ABORIGINAL ARCHAEOLOGICAL REPORT:

HANSON ASPHALT AND CONCRETE FACILITY, EASTERN CREEK, NSW

FOR

HANSON CONSTRUCTION MