite 3 (#45-5-3384) and Oakdale Campsite 4 (#45-5-3385).

- An area of archaeological sensitivity along Ropes Creek and the tops of the ridgelines to the west of the watercourse has been identified. This area includes Aboriginal sites Oakdale Campsite 1 (#45-5-3382), Oakdale Campsite 3 (#45-5-3384), Oakdale Campsite 4 (#45-5-3385), OW AS 1 (#45-5-4672), OW AS 2 (#45-5-4674), OW IF 1 (#45-5-4673) and OW IF 2 (#45-5-4675).
- Site OW IF 3 (#45-5-4676) and EP2 (#45-5-3311) are located outside of the area of archaeological sensitivity. This site is considered to be of low archaeological significance.

It is therefore recommended that:

- Aboriginal sites Oakdale Campsite 1 (#45-5-3382), Oakdale Campsite 3 (#45-5-3384), OW AS 1 (#45-5-4672), and OW AS 2 (#45-5-4674) will not be impacted by the proposed development, therefore no further archaeological investigation is required.
- The concept design indicates that some areas of archaeological sensitivity will be impacted including Aboriginal sites Oakdale Campsite 4 (#45-5-3385) and OW IF 2 (#45-5-4675).
- Test excavation should be conducted under the Code of Practice within the area of archaeological sensitivity that will be impacted by the proposal. The test excavation methodology will investigate the potential for subsurface cultural material within this area. Test excavation will determine the extent and archaeological significance of any identified cultural material and inform recommendations for further management or mitigation measures. A methodology for test excavation would be developed in consultation with the registered Aboriginal stakeholders.
- The results of the test excavation would be discussed in a test excavation report which would also recommend whether any further investigation or reporting was required.
- Aboriginal sites OW IF 3 (#45-5-4676) and EP2 (#45-5-3311) will be impacted by the proposed works. As both sites have been assessed as having low archaeological significance, no further investigation is required.
- No further investigation is required for areas of no archaeological sensitivity.
- If changes are made to the concept design that may result in further impacts to areas of archaeological sensitivity along the Ropes Creek corridor and associated ridgelines or to Aboriginal sites located outside the current area of impacts further archaeological assessment would be required.

CONTENTS

FIGURES

TABLES

PLATES

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

Goodman Group has engaged Artefact Heritage to prepare an Archaeological Survey Report (ASR) for the proposed development of Oakdale West Estate (OWE) located in Kemps Creek. The aims of this report are to identify any Aboriginal sites which may be present within the study area, to assess the potential for as yet unidentified Aboriginal archaeology to be present within the study area and to provide recommendations for further investigation, if required. This report has been prepared in accordance with the Office of Environment and Heritage (OEH) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (Code of Practice).

As part of the proposal, the Western North South Link Road (WNSLR) will form the primary access route to the OWE. Following consultation with Roads and Maritime Services (Roads and Maritime), the WNSLR was included in the scope of the State Significant Development application (SSDA) for the OWE. The additional area that encompasses WNSLR is known as 'Part B'.

1.2 The Study Area

PART A

The OWE project area is approximately 156 hectares, consisting of land contained within Lot 11 DP1178389 within the Penrith City Council Local Government Area (LGA). The study area is located within the suburb of Kemps Creek, Cumberland County, Parish of Melville. The study area is bound by Warragamba dam pipeline to the north, Ropes Creek to the east and private properties to the west and south (Figure 1).

PART B

The WNSLR is located within Lot 3031 of DP 1168407, Erskine Park, immediately to the north of the Part A. The road corridor runs from Lenore Drive to the proposed OWE. It is approximately 8.5 hectares in size.

1.3 The Proposal

The proposal is divided into two parts, which involve OWE (Part A) and WNSLR (Part B). Both parts are described below:

PART A

The proposal involves the development of the OWE. The concept design (Figure 2) includes the following:

- Initial bulk earthworks: to create broad, flat, developable hardstand areas.
- Civil works: including internal access roads, parking areas, basins, retaining walls and services.
- Building Works: Construction of several industrial use buildings within new subdivision area.

PART B

The proposal involves the construction of the WNSLR from Erskine Park Link Road in the north, down to OWE in the south. The concept design (Figure 3) includes the following:

- Earthworks and construction of the road.
- The bridge over the SCA pipeline.
- Intersections and infrastructure associated with the road such as drainage.

1.4 Objectives of Assessment

The objectives of this assessment are to prepare an ASR in accordance with the Code of Practice that includes the following:

- Describe the proposed OWE and WNSLR.
- Outline Aboriginal community consultation and involvement.
- Discuss the Aboriginal historical context of the study area.
- Discuss the archaeological context of the study area, including previous archaeological work in the area.
- Discuss the landscape context of the study area.
- Develop an archaeological predictive model.
- Describe and analyse Aboriginal sites identified within the study area.
- Assess the significance of Aboriginal sites within the study area.
- Assess the indicative impacts of the concept design on Aboriginal sites and areas of archaeological potential.

Figure 1: Location of Study Area showing both OWE and WNSLR

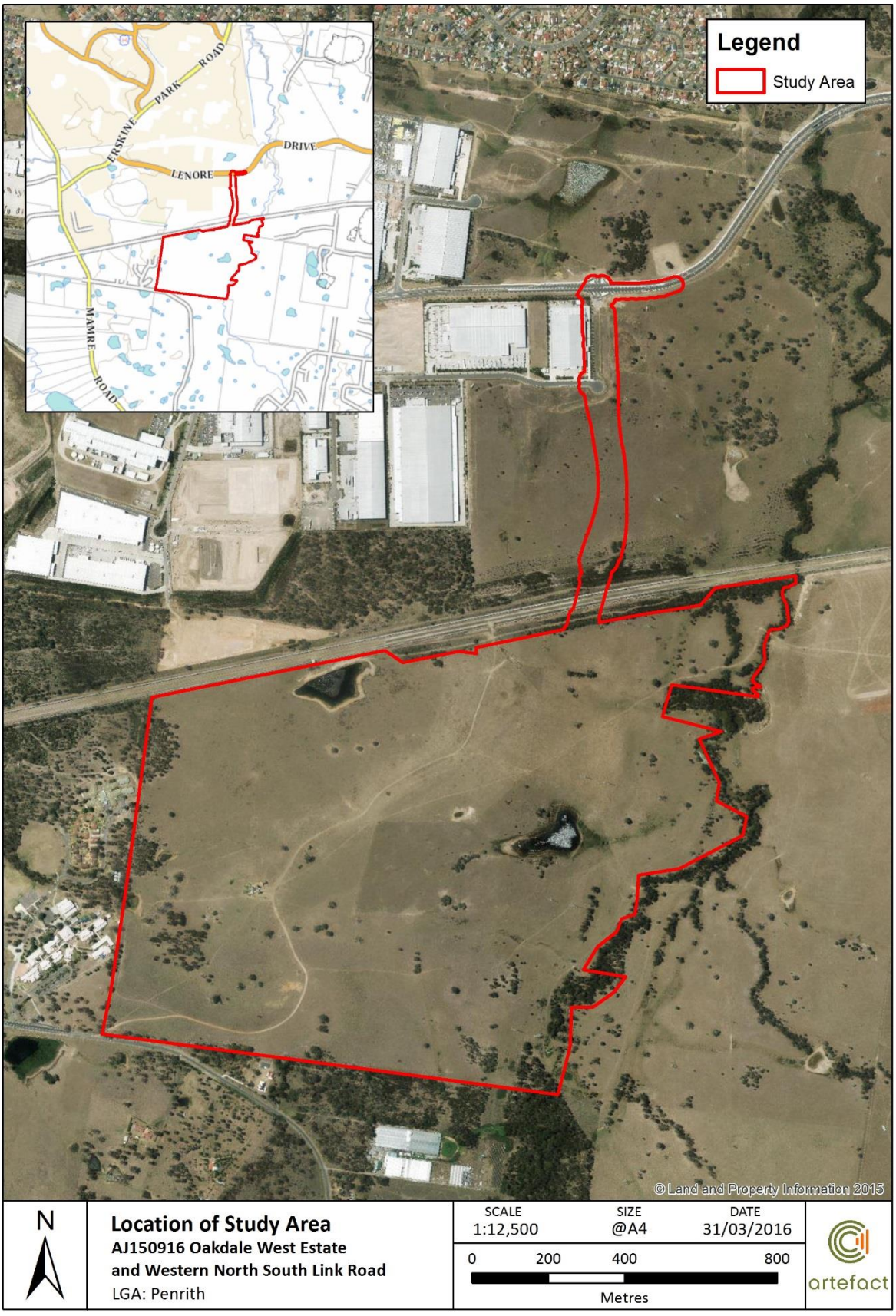
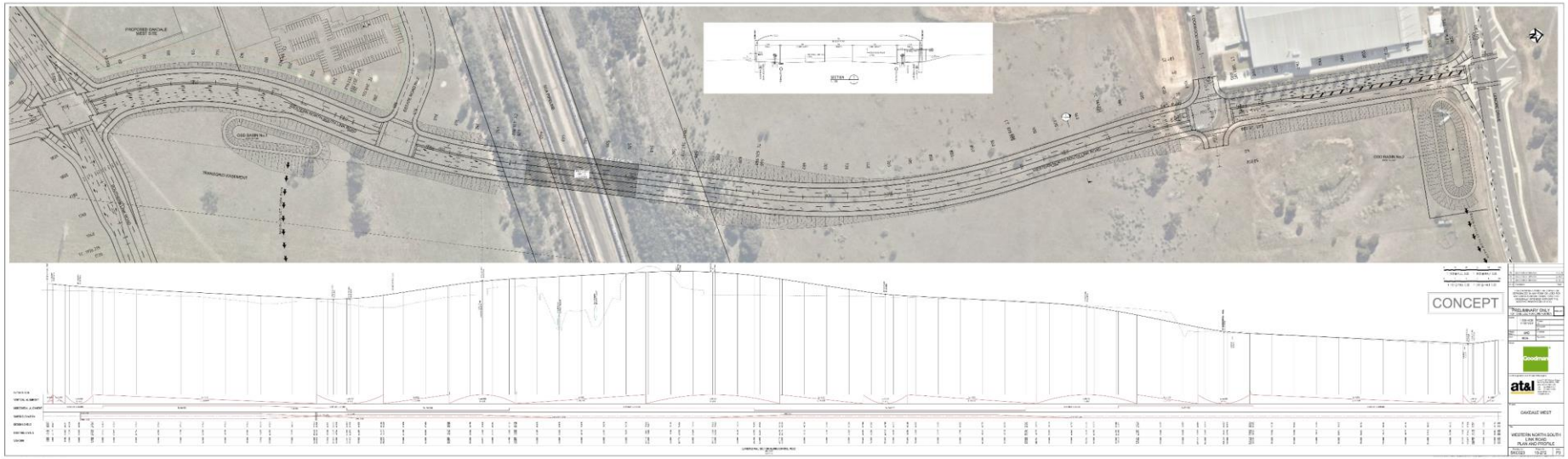


Figure 2: Concept Design: Part A - OWE

Figure 3: Concept Design: Part B – WNSLR (north to right of page)



1.5 Consultation

Consultation with Deerubbin Local Aboriginal Land Council (DLALC) has been conducted throughout preparation of this report. Steven Randall and Steven Knight, representatives of DLALC, took part in the field survey of the study area. Written comments from DLALC have been attached with this report as Appendix A.

Consultation was conducted in accordance with the OEH Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.

In accordance with the consultation requirements, Artefact Heritage corresponded with the following organisations by letter seeking to identify Aboriginal stakeholder groups or people who may wish to be consulted about the project:

- OEH EPRG (Parramatta)
- Deerubbin Local Aboriginal Land Council
- The Registrar, Aboriginal Land Rights Act 1983
- Native Title Tribunal
- NTSCORP
- Penrith City Council
- Greater Sydney Catchment Management Authority

Letters were sent to all Aboriginal persons or organisations identified through responses from the agencies listed above. The letters provided details about the location and nature of the proposal, as well as an invitation to register as an Aboriginal stakeholder.

An advertisement was placed in the St Mary Star on 20 October 2015. The advertisement invited all Aboriginal persons and organisations who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the study area to register their interest.

The following Aboriginal stakeholders registered an interest in the project:

- Butucarbin Aboriginal Corporation
- Darug Land Observations PTY LTD
- Didge Ngunawal
- Merrigarn Indigenous Corporation
- Darug Custodian Aboriginal Corporation
- Gundungurra Tribal Technical Services
- Murri Bidgee Mullangari Aboriginal Corporation
- Corroborree Aboriginal Corporation
- Goobah Developments
- Walbunja
- Elouera CHTS
- Tharawal CHTS
- Badu
- Bilinga
- Munyunga
- Yerramurra
- Nundagurri
- Gangangarra
- Wandandian
- Ngunawal
- Eora
- Murrumbul
- Wingikara

- Gunyuu CHTS
- Thaiaira CHTS
- Bidawal CHTS
- Dharug CHTS
- Ngarigo CHTS
- Djiringanj CHTS
- Walgalu CHTS
- Kuringgai CHTS
- Murrin CHTS
- Tocomwall
- Wullung
- Darug Aboriginal Cultural Heritage Assessments
- Aboriginal Archaeology Service Inc.
- Rane Consulting
- Murramarang
- Biamanga
- Cullendulla
- Gulaga
- Widescope Indigenous Group
- Amanda Hickey Cultural Services
- Caroline Hickey
- Kawul Cultural Services
- Wurrumay Consultant
- Warrigal Cultural Services

A comprehensive guide to Aboriginal consultation undertaken for this project, including copies of all correspondence, will be provided in the Aboriginal Cultural Heritage Assessment Report (ACHAR).

1.6 Investigators and Contributors

Archaeologist Claire Rayner prepared this report with management input and revision from Senior Archaeologist Alex Timms. Principal Archaeologist Dr Sandra Wallace provided the final review.

2.0 LEGISLATIVE CONTEXT

National Parks and Wildlife Act (1974) (NPW Act)

The NPW Act, administered by the OEH provides statutory protection for all Aboriginal 'objects' (consisting of any material evidence of the Aboriginal occupation of NSW) under Section 90 of the Act, and for 'Aboriginal Places' (areas of cultural significance to the Aboriginal community) under Section 84.

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

The NPW Act was amended in 2010 and as a result the legislative structure for seeking permission to impact on heritage items has changed. A Section 90 permit is now the only Aboriginal Heritage Impact Permit (AHIP) available and is granted by the OEH. Various factors are considered by OEH in the AHIP application process, such as site significance, Aboriginal consultation requirements, ESD principles, project justification and consideration of alternatives. The penalties and fines for damaging or defacing an Aboriginal object have also increased.

As this project is being assessed under Part 4 Division 4.1 of the *Environmental Planning & Assessment Act* 1979 permits issued under the NPW Act 1974 are not required.

Environmental Planning & Assessment Act (1979) (EP&A Act)

The EP&A Act is administered by the Department of Planning and Infrastructure and provides planning controls and requirements for environmental assessment in the development approval process. This Act has three main parts of direct relevance to Aboriginal cultural heritage. Namely, Part 3 which governs the preparation of planning instruments, Part 4 which relates to development assessment process for local government (consent) authorities and Part 5 which relates to activity approvals by governing (determining) authorities.

Planning decisions within Local Government Areas (LGAs) are guided by Local Environmental Plans (LEPs). Each LGA is required to develop and maintain an LEP that includes Aboriginal and historical heritage items which are protected under the EP&A Act 1979 and the *Heritage Act 1977.*

The study area is within the Penrith City Council LGA.

The Penrith LEP 2010 (Part 5, Clause 5.10) make standard provision for the protection of Aboriginal objects and Aboriginal places of heritage significance. There are no Aboriginal heritage items within the study area that are listed in the Penrith LEP 2010.

The proposal will be assessed under Part 4, Division 4.1 of the EP&A Act, which establishes an assessment and approval regime for State Significant Development (SSD). Part 4, Division 4.1 applies to development that is declared to be SSD by a State Environmental Planning Policy (SEPP). Section 89J of the EP&A Act specifies that approvals or permits under section 90 of the NPW Act 1974 are not required for approved SSD.

Aboriginal Land Rights Act (1983)

The *Aboriginal Land Rights Act 1983* is administered by the NSW Department of Human Services - Aboriginal Affairs. This Act established Aboriginal Land Councils (at State and Local levels). These bodies have a statutory obligation under the Act to; (a) take action to protect the culture and heritage

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

Native Title Act (1994)

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

2.1 Secretary's Environmental Assessment Requirements (SEARs)

SEARs have been issued for Part A of the proposal. It is assumed that Part B will come under the same SEARs.

The specific SEARs and where they are addressed in this in this report are summarised in Table 1. The specific requirements of the OEH, and Penrith City Council and where they are addressed in this report are summarised in Table 2 and Table 3. This ASR satisfies the requirements of the SEARs, Code of Practice and the OEH Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010).

Table 1: SEARs

SEAR	Section
Aboriginal cultural heritage in accordance with the relevant OEH guidelines. Any impacts on Aboriginal cultural heritage as a result of the development must be adequately mitigated	Section 10.0 Indicative Impact Assessment Section 11.0 Management and Mitigation Measures
Where it is likely that the development will impact upon Aboriginal cultural heritage, adequate community consultation should take place regarding the assessment of significance, likely impacts and management/mitigation measures	Section 1.5 Consultation Section 9.0 Archaeological Significance Assessment Section 10.0 Indicative Impact Assessment Section 11.0 Management and Mitigation Measures
Describe any actions that will be taken in order to avoid or mitigate impacts the development may have on Aboriginal cultural heritage	Section 11.0 Management and Mitigation Measures

Table 2: OEH requirements

OEH requirement	Section
The EIS must identify and describe the tangible and intangible Aboriginal cultural heritage values that exist across the whole area that will be affected by the project and document these in the EIS. This may include the need for surface survey and test excavation. The identification of cultural heritage values should be guided by the *Guide to investigation, assessing and reporting on Aboriginal Cultural Heritage in NSW* (DECCCW 2011)	Section 7.0 Survey Results Section 9.0 Archaeological Significance Assessment Section 11.0 Management and Mitigation Measures

Where Aboriginal cultural heritage are identified, consultation with Aboriginal people must be undertaken and documented in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW)	Section 1.5 Consultation
Impacts on Aboriginal cultural heritage values are to be assessed and documented in the EIS. The EIS must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are avoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH	Section 10.0 Indicative Impact Assessment Section 11.0 Management and Mitigation Measures

Table 3: Penrith City requirements

Penrith City Requirements	Section
European and indigenous heritage impact assessment including details of consultation with local Aboriginal stakeholder groups	Section 1.5 Consultation Section 10.0 Indicative Impact Assessment See also *Artefact Heritage 2015 Non-Aboriginal (historical) Heritage Assessment*

3.0 ENVIRONMENTAL CONTEXT

3.1 Geology and Soils

The underlying geology of the study area is divided into two types of deposit. Bringelly Shale is the dominant geological unit within the west and central portion of the study area. Bringelly Shale forms part of the Wianamatta Group, consisting of shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, rare coal, and tuff (Clark and Jones 1991). The eastern portion of the study area comprises of quaternary fluvial deposits associated with Ropes Creek. The quaternary fluvial deposits are described as fine grained sand, silt and clay (Clark and Jones 1991).

Overlying soils consisted of residual soils developed in situ across the raised portions of the study area associated with the underlying Bringelly Shale. The residual soils, called the Blacktown soil landscape, generally consisted of shallow duplex soils over a clay base (OEH 2014). Overlying fluvial soils were associated with the alluvium across the low-lying terrain bordering Ropes Creek. The fluvial soils, called the South Creek soil landscape, would be subject to frequent flood events, possibly resulting in a deep, homogenous deposit susceptible to mixing (OEH 2014).

A significant feature of the regional geological landscape included a significant source of silcrete at Plumpton Ridge, approximately ten kilometres northwest of the study area. Silcrete, a raw material used by Aboriginal people across Sydney Basin, was extracted from underlying Tertiary period geology called the St Marys formation. The silcrete raw material source at Plumpton Ridge was an important and extensively used quarry where extraction and tool manufacture activities took place (McDonald 2006).

3.2 Landforms and Hydrology

The study area is located across ridge crest, slope and undulating landforms bordering Ropes Creek.

The eastern portion of the study area is located across alluvial flats associated with the floodplains of Ropes Creek. The western portion is located on slopes and high ridgeline formations.

Ropes Creek, which forms the south eastern border of the study area (Figure 1), is a major watercourse across the Cumberland Plain that flows north into South Creek in the St Marys area.

3.3 Natural Resources

The study area would once have been covered by open Cumberland Plain Woodland, which is typical of the Wianamatta Group shale geology. Tree species would have included Forest Red Gum (*E. tereticornis*), and Grey Box (*E. moluccana*) (Benson and Howell 1990).

Aboriginal people were highly mobile hunter-gatherers utilising different landform units and resource zones. Different resources may have been available seasonally, necessitating movement or trade (Attenbrow 2010: 78). Aboriginal people hunted kangaroo and wallaby and snared possums for food and skins. In marine or estuarine environments Aboriginal people caught fish and collected shellfish. There are many accounts by Europeans of Aboriginal people in canoes on rivers and the ocean, fishing and cooking the fish on small fires within the vessels (e.g. Collins 1798).

Plants were an important source of nutrition, common edible species being Macrozamia, a cycad palm with poisonous seeds that were detoxified and ground into a paste and Xanthorrhoea, or grass tree. The grass tree nectar was a high-energy food, the resin strong hafting glue, and the flower spikes used for spear barbs.

From observations by early European colonists, only about twenty species of plant are identified as being used for food or manufacture by Aboriginal people of the Sydney region (Attenbrow 2010: 41). It is likely this is only a fraction of what was actually used.

3.4 Previous Land Use

The study area is located in the small suburb of Kemps Creek, Penrith, on land first granted to Nicholas Bayly in 1815. Historically, Kemps Creek was associated with Badgery's Creek, a larger settlement to the west established in 1809. Badgery's Creek was associated with British-born miller and farmer James Badgery and his Exeter Farms Estate. The earliest European land use in the study area was likely to have been associated with timber getting, grazing and pastoralism from the early 19th century onwards (AMBS 2007).

Early residential settlement in the broader Penrith area was driven by the availability of fertile soil and easily accessible water sources such as creeks and river beds. For example, the Nepean River (to the west of the study area) provided the most fertile soil in the region and occupation and farming took place along its banks and alluvials from 1789 onwards (Thorp 1986). Over the following decade, frequent flooding forced settlement to spread inland, to the east of the river. At this time, Eastern Creek (east of the study area) became associated with smaller allotments, often given to emancipated convicts while land surrounding the study area-further inland and less fertile-was issued to free settlers in the form of large acreages (AMBS 2007).

Part A - OWE

The entirety of Part A is located within Nicholas Bayly's Estate (also referred to as Razewood). Upon Bayly's death in 1823 the entire estate was put up for auction and purchased by Richard Jones in 1824 who renamed it Fleurs Estate. The land associated with study area was sold multiple times between 1844 and 1909, however no significant development seems to have taken place until the reclamation of the land for the Lenore Estate closer settlement scheme (AMBS 2007).

Land uses within the study area have generally been consistent with agricultural practices. The study area is currently used for the grazing of cattle and horses.

Part B - WNSLR

The WNSLR study area is located within the suburb of Erskine Park named after the first land grant in the area made to James Erskine in 1818 (Pollon 1988). Erskine arrived in the colony in 1817 and was sworn in as lieutenant-governor soon after (MacMillan 1966). The Erskine Park grant consisted of 3000 acres extending east of the current Mamre Road to Ropes Creek (Penrith Historical Society 2016). Sketches of Erskine Park indicate that the area was extensively cleared and cultivated, and included a homestead with associated buildings on the property by the 1830s.

Mr Andrew Thompson acquired Erskine Park and renamed the property Lenore Farm. Thompson had inherited his father's tanning business at a young age and had expanded the business to a second tannery which formed a 77-hectare property in October 1882. Thompson died at his home at Tyrone Erskine Park on 30 October 1918.

Land uses within Part B have generally been consistent with agricultural practices. The area currently has restricted access awaiting development.

3.4.1 Aerial Imagery Analysis.

The analysis of aerial imagery indicates that some portions of the study area have been disturbed by structures whilst other portions have remained relatively undisturbed. It appears that the majority of

buildings were located within the southern central portion of the study area. Some sheds, and what could possibly be small residential structures as evidenced by associated yards, can be seen in the 1947 aerial (Figure 4). By 1955 a series of yards with associated structures and the two large dams in the study area have been constructed (Figure 5). Some of these structures appear to have been demolished by 1965 and are not shown in the aerial from that year (Figure 6).

The area surrounding Ropes Creek and the adjacent ridgelines appear to have been left relatively untouched in these aerials (Figure 7 to Figure 9). There is no evidence of substantial construction occurring in this region of the study area.

Figure 4: 1947 aerial, central southern portion

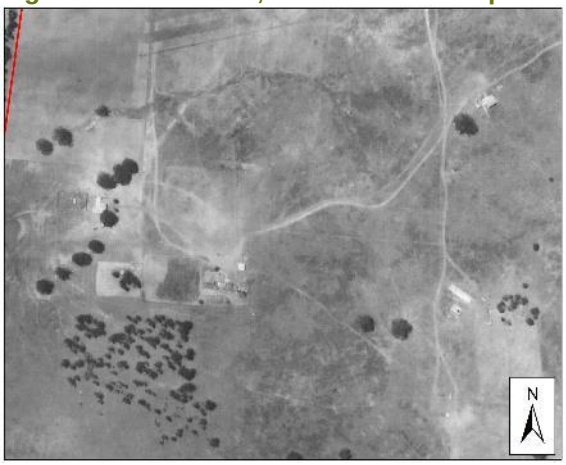


Figure 5: 1955 aerial, same region as Figure 4

Figure 6: 1965 aerial, same region as Figure 4 and Figure 5

Figure 7: 1947 aerial

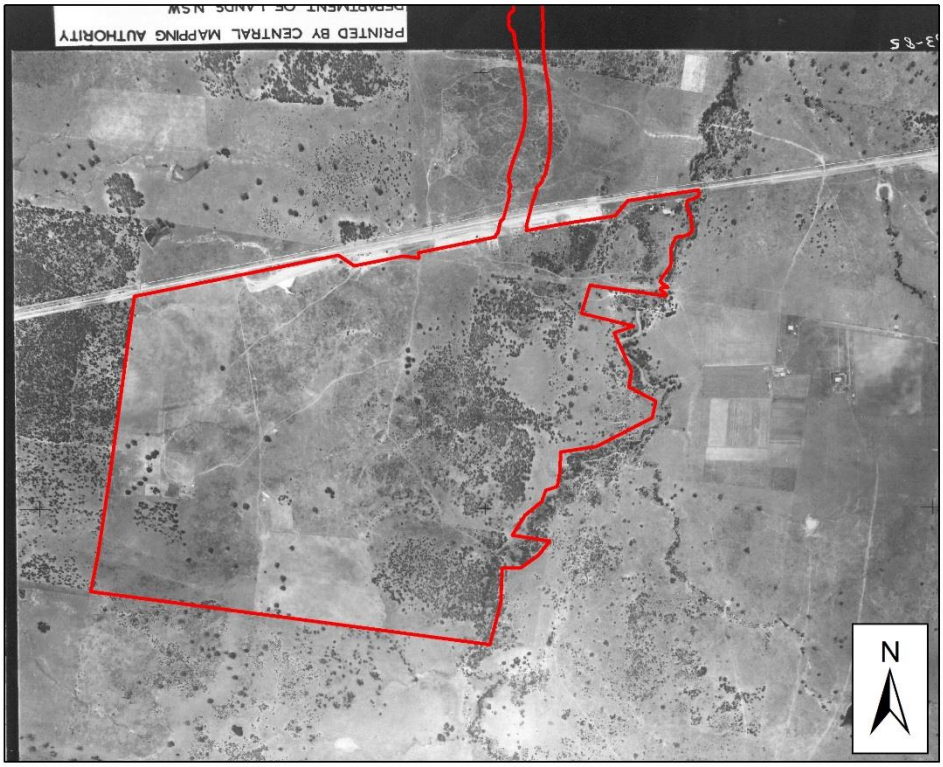


Figure 8: 1955 aerial

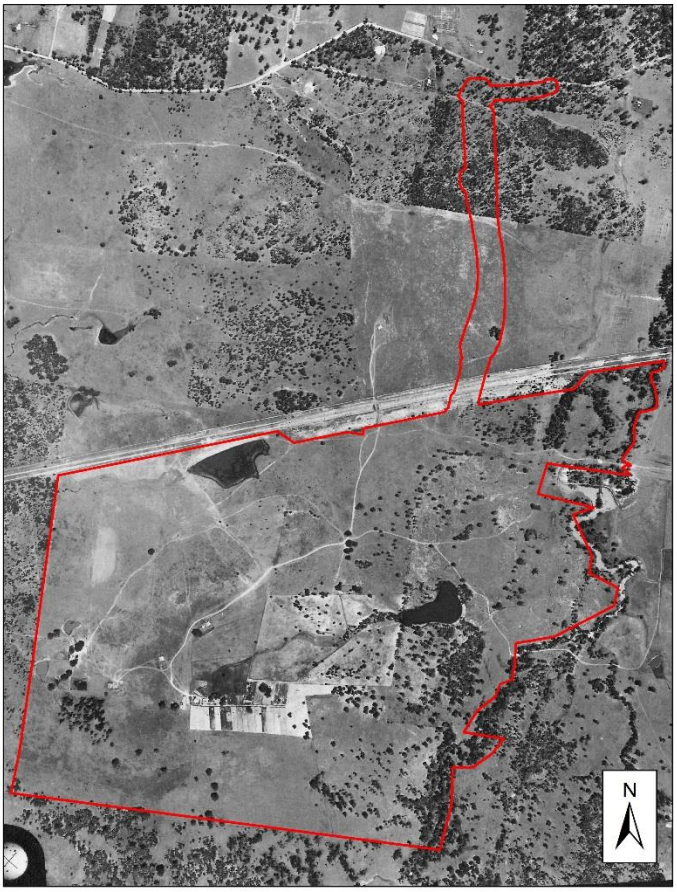


Figure 9: 1965 aerial

3.5 Archaeological Implications for the Study Area

Archaeological deposits across the residual soils on raised areas within the undulating terrain are less likely to have been affected by flood events and soil erosion than the low-lying portions of the study area. Potential sub-surface archaeological deposits across the raised areas are likely to have remained generally in situ. Impacts to the archaeological record would include some degree of vertical mixing from bioturbation and past pastoral land use practices, whilst downslope soil creep may have increased slightly with extensive vegetation clearance following European settlement.

Archaeological deposits across the low-lying, western portion of the study area are more likely to have been subject to frequent flood events and alluvial deposition. Flood events would not necessarily displace deposited archaeological material large distances, but would be more likely to 'dilute' the archaeological record amongst deep, homogenous loamy deposits.

The proximity of a significant source of raw material at Plumpton Ridge north of the Precinct suggests that silcrete would be the predominant raw material type identified in the study area.

4.0 ABORIGINAL HISTORICAL AND ARCHAEOLOGICAL CONTEXT

4.1 Aboriginal Material Culture

The archaeological understanding of the early Aboriginal settlement of the Sydney Basin and surrounds is constantly expanding and developing. At present, the earliest occupation known is associated with deposits on the Parramatta and Nepean Rivers, which have been dated to c.25-30ka and 36ka (JMCHM Oct 2005; AHMS Feb 2013). Two coastal sites south of Wollongong at Bass Point and Burrill Lake in the Shoalhaven have both been dated to around 20,000 yBP (Lampert 1971 and Nanson et al 1987). Evidence of Aboriginal occupation at Lake Mungo has been dated to 50-60,000 yBP (Bowler et al 2003).

The existing archaeological record is limited to certain materials and objects that were able to withstand degradation and decay. As a result, the most common type of Aboriginal objects remaining in the archaeological record are stone artefacts. Archaeological analyses of these artefacts in their contexts have provided the basis for the interpretation of change in material culture over time. Technologies used for making tools changed, along with preference of raw material. Different types of tools appeared at certain times, for example ground stone hatchets are first observed in the archaeological record around 4,000yBP in the Sydney region (Attenbrow 2010:102). It is argued that these changes in material culture were an indication of changes in social organisation and behaviour.

The Eastern Regional Sequence was first developed by McCarthy in 1948 to explain the typological differences he was seeing in stone tool technology in different stratigraphic levels during excavations such as Lapstone Creek near the foot of the Blue Mountains (McCarthy et al. 1948). The sequence had three phases that corresponded to different technologies and tool types (the Capertian, Bondaian and Eloueran). The categories have been refined through the interpretation of further excavation data and radiocarbon dates (Hiscock and Attenbrow 2005, McDonald 2006). It is now thought that prior to 8,500 yBP tool technology remained fairly static with a preference for silicified tuff, quartz and some unheated silcrete. Bipolar flaking was rare with unifacial flaking predominant. No backed artefacts have been found of this antiquity.

After 8,500 yBP silcrete was more dominant as a raw material, and bifacial flaking became the most common technique for tool manufacture. From about 4,000yBP to 1,000yBP backed artefacts appear more frequently. Tool manufacture techniques become more varied and bipolar flaking increases (McDonald 2006). It has been argued that from 1,400 to 1,000 years before contact there is evidence of a decline in tool manufacture. This reduction may be the result of decreased tool making, an increase in the use of organic materials, changes in the way tools were made, or changes in what types of tools were preferred (Attenbrow 2010:102). The reduction in evidence coincides with the reduction in frequency of backed blades as a percentage of the assemblage.

After European colonisation Aboriginal people of the Cumberland Plain often continued to manufacture tools, sometimes with new materials such as bottle glass or ceramics. There are several sites in Western Sydney were flaked glass has been recorded, for example at Prospect (Ngara Consulting 2003) and Oran Park (McDonald 2007).

4.2 Aboriginal History of the Locality

Prior to the appropriation of their land by Europeans, Aboriginal people lived in small family or clan groups that were associated with particular territories or places. It seems that territorial boundaries were fairly fluid, although details are not known. The language group spoken on the Cumberland Plain is known as Darug (Dharruk – alternative spelling).

This term was used for the first time in 1900 (Matthews and Everitt) as before the late 1800s language groups or dialects were not discussed in the literature (Attenbrow 2010:31). The Darug language group is thought to have extended from Appin in the south to the Hawkesbury River, west of the Georges River, Parramatta, the Lane Cove River and to Berowra Creek (Attenbrow 2010:34). This area was home to a number of different clan groups throughout the Cumberland Plain.

British colonisation had a profound and devastating effect on the Aboriginal population of the Sydney region, including Darug speakers. In the early days of the colony Aboriginal people were disenfranchised from their land as the British claimed areas for settlement and agriculture. The colonists, often at the expense of the local Aboriginal groups, also claimed resources such as pasture, timber, fishing grounds and water sources. Overall the devastation of the Aboriginal culture did not come about through war with the British, but instead through disease and forced removal from traditional lands. It is thought that during the 1789 smallpox epidemic over half of the Aboriginal people of the Sydney region died. The disease spread west to the Darug of the Cumberland Plain and north to the Hawkesbury. It may have in fact spread much further afield, over the Blue Mountains (Butlin 1983). This loss of life meant that some of the Aboriginal groups who lived away from the coastal settlement of Sydney may have disappeared entirely before Europeans could observe them, or record their clan names (Karskens 2010:425).

The British initially thought that Aboriginal people were confined to the coast taking advantage of the abundant marine resources available. The first major recorded expeditions into the interior did not witness any Aboriginal people, but evidence of their existence was noted. In April 1788 Governor Philip led an expedition west to Prospect Hill. It was noted,

> '…that these parts are frequented by the natives was undeniably proved by the temporary huts which were seen in several places. Near one of these huts, the bones of kangaroo were found, and several trees where seen on fire' (Phillip 1789).

In 1789 Captain Watkin Tench led an expedition to the Nepean River. He noted that:

> *Traces of the natives appeared at every step, sometimes in their hunting huts which consist of nothing more than a large piece of bark bent in the middle and opened at both ends, exactly resembling two cards set up to form an acute angle; sometimes in marks on trees which they had climbed; or in squirrel-traps….We also met with two old damaged canoes hauled up on the beach*. (Tench 1789)

It wasn't until rural settlement began in the western Cumberland Plain, during the 1790s, that Aboriginal groups in this region came into regular and permanent contact with British colonists. Relations quickly disintegrated, and tensions over land and resources spilled over. Governor King sanctioned the shooting of Aboriginal peoples in a General Order made in 1801 (Kohen 1986:24). Intermittent killings on both sides continued for over 15 years, including the Appin massacre and attacks at South Creek in 1816 (Kohen 1986:23, Karskens 2010:225).

Although tensions existed between Aboriginal people and the British on the Cumberland Plain, a number of Aboriginal families and British farmers managed to peacefully co-exist (Karskens 2010: 537). William Cox employed members of the Mulgowie tribe on his Mulgoa Estate (Karskens 2010). Impressive tree climbing demonstrations were recorded in 1828 on Robert Lethbridge's Flushcombe Estate near present-day Blacktown (Karskens 2010). Records indicate that Corroborees were held in Camden on the Macarthur's estate up until the 1850s (Karskens 2010).

The first parcels of land granted to an Aboriginal person were to the north of the study area between Richmond Road and Plumpton Ridge along Bells Creek. Governor Macquarie granted this land to Colebee and Nurragingy in 1819. Colebee did not stay long but Nurragingy lived on the land and it remained in the family until 1920 when it was resumed by the Aboriginal Protection Board (Kohen 1986:27).

The government policy of removal of Aboriginal children from their parents in order to assimilate them into white society began fairly early on in the colony's history, and was epitomized by the development of the Native Institution at Parramatta in 1814.

This facility was moved to the Black Town settlement in 1823. It was closed in 1829 and the land was used for farming, but the site remains significant for its historical, archaeological and social values (GML 2007:36).

Into the nineteen and twentieth centuries descendants of Darug language speakers continued to live in Western Sydney along with Aboriginal people from other areas of NSW.

4.3 AHIMS Search Results

The locations and details of Aboriginal sites are considered culturally sensitive information. It is recommended that this information and associated maps are removed from the report if it is to be made publically available.

An extensive search of the Aboriginal Heritage Information System (AHIMS) database was conducted on 16 March 2016 for sites registered within the following parameters:

GDA 1994 MGA 56	293368mE – 298402mE 6253369mN – 6257645mN
Buffer	200 m
Number of sites	115
AHIMS Search ID	216469

The AHIMS search area encompasses the wider region around the study area, in order to give context. The distribution of recorded sites within the AHIMS search area is shown in Figure 10. The frequency of site feature types is summarised in Table 4 below.

Table 4: Frequency of site features in extensive AHIMS search results

Site Feature	Frequency	Percentage
Artefact	109	94%
Artefact, Potential Archaeological Deposit (PAD)	3	3%
Potential Archaeological Deposit (PAD)	3	3%

Stone artefacts are the most frequent site feature within the search area (n=109, 94%).

Other site features recorded within the search area in Artefact with Potential Archaeological Deposit (PAD, n=3 3%) and PAD (n=3, 3%).

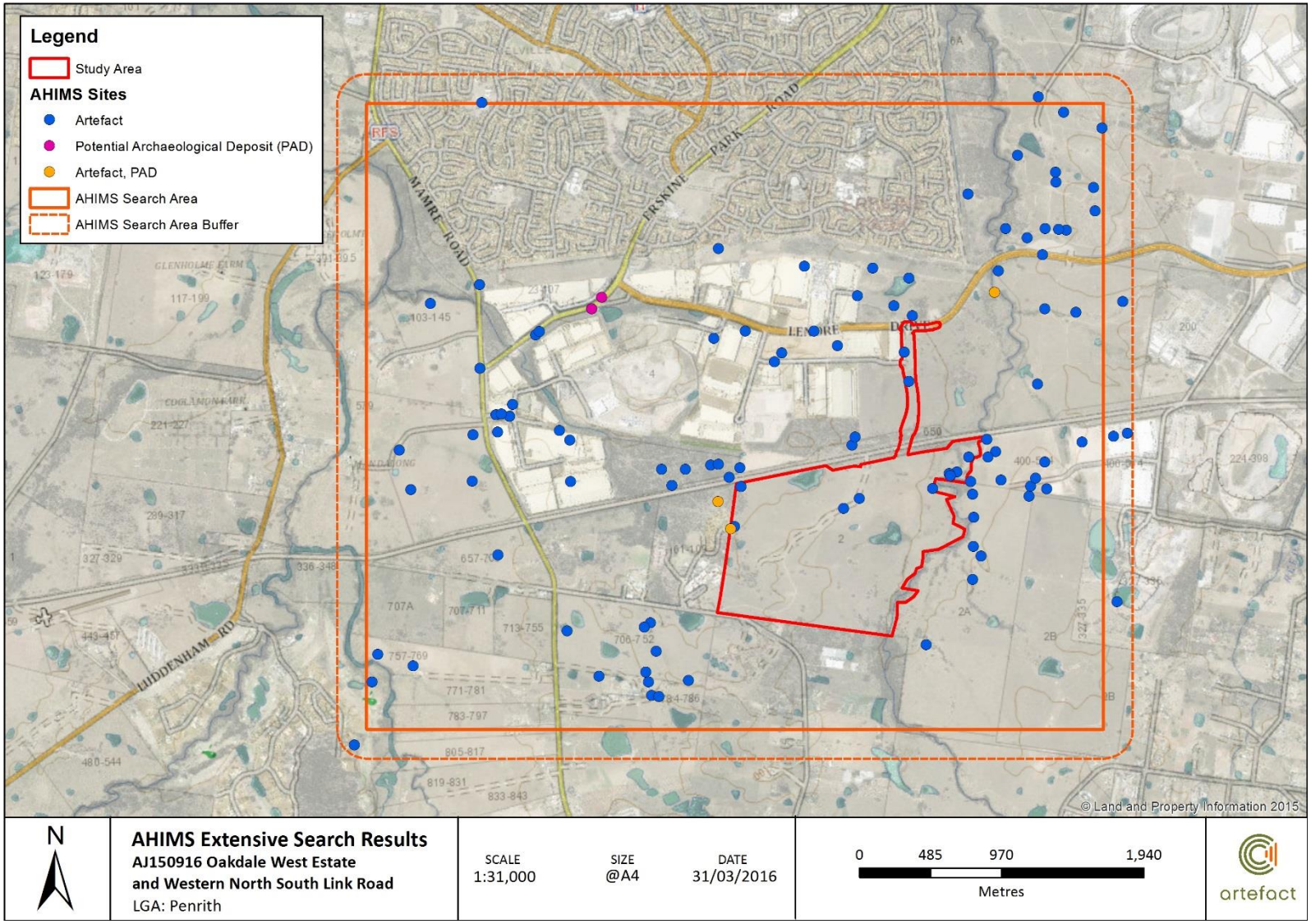
The background research for this report identified coordinate discrepancies with the coordinates of two AHIMS sites. Sites EV1 and EV4 appeared to be located within the survey area however when consulting the report in which the sites are described it was found that they were each located around

200 metres south west of the AHIMS coordinates. This error is consistent with the datum error that occurs between AGD and GDA coordinates. The original report by AHMS (AHMS March 2005) confirmed this assumption.

Site EPRC1 (#45-5-3234) is located in the north of the study area but has been destroyed. Site Erskine Park 2 (EP2 # 45-5-3311) is also located in the north of the study area, approximately 100 m south of Lockwood Road. An Aboriginal Heritage Impact Permit (AHIP) has been issued for this site.

A large number of sites are recorded in association with Ropes Creek and its tributaries (see Figure 10). The majority of sites have been recorded in association with land development projects. As such the concentrations of sites illustrated in Figure 10 may reflect the nature of land development within the search area rather than the distribution of Aboriginal objects.

Figure 10: Distribution of AHIMS sites within extensive AHIMS search results



4.4 Previous Archaeological Assessments

4.4.1 Regional archaeological context

There have been a number of archaeological assessments conducted within study area and around the local area. The following discussion takes into account the most recent and relevant studies in order to provide contextual information for the current study.

An Archaeological Study of Aboriginal Sites within the City of Blacktown (Kohen 1986)

Jim Kohen conducted an investigation of Aboriginal sites around the City of Blacktown LGA as part of PhD research and for Blacktown City Council (Kohen 1986). Kohen's (1986) investigation for Blacktown City Council included a sample survey of four areas within the LGA, including an area around Prospect Reservoir, Erskine Park, Marsden Park and along Ropes Creek. Using data gathered from the four sample survey areas, and previously recorded Aboriginal sites within the LGA, Kohen (1986:67) determined that there were 25 identified major archaeological sites within the Blacktown LGA, with a major site defined as containing more than 50 recorded artefacts.

Silcrete raw material was identified at all 25 of the major archaeological sites, with other raw materials present in varying frequencies including chert, quartz, silicified wood, basalt and quartzite. All of the major archaeological sites were located either adjacent to a watercourse or on a ridge landform. Kohen (1986:75) noted that the majority of identified major archaeological sites were located within 50 m of a reliable watercourse, and that 'where a ridge or hill is situated close to a major creek, the high ground would generally be selected for the campsite'

The Archaeological Investigation of Lot 2, DP 120673, the site of a proposed new clay and shale extraction area. Old Wallgrove Road Horsley Park, west of Sydney NSW (Appleton 2002)

An archaeological assessment of Lot 2, DP 120673 was undertaken by Appleton in 2002 on behalf of The Austral Brick Company for the location of a proposed clay/shale extraction site. This Lot is located to the west of the study area between Old Wallgrove Road and Ropes Creek. The survey identified an area of PAD associated with an isolated mudstone flake along the banks of Ropes Creek and an isolated mudstone flake within an unmarked vehicle track.

The area of archaeological potential was identified based on the location of the identified artefact eroding out of the creek bank at a depth of 20 cm below surface. Appleton stated that it could be reasonably assumed that other artefactual material may also be buried at the same or a similar depth. Appleton also recorded an area of Potential Archaeological Sensitivity (PAS) surrounding the PAD on the basis that any artefactual material recovered would have been associated with camp sites and/or activity areas along the creek bank. A second PAS was identified on a tributary of Ropes Creek within the vicinity of a previously recorded artefact. This area encompassed a slight rise in the landform making the location attractive for use as a camp site. These areas of sensitivity were not recorded as sites with AHIMS but were highlighted to indicate the potential of areas surrounding Ropes Creek and its tributaries for containing Aboriginal objects below the surface.

Proposed 132kV Transmission Line Erskine Park, NSW, Cultural Heritage Assessment (Navin Officer 2003)

Navin Officer conducted an Aboriginal cultural heritage assessment for Integral Energy for the proposed 132kV transmission line extending from the Sydney West Substation 3.5km west to Erskine Park. The assessment identified two Aboriginal sites and an area of archaeological potential. The sites and PAD recorded during this assessment are not located within the current study area.

The Aboriginal sites identified were both artefact scatters. The first, Erskine Park 1 (EP 1 #45-5-3235) was located within an eroded area adjacent to a minor drainage line. There were seven artefacts recorded consisting of silcrete and mudstone flakes, broken flakes and a core. The second site. Erskine Park 2 (EP 2 #45-5-3935) was located within a backhoe hole and consisted of eight artefacts. The assemblage consisted of silcrete flakes, broken flakes, a core and three blades.

An area of archaeological potential was recorded on both sides of Ropes Creek, near the junction of the creek with an unnamed tributary. This PAD (EP PAD 1 #45-5-3062) was identified based on the raised landform surrounding the creek and previous studies within the Cumberland Plain that have demonstrated larger sites with higher artefact densities are more likely to occur near permanent water sources. Therefore, Ropes Creek has been identified as an area of archaeological sensitivity.

Aboriginal Archaeological Test Excavation Report, Proposed Wonderland Business Park Development (Steele 2003)

A program of test excavations was undertaken by Dominic Steele Consulting Archaeology for Australand within the then proposed Wonderland Business Park. This location is situated to the north east the current study area. The test excavations focussed on eight previously recorded sites within the proposed works area.

The test pit locations were oriented along five transects that sampled sections of the previously recorded sites. The rationale behind this sampling method was to test the archaeological potential of each site as well as sampling the different landforms across the site. The transects located upon hill crest and slopes found these locations to retain a thin cover of topsoil of around 10 cm or less. The transects located further down slope also revealed shallow subsurface profiles of around 20 cm or less.

The test excavations recovered a total of five artefacts from 20 test pits whilst 33 artefacts were recorded on the surface. Of these 38 artefacts eight were recorded as broken flakes or core fragments, one as a ground edge axe fragments and 29 as manuports brought into the area.

The low density of artefacts was thought to indicate that the site was unlikely to have been subject to repeated use by Aboriginal people in the past. The assemblage is likely to form part of a background scatter evident of sporadic visitation of the area. This is supported by the absence of a raw material source in close proximity to the site and the general location of the area away from major drainage lines. The low density of artefacts supports the model proposed as part of the Rouse Hill Infrastructure Project that states hill-slope zones and ephemeral or temporary water courses are likely to reveal evidence for limited occupation.

Archaeological Investigations at the Austral Site (#45-5-2986) 'The Vineyard', Wallgrove Road, Horsely Park (JMcD CHM 2004)

Jo McDonald Cultural Heritage Management (JMcD CHM) conducted a program of test and salvage excavations within Aus 1 #45-5-2986 within the Austral Bricks property, The Vineyard, Horsley Park located to the north east of the current study area.

The excavation program involved the excavation of 37 test pits and five open areas. The site was located at the base of a former slope and at the south western margin of a small alluvial floodplain. The area had undergone significant modification and disturbance from earth-moving and quarrying operations.

The excavation recovered 2029 lithic items with 17 artefacts recorded per square metre. The predominant raw material was silcrete with silicified tuff, quarts and silicified wood also present within the assemblage.

Reduction types recorded include flakes, points, broken flakes, cores and manuports. Retouch was present on some of the artefacts, backed flakes were identified and bipolar flaking was also evident.

The generally low density of the artefact assemblage supports the interpretation of the site use as transitory in nature. This is supported by the small size of the artefacts and low rates of core discard.

Heritage Conservation Strategy for Aboriginal sites in the lands owned by Valad Funds Management Ltd and Sargents P/L, in the Eastern Creek Business Park (Stage 3) Precinct Plan (JMcD CHM 2005).

Jo McDonald CHM prepared a Heritage Conservation Strategy for an area of land located three kilometres north of the study area in 2005. Previous heritage studies had identified areas of high, moderate and low areas of archaeological sensitivity within the area. The areas of sensitivity were defined by landscape feature and proximity to water.

Landforms with high archaeological value were identified as shale hill slopes, first order tributary creek lines, shale ridges and low ridgetops. Areas of moderate sensitivity were identified as areas surrounding high value landforms that demonstrated low levels of disturbance.

Areas of low archaeological sensitivity were identified as those that demonstrated high levels of disturbance. This included for example areas that had been quarried.

The report recommended that a conservation zone be established for the area bounded by Archbold road to the west and the M4 motorway to the north. This area was found to provide a representative sample of the sensitive landforms within the SEPP59 area.

Emmaus Village, Kemps Creek, NSW: Aboriginal Archaeological Assessment (AHMS March 2005), Emmaus Village: Aboriginal Archaeological Test Excavation Report (AHMS November 2005).

AHMS conducted an Aboriginal archaeological assessment and test excavation for the proposed expansion of the Emmaus Village aged care facility. The archaeological assessment identified four locations containing Aboriginal objects and zones of high, moderate and low potential to contain subsurface Aboriginal objects. The assessment area borders the current study area to the west.

The sites recorded during the archaeological assessment consisted of low density artefact scatters and isolated artefacts. High archaeological potential zones were defined as those areas where disturbance is limited. This included the undeveloped northern portion of the site and the hill crest. Areas of moderate potential included those with localised disturbance and slope areas not normally associated with occupation sites. Areas of low potential were defined as those areas that had been subject to various development activities in the past.

The archaeological test excavation program aimed to explore the model of potential proposed by the initial archaeological assessment. The program involved the mechanical excavation of 18 one metre by one metre test trenches. The locations of the trenches were chosen to test the range of topography within the northern portion of the undeveloped portion of the study area and the area of potential associated with the proposed access road.

The testing program recovered a total of 11 stone artefacts. The excavations revealed little stratigraphic integrity existed across the site due to European activities that have disturbed the soil profile. The artefact assemblage recovered equated to 0.6 artefacts per metre^2. No artefacts were located within the elevated crest landform. Disturbances across the site were interpreted to suggest that the archaeological material found during test excavation was not an accurate reflection of Aboriginal occupation and use except at a very broad level.

The sites located with the study area were assessed to be of low Aboriginal heritage significance.

Archaeological Subsurface Investigations at SEPP59 EC/1 (#45-5-3201) and EC3/2 (#45-5-3202), Wonderland Surplus, Old Wallgrove Road, Eastern Creek (JMcD CHM 2006)

Jo McDonald CHM were commissioned to conduct a salvage excavation program within the Wonderland Surplus (AHIP 2470). This area is located to the north east of the current study area.

The salvage area encompassed two PADS, EC3-PAD1 (45-5-3201) and EC3-PAD2 (45-5-3202). The salvage program targeted areas identified in earlier works as having good potential to contain intact archaeological deposits. Open areas were excavated around areas of higher artefact density. The deposits within the sites were found to be relatively shallow with the A1 horizon largely absent across the site and artefacts recovered from the remnant A2 horizon.

The first PAD, EC3-PAD1 sampled a hill slope and drainage gully. The open area within this PAD recovered a low density, sometimes discontinuous scatter. The artefacts were found to have been displaced in a downslope direction, an expected outcome of colluvial processes.

The second area of salvage sampled an adjacent ridge top. Lithic distribution within the area was continuous but of a fairly low density. The open area excavation revealed that the assemblage had been dispersed in a generally east to north-east direction. This dispersal was interpreted to have likely occurred due to behavioural or environmental events more so than colluvial processes given the ridgetop location of the artefacts.

A total of 1,550 artefacts were recovered from the PAD sites, equating to densities of 0.8 and 0.9 lithics/m^2. The predominant raw material was silcrete with some silicified tuff, quartz and petrified wood. Reduction types recorded included flakes, broken flakes, cores, retouched tools and backed flakes. Reduction techniques included bifacial, unifacial and asymmetrical flaking.

The low density of artefacts within the excavated areas indicates that the sites were likely to have been used in an intermittent manner. The accumulation of lithics at the site is likely to have occurred slowly over long time periods rather than intense discard associated with tool production areas or domestic areas.

Erskine Park Employment Area, Ropes Creek, Western Sydney, NSW, Archaeological Subsurface Testing Program (Navin Officer 2007)

A subsurface testing program was conducted by Navin Officer within part of the Erskine Park Employment Area, located west of the southern portion of the current study area. The test excavations focussed on three previously identified sites, EPRC1 (45-5-3234), EPRC 2 (45-5-3312) and EPRC3.

Areas of archaeological potential ranging from low to high were defined in relation to these sites and 112 test pits were excavated to test that potential. From these test pits 310 lithic were recovered with 261 recorded as artefacts resulting in an average density of 5.7 artefacts per m^2. The raw material present at the sites included silcrete, tuff, quartzite and chert with silcrete being the dominant lithology. The artefacts present included flakes, broken flakes, cores, core fragments, and microblades. Bipolar flaking, utilised pieces and backed flakes were also identified within the assemblage.

Out of the four areas of potential, the two areas closest to Ropes Creek returned the highest number of artefacts. One of these areas was located on the basal midslopes and crest of a north-south running spur line above Ropes Creek. Navin Officer proposed these results suggest that the whole broad spur line was the location of repeated and ephemeral habitation involving transitory camp sites.

The areas with the lowest incidence of artefacts were located adjacent to first order drainage lines and were furthest away from Ropes Creek. These results fit within the broader regional model that predicts these areas to have low to moderate potential.

Erskine Park Link Road Aboriginal Archaeological Excavation undertaken as part of AHIP1113179: Excavation Report for Roads & Traffic Authority (Biosis 2010).

Biosis Research conducted sub-surface investigations at three Aboriginal sites south of Lenore Drive to the north east of the study area. All three sites contained sub-surface Aboriginal cultural material despite very few surface artefacts and evidence of ground disturbance across all sites.

Site RCIF1 (45-5-3843) was originally recorded as an isolated artefact. The site was recorded on the bank of a dam. There were 16 test pits excavated at this site with a total of eight artefacts recovered The raw materials present were predominantly silcrete and chert with basalt also recorded. Reduction types present within the assemblage included flakes and debitage.

Site EPLR1 (45-5-3842) was recorded as an artefact scatter, 19 artefacts were excavated within this site. The site was located upon a large low lying plain near a shallow tributary creek line. A total of three artefacts were retrieved from EPLR1, two silcrete and one quartz artefact.

The PAD site, EP PAD 1 (45-5-3062) was divided into two parts as it spanned both sides of Ropes Creek. The eastern portion of the PAD was located across an exposed sandstone ridge that has also been used as a dumping space for removed landfill from a nearby small dam. There were 27 test pits located within this portion of the site, 52 artefacts were retrieved. The predominant lithology of the artefacts was silcrete with chert, quartz and basalt also recorded. The reduction types present within the assemblage include flakes and a core.

The western portion of EP PAD 1 contained the highest proportion of artefacts with 289 artefacts recovered. The majority of these were silcrete, whilst chert, quartz and mudstone were also recorded within the assemblage. The predominant reduction type recorded was flakes.

The small number of retouched pieces within the assemblages recovered suggests that raw materials were readily available so the conservation of tools was not an issue.

Energy from Waste (EFW) Plant, Eastern Creek, Aboriginal Cultural Heritage Assessment (GML 2014)

GML Heritage (GML) Pty Ltd prepared an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the proposed Energy from Waste (EFW) facility at Eastern Creek project. The assessment area is located approximately three kilometres north east of the current study area.

The survey conducted by GML relocated three previously recorded Aboriginal sites. The first of these, Archbold 1 (45-5-4492) is comprised of three previously recorded sites (M4U4, RF/IS1 and RF/ISF2). An area of high archaeological potential and two additional stone artefacts were recorded during the 2014 survey.

Archbold Road 2 (45-5-4493) was previously recorded as an area of moderate archaeological potential. The site is located on a gentle slope covered in dense grass. An east west running unnamed ephemeral creek crosses the area which has been dammed. Three isolated stone artefact were located along a vehicle track that runs through the site.

EFW South (45-5-4491 was previously recorded as an area of high archaeological potential. The site was located at the confluence of three waterlines on an elevated area. Two stone artefacts were recorded during the 2014 survey.

Energy from Wast Facility, Eastern Creek, Aboriginal Heritage Test Excavation (Artefact Heritage 2014)

Artefact Heritage conducted test excavations within Aboriginal site EFW South (45-5-4491). The site was located on an elevated area at the confluence of three waterlines.

The subsurface testing involved the excavation of thirty-seven 500 x 500 mm test pits. An assemblage of 14 artefacts from nine of these test pits were retrieved resulting in an artefact density of 0.76 artefacts/m^2. Silcrete was the only raw material represented within the assemblage. Reduction types present included angular fragments, flakes and broken flakes.

The assemblage was interpreted to represent expedient stone reduction and discard. It is likely that use of the site was intermittent and opportunistic. Whilst the area was close to water sources it was also prone to flooding. Following the predictive model established by previous studies, the higher slopes and crests surrounding the area would have been more preferable camp sites.

4.4.2 Previous archaeological investigations within the Oakdale Industrial Estate

Archaeological investigations including survey, test excavation and salvage excavation have previously been conducted within the Oakdale Industrial Precinct. Oakdale Central has been subject to survey, test excavation and salvage excavation. Oakdale South has been subject to survey and test excavation. These studies are summarised below.

4.4.2.1 Oakdale Industrial Precinct

Oakdale Concept Plan, Aboriginal Heritage Assessment and Impact Assessment (Godden Mackay Logan 2007)

An Aboriginal Heritage Assessment was prepared by Godden Mackay Logan (GML) in 2007 for the Oakdale Concept Plan. The Aboriginal Heritage Assessment included a number of precincts that are part of the Oakdale Concept Plan; including Oakdale Central, Oakdale South and Oakdale West (the current study area).

The background research conducted as part of the Aboriginal Heritage Assessment identified five previously recorded AHIMS sites. The sites included two isolated artefacts and three artefact scatters. All of the sites were located to the east of the current study area, within the Oakdale Central precinct.

A predictive model was developed as part of the Aboriginal Heritage Assessment. The predictive model indicated that the most likely Aboriginal site types to occur within the Oakdale Concept Plan area would be open campsites, midden deposits, isolated finds and scarred trees. The likely distribution of these site was based on proximity to water sources, which was informed by earlier archaeological work by McDonald (1997, 1999). It was interpreted that open campsites and midden deposits would be associated with dry landforms along or adjacent any watercourses. Isolated artefacts could be identified anywhere across the landscape; representing deliberate discard or movement via natural processes. Scarred trees would be identified within areas consisting of remnant, mature vegetation.

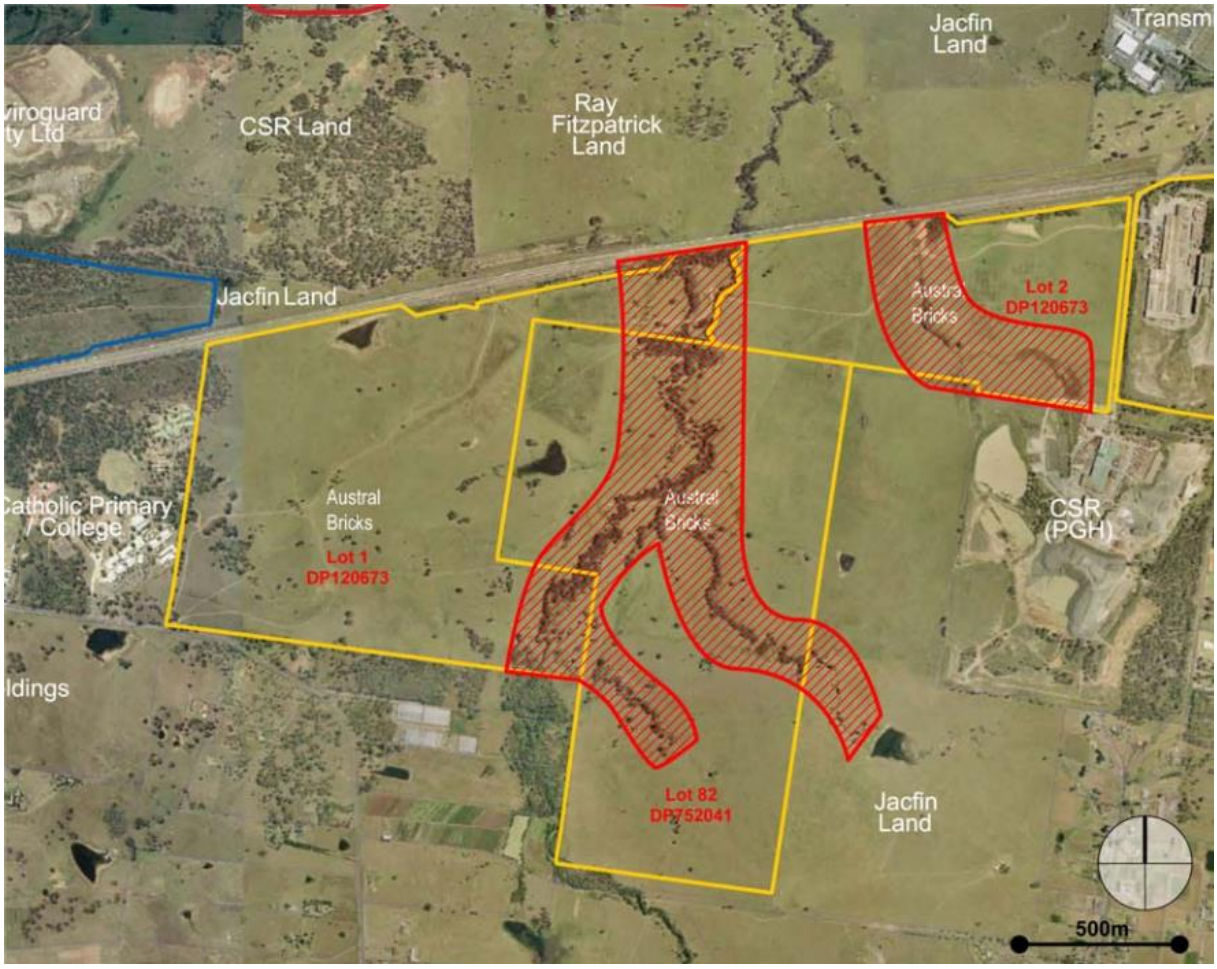
A subsequent archaeological survey was conducted across the Oakdale Concept Plan area. Due to the dense grass and other vegetation across the site, the survey targeted areas of ground surface exposure and locations retaining archaeological potential. A total of eleven Aboriginal sites were recorded during the survey. The sites included five isolated artefacts and six low density artefact scatters. The identified artefacts predominately consisted of red silcrete waste flakes. The majority of Aboriginal sites were identified within vehicle tracks and excavated/scoured areas within close proximity to Ropes Creek and its tributaries. Almost all of the sites were located within the northern portion of the Oakdale Concept Plan area.

Six sites were identified within the Oakdale West Precinct generally concentrated along Ropes Creek on the Eastern Boundary of the study area. The sites consist of three isolated finds (IF3, IF4 and IF5) and three artefact scatters (OC1 #45-5-3382, OC3 #45-5-3384 and OC4). The isolated finds and OC4 do not appear to be registered with AHIMS. However, from the comparison of the report figure (GML 2007: Figure 4.8, p 43) and the AHIMS results it appears that IF5 has been registered as OC4 #45-5-3385.

The Aboriginal Heritage Assessment concluded that there was potential for further intact cultural material to be located within surface and subsurface contexts along land bordering Ropes Creek and associated tributaries. It was suggested that the Oakdale Lands were unlikely to have been subject to intensive occupation resulting in substantial deposits. Aboriginal people were more likely to have camped along more prominent watercourses such as Eastern and South Creeks. Therefore, any Aboriginal objects located within the area are likely to be representative of background scatter.

The surrounding undulating pastoral land was believed to have low archaeological potential due to past land clearance. An Aboriginal archaeological sensitivity map was developed, based on proximity to Ropes Creek and tributaries (GML 2007:55). The area of archaeological potential within the current study area is show below in Figure 11. It was therefore recommended that the area of archaeological potential be subject to intensive surface survey and test excavation (where survey identifies areas of subsurface archaeological potential).

Figure 11: Areas of Archaeological Sensitivity Identified by GML (2007:55)



4.4.2.2 Oakdale Central

Oakdale Central Aboriginal Archaeological Technical Report (GML 2013)

GML conducted test excavations along Ropes Creek within the Oakdale Central precinct to the east of the current study area in 2013. The testing program was recommended following a field survey by GML in 2007 that identified an area of moderate archaeological potential along Eastern Creek (Figure 11). The program consisted of 109 test pits within the area of moderate potential adjacent to the creek as well as the area of low potential along the hill slopes. Three landforms composed of three different soil landscapes were tested. A total of 285 lithic artefacts were recovered from 54 of the excavated test pits. The assemblage included two backed artefacts, three artefacts with possible usewear, two retouched tools, two retouched artefacts and two cores. Raw materials present within the assemblage included silcrete (88%), indurated mudstone, quartz and quartzite.

The distribution of artefacts along Ropes Creek and the across the hill slopes was compared. It was found that artefact densities were generally continuous along those transects closest to the creek. Artefact distribution was found to be sparser further away from the creek within the slope landforms.

The excavations identified a total of four new Aboriginal sites and determined the boundary of AHIMS site #45-5-3383. Three of the sites are located adjacent to Ropes Creek, one is located on a lower hill slope and one site is located on the upper hillslope.

Oakdale Central Salvage Excavation, Post-salvage Excavation Report (GML 2015)

Following the program of test excavations in 2013 GML conducted salvage excavation of the sites identified in Oakdale Central in the same year. The excavations recovered a total of 598 lithics, 370 of which were identified as Aboriginal stone artefacts and 228 as other lithics for example heat shatters and indeterminate fragments. The largest number of artefacts were recovered from area 37 (n=226) located within site Oakdale Central 3. Within Oakdale Central 2 four features were identified and excavated including three burnt-out tree stumps and roots and the remains of an Aboriginal ground oven. More remains associated with Aboriginal ground ovens were identified within Oakdale Central 3.

The clay oven features identified within Oakdale Central 2 and 3 consisted of a roughly cresent-shaped, smooth-edged cut. They were found to be typical of others excavated on the Cumberland Plain. The internal structure of the feature included an increased concentration of burnt clay balls towards the bottom, charcoal fragments around the sides of the pit and a patch of grey ash soil at the base. Charcoal samples taken from the feature returned dates of 1161 ± 21BP and 909 ± 29BP. The large variation in dates was proposed to be caused by reuse of the feature over an extended period of time.

The lithic assemblage showed a relatively high rate of post-discard artefact breakage. Silcrete was the most common raw material type followed by indurated mudstone. The assemblage included some retouched and backed pieces. The excavations revealed that three distinct areas of artefact concentrations and two smaller outlying concentrations of lower densities. Background scatter was identified between these sites. Oakdale Central was found to contain defined areas of flaking and retouch stone working activities with some discard in conjunction with low density background scatter, primarily from discarding or loss of objects, or excess material from retouch, between these activity areas and across the hill landform.

Stratified deposits were identified in some excavated areas containing artefacts in association with charcoal. Radiocarbon dating of features within these layers indicates that the Oakdale Central area was occupied around 4000 years ago. It is likely that this occupation continued up until contact with European colonists.

4.4.2.3 Oakdale South

Oakdale South Industrial Estate, Aboriginal Archaeological Survey Report (Artefact Heritage February 2015)

Artefact Heritage prepared an Aboriginal Archaeological Survey Report (ASR) for the Oakdale South Industrial Estate in March 2015. The proposed works are located to the south west of the southern portion of the current study area. The survey relocated previously recorded site OC 5 (45-5-3386) and located six newly recorded sites. The newly recorded sites consist of four artefact scatters and two isolated finds. The artefacts are predominantly silcrete and are generally located within close proximity to a tributary of Ropes Creek.

Oakdale South Industrial Estate Archaeological Test Excavation Report (Artefact Heritage August 2015)

Artefact Heritage conducted test excavations across four areas associated with the surface artefacts recorded during the ASR investigations. These test areas were all associated with Ropes Creek and its tributaries. A total of 341 stone artefacts were retrieved during the test excavation from 109 test units resulting in an artefact density of 12.26 artefacts/m^2. The majority of artefacts were excavated from within the first two spits (20 centimetres) with numbers dropping dramatically with depth.

The overall assemblage primarily consisted of small to medium size flakes and angular fragments. Silcrete was the predominant raw material across the tested areas with a concentration of indurated mudstone tuff (IMT) identified within Testing Area 4. The highest density of artefacts was identified within Testing Area 3.

The artefact assemblage did not indicate evidence of sustained occupation of the area. The assemblage was interpreted to reflect general stone reduction and discard rather than intensive occupation of site use.

4.4.3 Archaeological Investigations within the WNSRL Area

Erskine Park Employment Area, Ropes Creek, Western Sydney, NSW, Archaeological Subsurface Testing Program (Navin Officer 2007)

A subsurface testing program was conducted by Navin Officer within part of the Erskine Park Employment Area, located west of the southern portion of Part B. The test excavations focussed on three previously identified sites, EPRC1 (45-5-3234), EPRC 2 (45-5-3312) and EPRC3.

Areas of archaeological potential ranging from low to high were defined in relation to these sites and 112 test pits were excavated to test that potential. From these test pits 310 lithic were recovered with 261 recorded as artefacts resulting in an average density of 5.7 artefacts per m^2. The raw material present at the sites included silcrete, tuff, quartzite and chert with silcrete being the dominant lithology. The artefacts present included flakes, broken flakes, cores, core fragments, and microblades. Bipolar flaking, utilised pieces and backed flakes were also identified within the assemblage.

Out of the four areas of potential, the two areas closest to Ropes Creek returned the highest number of artefacts. One of these areas was located on the basal midslopes and crest of a north-south running spur line above Ropes Creek. Navin Officer proposed these results suggest that the whole broad spur line was the location of repeated and ephemeral habitation involving transitory camp sites.

The areas with the lowest incidence of artefacts were located adjacent to first order drainage lines and were furthest away from Ropes Creek. These results fit within the broader regional model that predicts these areas to have low to moderate potential.

Navin Officer recommended that no further archaeological investigation was necessary for the works and an area based Section 90 Consent to Destroy was issued for the study area. The s.90 consent (#2666) expired in 2012.

Western Sydney Employment Hub Erskine Park Link Road Network, Aboriginal Heritage Review (Navin Officer 2008)

Navin Officer conducted an Aboriginal heritage review for the Erskine Park Link Road Network. This included the current study area. The review included a desktop study and field inspection conducted with Aboriginal stakeholders.

The review identified 30 Aboriginal sites within the assessment area, this includes four sites identified during the field inspection. Thirteen of these sites had already been assessed and impacted by construction works or were subject to s.90 Consent to Destroy permits. Six sites would be subject to direct impact by construction of the proposed link road network and were not currently subject to any permits. Eleven sites would not be impacted by the link road network.

5.0 PREDICTIONS

5.1 Aboriginal Land Use

Assumptions about Aboriginal land use patterns are made on the basis of archaeological information gained from the local area, from observations made by Europeans after settlement of the area, and from information known about available natural resources.

As Aboriginal people were mobile hunter-gatherers, it would be likely that they moved across the landscape between resources. It would also be likely that movement was related to socio/cultural factors such as gatherings and ceremonial obligations. Campsites would have provided temporary residences such as bark structures. It is difficult to ascertain whether a campsite existed at a given location, but correlations between stone artefact density and campsites are often assumed. While it would be likely that knapping would have occurred at a campsite, it would also be likely that knapping would have occurred during movement across the landscape, as tools were prepared or repaired during hunting and gathering activities.

Data including landscape context and artefact density from previous archaeological excavations on the Cumberland Plain has been synthesised to develop a model of site distribution (White and McDonald 2010). The model demonstrated a strong correlation between proximity to permanent water sources and site location, and also highlighted the relationship between topographical unit and Aboriginal occupation in the region.

The major findings of the study were that artefact densities were most likely to be greatest on terraces and lower slopes within 100 metres of water. The stream order model was used to differentiate between artefact densities associated with intermittent streams as opposed to permanent water. It was found that artefacts were most likely within 50 to100 metres of higher (4th) order streams, within 50 metres of second order streams, and that artefact distribution around first order streams was not significantly affected by distance from the watercourse (White and McDonald 2010:33).

Overall, landscapes associated with higher order streams (2nd order or greater) were found to have higher artefact densities, higher maximum densities, and more continuous distribution than lower order intermittent streams. The analysis also concluded that while there were statistically viable correlations that demonstrated a relationship between stream order, land form unit and artefact distribution across the landscape; the entire area should be recognised as a cultural landscape with varied levels of artefact distribution (White and McDonald 2010:37).

5.2 Predictive Model

Archaeological data gathered in the locality has demonstrated the widespread and varying use of the area by Aboriginal people. This predictive model comprises a series of statements about the nature and distribution of evidence of Aboriginal land use that is expected in the study area. These statements are based on the information gathered regarding:

- Landscape context and landform units.
- Ethno-historical evidence of Aboriginal land use.
- Distribution of natural resources.
- Results of previous archaeological work in area.
- Predictive modelling proposed in previous archaeological investigations.

- Stone artefact scatters are the most likely Aboriginal site type to be identified within the study area. This has been demonstrated in previous archaeological investigations which have identified a series of sites across the Oakdale Industrial Precinct (GML 2007, GML 2013, Artefact Heritage Feb 2015).
- There is potential for intact sub surface archaeological deposits with high densities of stone artefacts. This has been demonstrated through archaeological test and salvage excavations conducted along Ropes Creek adjacent to the study area. (GML 2013, GML 2015, Artefact Heritage Aug 2015).
- Based on the location of recorded Aboriginal sites in the surrounding areas and on predictive models developed for the Cumberland Plain (White and McDonald 2010) the highest numbers of sites and sites with the highest densities of artefacts are likely to be located along Ropes Creek and its tributaries.
- *In situ* stone artefacts are likely to be located where there is least ground disturbance.
- Based on the natural resources available and the results of previous archaeological investigations, silcrete will be the dominant raw material of stone artefact assemblages.
- Visibility is likely to be low, obstructed by dense grass cover. Sites on the ground surface will be most obvious in exposed areas where vegetation has recently been cleared, vehicle tracks and eroded banks of waterlines.

It is probable that the only material traces of Aboriginal occupation remaining will be stone artefacts and/or modified trees. The potential for shelter sites, middens, quarries, rock engravings and axe grinding grooves is limited by the landscape context and historical land use.

Archaeological sensitivity would be dependent on landform and levels of disturbance. Based on previous investigations within the vicinity of the study area raised terraces and high ridge tops and crests overlooking Ropes Creek are likely to contain high to moderate archaeological sensitivity dependant on disturbance levels. Landforms such as slopes and areas further away from the creek are likely to contain lower archaeological sensitivity. Areas of archaeological sensitivity would not be identified across steep slopes, swampy deposit, in areas of flooding, or in areas of high disturbance.

6.0 FIELD METHODS

6.1 Site Definition

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

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

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

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

6.2 Survey Methodology

A survey of Part A of the study area was conducted by Alexander Timms (Artefact Heritage), Claire Rayner (Artefact Heritage), Steven Randall (DLALC) and Steven Knight (DLALC) on 21 October 2015. A second survey was undertaken for Part B of the study area by Duncan Jones (Artefact Heritage), Veronica Norman (Artefact Heritage), Steven Randall (DLALC) and Jamie Stewart (Fitzpatrick) on 29 March 2016. Both surveys were undertaken in accordance with the Code of Practice.

All survey units were covered on foot. All exposed areas within survey units were targeted for stone artefacts or other traces of Aboriginal occupation. Mature trees were inspected for evidence of cultural scarring or carving. Previously recorded sites within the study area were revisited. Dense grasses covered the majority of the study area making the relocation of sites difficult.

A handheld Global Positioning System (GPS) was used to track the path of the surveyor, relocate previously recorded sites and to record the geographical coordinates of features within the study area. Aerial photographs and topographic maps were carried by survey team members.

A photographic record was kept of all sections of the study area. Photographs were taken to represent the landform unit, vegetation communities, objects of interest and levels of disturbance. Scales were used for photographs where required by the Code of Practice.

7.0 SURVEY RESULTS

7.1 Effective Survey Coverage

The survey covered all four survey units identified within the study area (Figure 12), including flat, slope and ridge landform contexts. Transect survey coverage is outlined in Table 5, and landform survey coverage is outlined in Table 6.

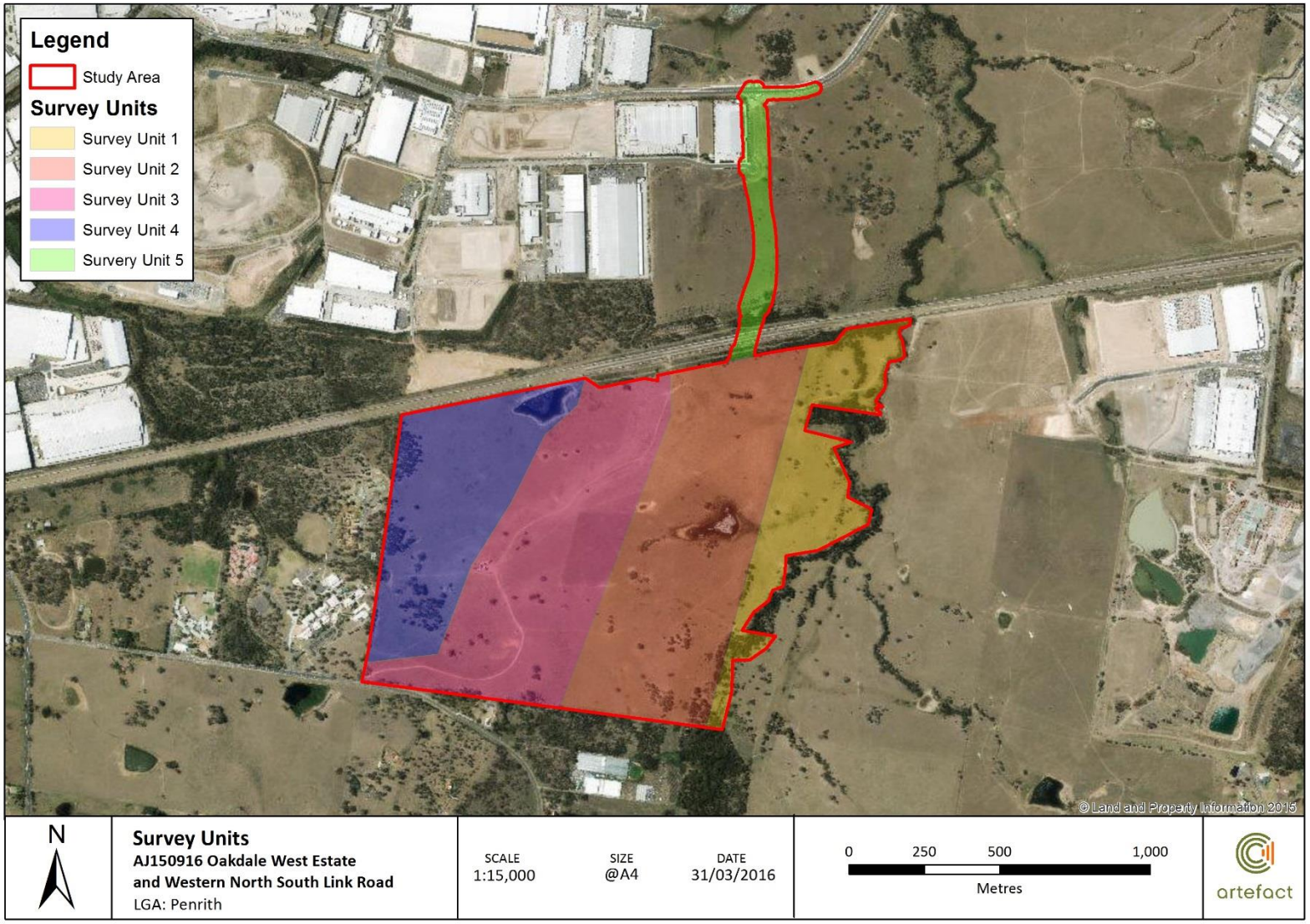
Table 5: Effective survey coverage

Survey Unit	Landform	Survey unit area (m^2)	Visibility (%)	Exposure (%)	Effective Survey Coverage (m^2)	Effective Coverage (%)
1	Flat, slope	231,954	5	10	1,160	0.5
2	Slope, ridge	527,366	5	5	1,318	0.25
3	Slope, ridge	473,179	10	15	7,098	1.5
4	Slope, flat	324,399	5	5	811	0.25
5	Slope, modified land	84,820	5	15	636	0.75

Table 6: Landform survey coverage

Landform	Landform area (m^2)	Area effectively surveyed	% of landform surveyed	Number of sites
Flat	435,070	3,175	0.7	8
Slope	685,880	2,891	0.4	1
Ridge	518,966	4,892	0.9	4
Modified land	1,802	65	3.6	0

Figure 12: Survey units



7.2 Survey Observations

7.2.1 Survey Unit 1

Survey unit 1 encompasses the flat and slope landforms closest to Ropes Creek (Plate 1). The majority of the survey unit is covered by dense grasses with exposures occurring along vehicle tracks, cattle tracks and areas of erosion (Plate 2). Visibility within these exposures was often limited by leaf litter. The sites recorded were all located within exposures. Vegetation is thick along the banks of Ropes Creek increasing in density towards the southern portion of the study area (Plate 3). Run off from the large dam located to the west of the survey unit had caused part of the central area to become quite boggy.

The majority of the survey unit has been subject to very little disturbance. A creek crossing has been cut into Ropes Creek towards the centre of the survey unit on the eastern boundary (Plate 4). Various building materials such as bricks were noted within the vicinity of the crossing. Some concrete blocks were also noted as well as large shale blocks that may have been excavated during the construction of the transmission line (Plate 5). The north western corner of the survey unit has been heavily disturbed. This appears to be related to the construction currently underway in Oakdale Central. A set down area containing a generator and vehicle access track has been constructed within this portion of the survey unit (Plate 6). This has disturbed the top A soil horizon of the area occupied by the set down area and vehicle access track. A pipeline runs through this disturbed area and continues west across the study area following the northern boundary.

Plate 1: View south across flat beside Ropes Creek, survey unit 1

Plate 2: Exposure caused by cattle track, survey unit 1

Plate 3: Dense vegetation lining Ropes Creek, survey unit 1

Plate 4: Creek crossing, survey unit 1

Plate 5: Shale blocks possibly excavated during construction of the transmission line, survey unit 1

Plate 6: Set down area and access track in north eastern corner, survey unit 1

7.2.2 Survey Unit 2

Survey unit 2 includes the ridgelines and slopes immediately west of survey unit 1. The tops of the ridgelines are flat to gently undulating and overlook Ropes Creek (Plate 7). A large dam is located within the central portion of the survey unit with a smaller dam located just to the north west. Vehicle access tracks and cattle tracks with high exposure traverse the survey unit. Large exposures were located on the dam walls with good visibility. Dense grass inhibits visibility throughout the rest of the survey unit.

Aside from the dam construction there was little disturbance noted across the majority of the survey unit. Some concrete footings were noted south west of the large dam. The AusGrid transmission line passes through the survey unit along the eastern boundary. Disturbances associated with the transmission line appear to be localised around the footings of the towers.

Plate 7: top of ridgeline vegetation to the right indicate Ropes Creek, survey unit 2

Plate 8: View east towards large dam, survey unit 2

Plate 9: High exposure and good visibility on dam walls, survey unit 2

Plate 10: View south along power transmission line, survey unit 2

7.2.3 Survey Unit 3

Survey unit 3 is characterised by a south west to north east trending ridgeline with incised drainage gullies to the west (Plate 11 and Plate 12). The highest point of the ridgeline runs along the central portion of the survey unit sloping to the north eastern corner of the survey unit. A vehicle access track runs along this ridgeline (Plate 13). Exposures were limited to this track and an area of disturbance located in the southern portion of the survey unit. Visibility was generally impaired by dense grass.

Disturbances were noted in association with the house located along the western boundary of the survey unit (Plate 14). An area south of the house has been heavily disturbed with the A and B soil horizons removed, construction rubbish visible on the surface and in large pits dug into the hill side (Plate 15). The 1950 aerial indicates that animal pens and sheds were located to the east of the dump site. Concrete foundations and bricks were noted throughout this area (Plate 16).

Plate 11: View north along ridgeline, survey unit 3

Plate 12: Drainage line to the west or ridgeline, survey unit 3

Plate 13: Exposures limited to vehicle access track, survey unit 3

Plate 14: House in the background and on the left hand side of image, survey unit 3

Plate 15: Area of disturbance, survey unit 3

Plate 16: Concrete footings in location of former sheds and animal pens shown on the 1950s aerial, survey unit 3

7.2.4 Survey Unit 4

Survey unit 4 encompasses the slopes and flats to the west of the ridgeline in survey unit 3. The area is covered by dense grasses and regrowth forest. A large dam is located in the north eastern corner of the survey unit and two smaller dams are located near the western boundary (Plate 17). Vehicle access tracks traverse the area. Exposures were limited to these tracks with generally poor visibility. Some exposures also occurred in areas of erosion and around the base of trees (Plate 18). Dense grass and leaf litter inhibited visibility in the majority of the study area.

Disturbances were related to the construction of dams and former structures. A subsurface utility was observed in the north western corner of the survey unit located within an area of heavy disturbance (Plate 19). A collapsed timber slab hut is located in the southern portion of the survey unit and several concrete footings indicate the presence of former structures in this area (Plate 20).

Plate 17: Large dam located in north eastern corner of survey unit 4

Plate 18: Small area of exposure where an artefact was recorded, survey unit 4

Plate 19: Area of high disturbance related to subsurface utility in north western corner of survey unit 4

Plate 20: Collapsed timber slab hut, survey unit 4

7.2.5 Survey Unit 5

Survey unit 5 encompasses the slopes and flat to the north of the study area, running south from Lenore Drive to the east of Lockwood Road. The area is covered by dense grasses, sparse trees and shrubs. Visibility was nil-low across the majority of the study area. Exposures occurred in vehicle tracks, areas of modification and erosion.

The majority of the survey unit has been subject to extensive vegetation clearance and modification. A sewer and associated services runs north-south from Lenore Drive and around the cul-de-sac of Lockwood Road (Plate 21). Clay and introduced material can be seen in the related exposures. Modified mounds of vegetation covered dirt were located to the east of the sewer, likely related to the excavation of the sewer (Plate 22).

Vegetation across the survey unit was limited to new growth shrubs and trees, no mature vegetation is present (Plate 23). The location of registered site AHIMS # 45-5-3311 was located and inspected. No artefactual material was relocated (Plate 24).

A transmission easement is located in the south east of the survey unit, on the top of a ridgeline (Plate 25). The south of the survey unit is bounded by the Warragamba Pipe Line which is located in a highly disturbed context (Plate 26).

Plate 21: View east towards sewer and service, survey unit 5

Plate 22: View south modified mound, survey unit 5

Plate 23:View west new growth vegetation, survey unit 5

Plate 24: View west approximate location of AHIMS # 45-5-3311, survey unit 5

Plate 25: View north east transmission easement across top of hill, survey unit 5

Plate 26: View south Warragamba Pipe Line, survey unit 5

7.3 Summary of Results

The locations of the six previously recorded AHIMS sites were visited during the survey. Another five artefact sites were recorded during the survey. These results are discussed below and shown in Figure 13.

7.3.1 Previously recorded Aboriginal sites

7.3.1.1 EV1 (#45-5-3058)

Site Type: Artefact, Potential Archaeological Deposit (PAD)
AHIMS Centroid: AMG66 Zone 56 295571mE 6254547mN
AHMS Report Centroid: MGA94 Zone 56 295751mE 6254547mN

EV1 was originally recorded by AHMS in 2005. The coordinate recorded with AHIMS places the site within the current study area. The coordinates recorded in the original Aboriginal archaeological assessment report place the site approximately 216 metres south west of the AHIMS coordinates and therefore outside of the study area.

The site is described as two silcrete artefacts in either bank of a minor gully. The gully had been cleared and appeared to be subject to erosion. The assessment considered the area in which the site was located to be of moderate archaeological potential.

Result of current assessment

The location of the AHIMS coordinates were inspected during the current survey. The artefacts were not relocated; this is likely because the coordinates recorded with AHIMS are incorrect. The 216 metre inaccuracy is consistent with the difference between AGD and GDA coordinates therefore this could be the cause of the discrepancy between the AHIMS coordinates and the report coordinates.

7.3.1.2 EV4 (#45-5-3061)

Site Type: Artefact
AHIMS Centroid: AMG66 Zone 56 295822mE 6254837mN
AHMS Report Centroid: MGA94 Zone 56 295826mE 6254837mE

EV4 was recorded at the same time as EV1 by AHMS in 2005. Therefore, the same discrepancy in coordinates has occurred. The coordinates recorded in the archaeological assessment report place EV4 approximately 213 metres south west of the coordinates given by AHIMS.

The site is described as one weathered mudstone/chert flake. The site was recorded within a cleared area to the east of the Emmaus Village complex.

Result of current assessment

The AHIMS coordinates were inspected during the current survey. The artefacts were not relocated for the same reasons given above for EV1.

7.3.1.3 Oakdale Campsite 1 (#45-5-3382)

Site Type: Artefact Scatter
Centroid: MGA94 Zone 56 297479mE 6255232mN
Description: three silcrete artefacts embedded in buff silty topsoil in area trodden by cattle

The site was recorded by Godden Mackay Logan in 2007 as part of an Aboriginal Heritage Assessment for the Oakdale Concept Plan.

Result of current assessment

The artefacts from the original recording were not relocated during the current site visit. The recorded coordinates of the site place it within a densely grassed area adjacent to a vehicle access track (Plate 27). A compound area is located to the east of the site.

Plate 27:Recorded location of Oakdale Campsite 1, edge of track and compound site can be seen in the right hand side of the image

7.3.1.4 Oakdale Campsite 3 (#45-5-3384)

Site Type: Artefact, Potential Archaeological Deposit (PAD)
Centroid: MGA94 Zone 56 297396mE 6255126mN
Description: Two red silcrete and two yellow chert cortical flakes

The site was recorded by Godden Mackay Logan in 2007 as part of an Aboriginal Heritage Assessment for the Oakdale Concept Plan. Due to OC3 being closely located to a number of other sites, it was considered it may form part of previously documented archaeological evidence on the land, such as that recorded by Appleton in 2002.

Result of current assessment

The recorded coordinates of Oakdale Campsite 3 are located on a creek crossing approximately 130 metres south west of Oakdale Campsite 1. The artefacts were not relocated during the current survey. Dense grass covered the crossing inhibiting visibility.

Plate 28: Recorded location of Oakdale Campsite 3

7.3.1.5 Oakdale Campsite 4 (#45-5-3385)

Site Type: Artefact, Potential Archaeological Deposit (PAD)
Centroid: MGA94 Zone 56 296733mE 6254945mN
Description: Two red silcrete and one yellow silcrete piece

The site was recorded by Godden Mackay Logan in 2007 as part of an Aboriginal Heritage Assessment for the Oakdale Concept Plan. OC4 was located in a similar context to OC3.

Result of current assessment

Oakdale Campsite 4 is located approximately 12 metres east of a vehicle access track within a flat landform context (Plate 29). The artefacts were not relocated during the current survey however two artefacts were recorded within the vehicle access track just east of the site. The artefacts consist of a silcrete complete flake and a silcrete single platform core (Plate 30 and Plate 31). The artefacts appear to be different from those originally recorded at Oakdale Campsite 4 and will therefore be added to the site card with AHIMS.

Plate 29: Location of Oakdale Campsite 4

Plate 30: Silcrete complete flake

Plate 31: Silcrete single platform core

7.3.1.6 Erskine Park 2 (EP2 #45-5-3311)

Site Type: Artefact
Centroid: MGA94 Zone 56 296969mE 6255555mN
Description: Two quartz, one tuff and one silcrete flakes

EP2 was originally recorded by Navin Officer during a test excavation in 2007. The coordinate recorded with AHIMS places the site within the current WNSRL study area.

A total of 15 pits were excavated and 4 lithic items retrieved. The assessment considered the area in which the site was located to be of low archaeological potential.

Result of current assessment

The location of the AHIMS coordinates were inspected during the current survey. As the site was identified during a test excavation program (Navin Officer 2003), no surface artefacts were identified. The site is located within a densely grassed area approximately 100 m south of Lockwood Road (Plate 32).

Plate 32: Recorded location of EP2

7.3.2 Newly recorded Aboriginal sites

7.3.2.1 Oakdale West Artefact Scatter 1 (OW AS 1 #45-5-4672)

Site Type: Artefact Scatter
Centroid: MGA94 Zone 56 297234mE 6255014mN
Site Length: 2.5 metres
Site Width: 2 metres

Oakdale West Artefact Scatter 1 is an artefact scatter consisting of six silcrete artefacts located within an exposure adjacent to Ropes Creek (Plate 33, Plate 34). It is located on an undulating plain, within isolated clumps of trees and less than 5 metres from water.

Table 7: Artefacts recorded at OW AS1

Artefact #	Reduction Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
1	Angular Fragment	Silcrete	7	5	4	
2	Distal Fragment	Silcrete	20	9	2	Conjoins with artefact #3
3	Medial Fragment	Silcrete	20	8	3	Conjoins with artefact #2
4	Angular Fragment	Silcrete	19	8	2	
5	Single Platform Core	Silcrete	19	17	10	2 flake scars
6	Angular Fragment	Silcrete	25	11	9	

Plate 33: Location of OW AS 11

Plate 34: Artefacts recorded at OW AS 1

7.3.2.2 Oakdale West Isolated Find 1 (OW IF 1 #45-5-7673)

Site Type: Isolated Find
Centroid: MGA94 Zone 56 297349mE 6255114mN
Site Length: 1 metres
Site Width: 1 metres

Oakdale West Isolated Find 1 consists of a single silcrete complete flake. The artefact was recorded in an exposure caused by a vehicle access track approximately 60 metres north of Ropes Creek.

Table 8: Artefact recorded at OW IF 1

Artefact #	Reduction Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)
1	Complete Flake	Silcrete	32	9	31

Plate 35: Location of OW IF 1

Plate 36: Complete flake, OW IF 1

7.3.2.3 Oakdale West Artefact Scatter 2 (OW AS 2 #45-5-4674)

Site Type: Artefact Scatter
Centroid: MGA94 Zone 56 297355mE 6255099mN
Site Length: 2 metres
Site Width: 1 metre

Oakdale West Artefact Scatter 2 consists of three silcrete artefacts. The artefacts were recorded within an area of exposure approximately 30 metres north of Ropes Creek and 15 metres south of Oakdale Isolated Find 1.

Table 9: Artefacts, OW AS 2

Artefact #	Reduction Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)
1	Multiplatform Core	Silcrete	24	15	7
2	Angular Fragment	Silcrete	17	16	3
3	Complete Flake	Silcrete	11	11	3

Plate 37: Location of OW AS 2

Plate 38: Artefacts, OW AS 2

7.3.2.4 Oakdale West Isolated Find 2 (OW IF 2 #45-5-4675)

Site Type: Artefact Scatter
Centroid: MGA94 Zone 56 296627mE 6254876mN
Site Length: 1 metres
Site Width: 1 metres

Oakdale West Isolated Find 2 is located within a slope landform. The site consists of a single silcrete single platform core recorded within a vehicle access track.

Table 10: Artefacts, OW IF 2

Artefact #	Reduction Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)
1	Single Platform Core	Silcrete	25	25	5

Plate 39: Location of OW IF 2

Plate 40: Artefact recorded at OW IF 2

7.3.2.5 Oakdale West Isolated Find 3 (OW IF 3 #45-5-4676)

Site Type: Artefact Scatter
Centroid: MGA94 Zone 56 295882mE 6254754mN
Site Length: 1 metre
Site Width: 1 metre

Oakdale West Isolated Find 3 is located within an area of exposure near the western boundary of the study area. An unnamed ephemeral watercourse runs through this area. The site consists of a single silcrete artefact.

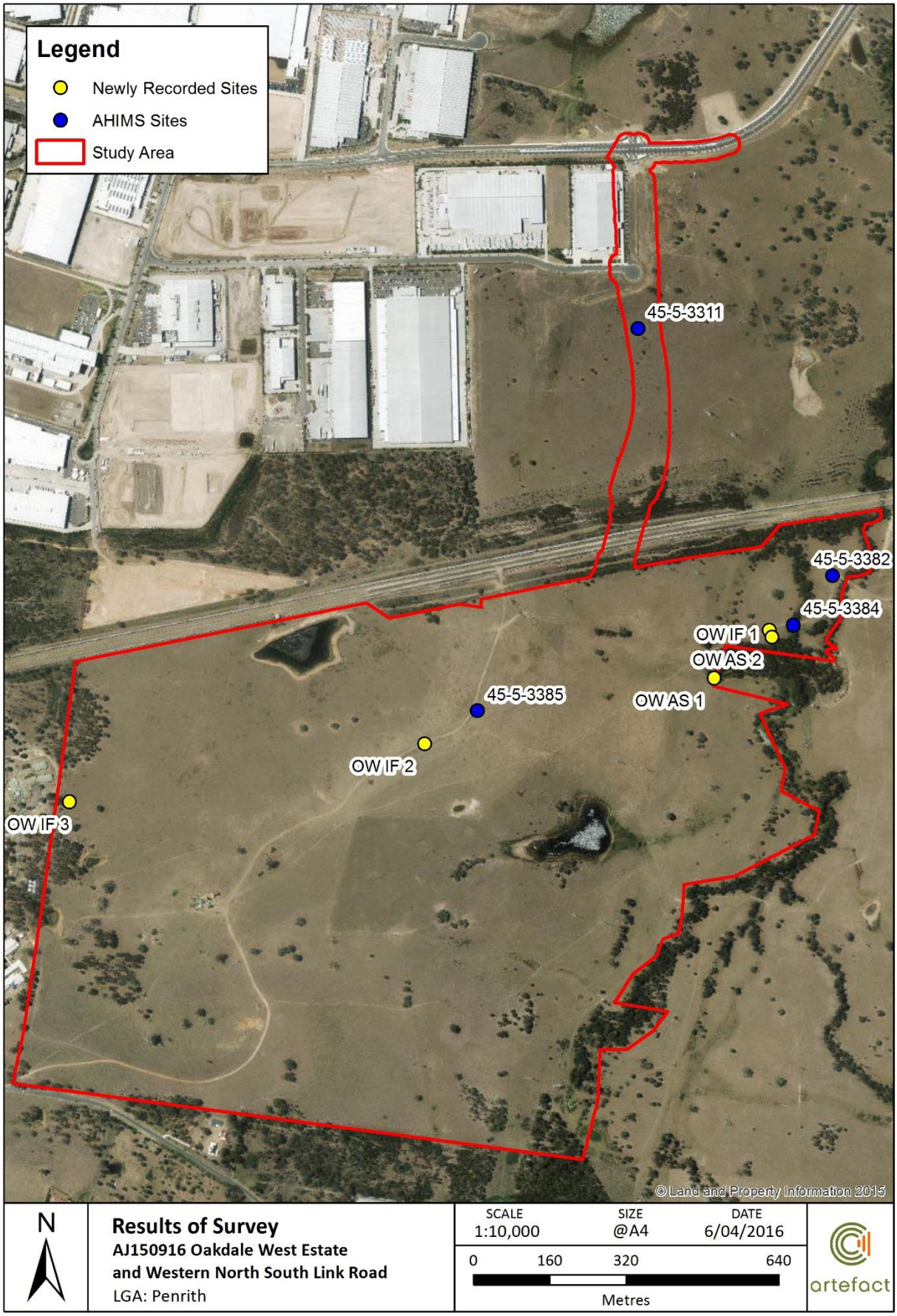
Table 11: Artefact recorded at OW IF 3

Artefact #	Reduction Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)
1	Angular Fragment	Silcrete	24	26	5

Plate 41: Location of OW IF 3

Plate 42: Artefact recorded at OW IF 3

Figure 13: Survey results



8.0 ANALYSIS AND DISCUSSION

8.1 Disturbance Levels

Disturbance levels varied across the study area. Vegetation clearance has occurred across the entirety of the study area. A number of dams are located across the study area that appear to have been constructed after 1947. Survey unit 3 demonstrates high levels of disturbance in association with the house and area that has been scrapped back and used to discard construction materials. Historical aerials indicate that a number of structures were located within survey unit 3 and 4. The footings of these were identified during the site visit and the areas in the vicinity of these structures generally appeared to be disturbed. The findings of the contamination study by AECOM and the analysis of aerial imagery from 1947 until present supports these observations (AECOM 2012). The north western corner of survey unit 4 has been heavily impacted by the construction of an underground utility. The north of survey unit 5 has undergone significant development since 2008. This includes the construction of Lenore Drive and Lockwood Road, levelling and clearing of the land, erection of a large business development and minor drainage line and associated earthworks. The southern portion of survey unit 5 has been completely disturbed in relation to the Warragamba Pipeline. The central area of survey unit 4 appears to have been only been subject to rural and agricultural impacts and is therefore less disturbed.

Survey unit 1 and the eastern section of survey unit 2 generally appeared to be less disturbed than areas of survey units 3 and 4 where buildings have previously been located. The very north eastern portion of survey unit 1 has been heavily disturbed by its use as a compound area for construction currently underway in the Oakdale Central Estate.

Overall the majority of the study area demonstrated low levels of disturbance.

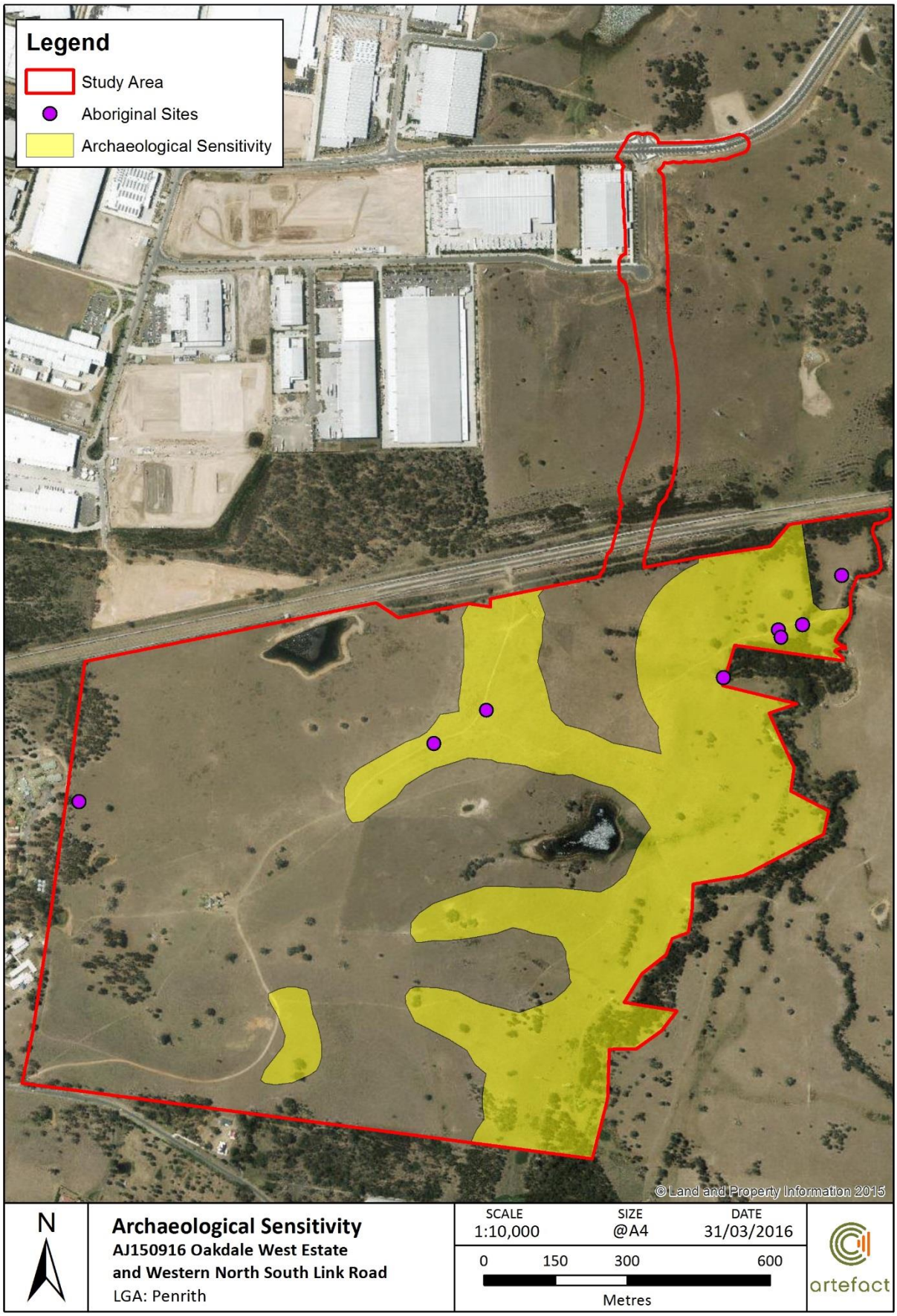
8.2 Archaeological Sensitivity

Archaeological sensitivity is closely related to the levels of ground disturbance in the area. Other factors are also taken into account when assessing archaeological sensitivity, such as whether artefacts were located on the surface, and whether the area is within a sensitive land form unit according to the predictive statements for the area.

Previous archaeological investigations within the Oakdale Central and Oakdale South Estates indicate that there is potential for intact cultural material to be located within subsurface contexts along Ropes Creek and its tributaries. Previous investigations in the surrounding area indicate that ridgelines overlooking Ropes Creek have the potential to contain intact archaeological deposits. Areas in which considerable ground disturbance has occurred will have lower potential for intact cultural material to be located within subsurface contexts. Within the study area this includes the areas that have been disturbed by the construction of buildings, dams and the dumping of construction materials.

Based on the results of the site visit and the conclusions of previous studies in the local area areas of archaeological sensitivity have been identified along Ropes Creek and the prominent ridgelines that extend to the west of the watercourse.

Figure 14: Model of archaeological sensitivity



9.0 ARCHAEOLOGICAL SIGNIFICANCE ASSESSMENT

9.1 Assessment Criteria

Archaeological significance refers to the archaeological or scientific importance of a landscape or area. This is characterised by using archaeological criteria such as archaeological research potential, representativeness and rarity of the archaeological resource and potential for educational values. These are outlined below:

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

9.1 Archaeological Significance Assessment

The archaeological significance of the sites recorded within the study area have been assessed by observations made during the site survey, previous investigations in the region as well as the landscape and archaeological context of the study area. The significance values are summarised in (Table 12) below.

Table 12: Archaeological significance assessment

Site name	Research Potential	Scientific Value	Representative Value	Rarity Value	Overall archaeological Significance
Oakdale Campsite 1 (#45-5-3382)	Moderate	Moderate	Moderate	Low	Moderate
Oakdale Campsite 3 (#45-5-3384)	Moderate	Moderate	Moderate	Low	Moderate
Oakdale Campsite 4 (#45-5-3385)	Moderate	Moderate	Moderate	Low	Moderate
OW AS 1 (#45-5-4672)	Moderate	Moderate	Moderate	Low	Moderate
OW AS 2 (#45-5-4672)	Moderate	Moderate	Moderate	Low	Moderate
OW IF 1 (#45-5-4673)	Low	Low	Low	Low	Low

Site name	Research Potential	Scientific Value	Representative Value	Rarity Value	Overall archaeological Significance
OW IF 2 (#45-5-4675)	Low	Low	Low	Low	Low
OW IF 3 (#45-5-4676)	Low	Low	Low	Low	Low
EP2 (#45-5-3311)	Low	Low	Low	Low	Low

Sites of low archaeological significance

Sites considered to be of low archaeological significance were generally isolated artefacts located within disturbed contexts OW IF 1 (#45-5-4673), OW IF 2 (#45-5-4675), OW IF 3 (#45-5-4676) EP2 (#45-5-3311). This assessment is based on previous research within the local area. Artefact scatters and isolated finds are well represented within the archaeological record of the Cumberland Plain. Therefore, these site types are not rare and do not contribute significantly to research questions within the region.

Sites of moderate archaeological significance

The archaeological significance of sites Oakdale Campsite 3 (#45-5-3384), Oakdale Campsite 4 (#45-5-3385), OW AS 1 (#45-5-4672) and OW AS 2 (#45-5-4672) is assessed to be moderate. All these sites have moderate research potential and are within areas assessed as having archaeological sensitivity.

Significance of areas of archaeological sensitivity

An area of archaeological sensitivity has been assessed within the study area. Excavations within the Ropes Creek corridor have recovered high densities of artefacts and rare features such as ground ovens (GML 2013, Artefact 2015). The significance of the areas of sensitivity is not known and would be informed by the results of archaeological testing.

Areas outside of the area of archaeological sensitivity have limited research potential and rarity values, and are likely to be in disturbed contexts not representative of intact areas on the Cumberland Plain. All recorded Aboriginal sites and areas of archaeological sensitivity within the Precinct have education potential.

The distribution and nature of Aboriginal sites and associated heritage values provide important educational values for Aboriginal land-use on the Cumberland Plain. Higher educational values are associated with more intact areas on the Cumberland Plain such as those areas bordering Ropes Creek, considering the dense residential and commercial development in other parts of the region.

9.2 Cultural Significance

During the field survey of the study area, DLALC representatives noted that the Aboriginal cultural heritage values of the study area were high due to the proximity of Ropes Creek and ridgelines. The DLALC representatives believed that the surface artefacts identified during survey near the waterline were an indication of potential high density subsurface artefacts. The survey report composed by DLALC (Appendix A) recommends that further archaeological work be completed in Part A of the study area. The second survey report composed by DLALC (Appendix B) recommends that no further archaeological work be completed in Part B of the study area.

10.0 INDICATIVE IMPACT ASSESSMENT

The proposal involves the construction of warehouse facilities and associated infrastructure such as access roads (including WNSLR) and subsurface services.

The concept design will be executed in four stages and will include:

- Significant cut to fill across the site in order to level the terrain
- Construction of the WNSLR
- Construction of retaining walls
- Stormwater infrastructure including site based detention basins
- Sewer services
- Water services

The impacts to the sites recorded within the study area are summarised in the table below and in Figure 15.

Table 13: Indicative impact assessment

Site	Type of harm	Degree of harm	Consequence of harm
Oakdale Campsite 1 (#45-5-3382)	None	None	None
Oakdale Campsite 3 (#45-5-3384)	None	None	None
Oakdale Campsite 4 (#45-5-3385)	Direct	Total	Total loss of value
OW AS 1	None	None	None
OW AS 2	None	None	None
OW IF 1	None	None	None
OW IF 2	Direct	Total	Total loss of value
OW IF 3	Direct	Total	Total loss of value
EP2	Direct	Total	Total loss of value

Figure 15: Potential impacts to Aboriginal sites located within the study area

11.0 MANAGEMENT AND MITIGATION MEASURES

11.1 Guiding Principles

The overall guiding principle for cultural heritage management is that where possible Aboriginal sites should be conserved. If conservation is not practicable, measures should be taken to mitigate against impacts to Aboriginal sites.

The nature of the mitigation measures recommended is based on the assessed significance of the site or sites and the assessed archaeological sensitivity for areas in which the sites are located. The final recommendations would also be informed by cultural significance, which will be discussed by the Aboriginal community in their responses during the next stage of consultation.

11.2 Mitigation and Management Measures

The current assessment has assessed the areas bordering Ropes Creek and the crests of the ridgelines to be archaeologically sensitive. Newly identified sites within the study area generally consist of isolated and low density artefact scatters. The majority of sites are located within the area of archaeological sensitivity. These surface finds are considered to be indicative of subsurface archaeological deposits.

Sites Oakdale Campsite 1 (#45-5-3382), Oakdale Campsite 3 (#45-5-3384), Oakdale Campsite 4 (#45-5-3385), OW AS 1 (#45-5-4672), OW AS 2 (#45-5-4674), OW IF 1 (#45-5-4673) and OW IF 2 (#45-5-4675) are all located within areas of archaeological sensitivity.

The proposed concept design would directly impact Oakdale Campsite 4 (#45-5-3385), OW IF 2 (#45-5-4675) and OW IF 3 (#45-5-4676). Due to the proposed impacts to Aboriginal sites a program of archaeological test excavation should be conducted within the area of archaeological sensitivity. Aboriginal sites OW IF 3 #45-5-4676 and EP 2 (#45-5-3311) are located outside of the area of archaeological sensitivity. These sites have been assessed as having low significance and do not require archaeological testing.

Test excavation would determine the extent and archaeological significance of any identified material within the areas to be impacted and inform recommendations for further management or mitigation measures. A research design for test excavation would be developed in consultation with the registered Aboriginal stakeholders.

The remainder of the study area is not considered to be archaeologically sensitive. This is based on previous disturbances within these areas, landform and distance from Ropes Creek. These areas are considered unlikely to contain intact archaeological deposits. No further investigation is recommended.

12.0 RECOMMENDATIONS

The following recommendations were based on consideration of:

- Statutory requirements under the EP&A Act 1979.
- The requirements of the SEARs.
- The results of the background research, site survey and assessment.
- The likely impacts of the proposed development.
- The interests of DLALC.

The findings of the ASR are:

- Based on the Aboriginal Heritage Information Management System (AHIMS) data, previously recorded sites EV1 and EV4 appeared to be located within the study area. However, the original recording of these sites (AHMS 2005) indicates that the sites were located to the west and within the adjacent property. This error is consistent with the datum error that occurs between AGD and GDA coordinates. The archaeological survey confirmed that EV1 and EV 4 are located outside the study area.
- Five newly recorded Aboriginal sites were identified during the current survey: OW AS 1 (#45-5-4672), OW AS 2 (#45-5-4674), OW IF 1 (#45-5-4673), OW IF 2 (#45-5-4675) and OW IF 3 (#45-5-4676).
- Three previously recorded AHIMS sites are located within the study area: Oakdale Campsite 1 (#45-5-3382), Oakdale Campsite 3 (#45-5-3384) and Oakdale Campsite 4 (#45-5-3385).
- An area of archaeological sensitivity along Ropes Creek and the tops of the ridgelines to the west of the watercourse has been identified. This area includes Aboriginal sites Oakdale Campsite 1 (#45-5-3382), Oakdale Campsite 3 (#45-5-3384), Oakdale Campsite 4 (#45-5-3385), OW AS 1 (#45-5-4672), OW AS 2 (#45-5-4674), OW IF 1 (#45-5-4673) and OW IF 2 (#45-5-4675).
- Site OW IF 3 (#45-5-4676) and EP2 (#45-5-3311) are located outside of the area of archaeological sensitivity. This site is considered to be of low archaeological significance.

It is therefore recommended that:

- Aboriginal sites Oakdale Campsite 1 (#45-5-3382), Oakdale Campsite 3 (#45-5-3384), OW AS 1 (#45-5-4672), and OW AS 2 (#45-5-4674) will not be impacted by the proposed development, therefore no further archaeological investigation is required.
- The concept design indicates that some areas of archaeological sensitivity will be impacted including Aboriginal sites Oakdale Campsite 4 (#45-5-3385) and OW IF 2 (#45-5-4675).
- Test excavation should be conducted under the Code of Practice within the area of archaeological sensitivity that will be impacted by the proposal. The test excavation methodology will investigate the potential for subsurface cultural material within this area. Test excavation will determine the extent and archaeological significance of any identified cultural material and inform recommendations for further management or mitigation measures. A methodology for test excavation would be developed in consultation with the registered Aboriginal stakeholders.

- The results of the test excavation would be discussed in a test excavation report which would also recommend whether any further investigation or reporting was required.
- Aboriginal sites OW IF 3 (#45-5-4676) and EP2 (#45-5-3311) will be impacted by the proposed works. As both sites have been assessed as having low archaeological significance, no further investigation is required.
- No further investigation is required for areas of no archaeological sensitivity.
- If changes are made to the concept design that may result in further impacts to areas of archaeological sensitivity along the Ropes Creek corridor and associated ridgelines or to Aboriginal sites located outside the current area of impacts further archaeological assessment would be required.

13.0 REFERENCES

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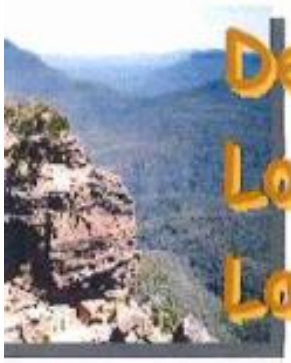
14.0 APPENDIX A: DLALC REPORT – PART A



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Our Ref: 2613

23 November 2015

SUBJECT: PROTECTION OF ABORIGINAL CULTURAL HERITAGE

Oakdale West Development

Lot 11 in DP 1178389, Bakers Lane, Kemps Creek

Attention: K Dracopoulos,

Two representatives of the Deerubbin Local Aboriginal Land Council accompanied consulting archaeologist from Artefact Heritage on an inspection the proposed Oakdale West Precinct, Kemps Creek on Wednesday, 21st October 2015. An Aboriginal cultural heritage assessment was undertaken by Deerubbin LALC representatives to evaluate the likely impact the proposed future development has on the cultural heritage of the land.

A walkover of the study area from the western bank of Ropes Creek and ridgetop as well as the boundaries revealing aboriginal cultural materials in the form of stone artefacts being located.

Deerubbin Local Aboriginal Land Council therefore, recommends further investigations be undertaken with a program of test pitting & salvage works before any development.

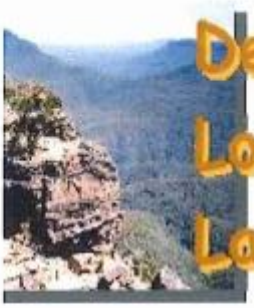
Yours Faithfully,

S Randall
(Steven Randall
Aboriginal Cultural Heritage Officer)

C.c. Miranda Firman – Office of Environment & Heritage

C.c. Alex Timms - Artefact

15.0 APPENDIX B: DLALC REPORT – PART B



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Goodman Property Services (Aust) Pty Ltd
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SYDNEY NSW 2001

Our Ref: 2683

8 April 216

SUBJECT: PROTECTION OF ABORIGINAL CULTURAL HERITAGE

Western North South Link Road Development

From Lenore Drive to Oakdale West Estate

Erskine Park

Attention: K Dracopoulos,

A Deerubbin Local Aboriginal Land Council representative accompanied consulting archaeologist from Artefact Heritage on an inspection the proposed Western North South Link Road on Tuesday, 29th March 2016. An Aboriginal cultural heritage assessment was undertaken by Deerubbin LALC representatives to evaluate the likely impact the proposed road development has on the cultural heritage of the land.

A walkover of the study area from Lenore Drive to Oakdale West Estate did not reveal any Aboriginal cultural materials (in the form of Stone artefacts, for example).

Deerubbin Local Aboriginal Land Council therefore, has no objection for the Western North South Link Road Development.

Yours Faithfully,

S Randall

(Steven Randall
Aboriginal Cultural Heritage Officer)

C.c. Miranda Firman – Office of Environment & Heritage

C.c. Veronica Norman - Artefact

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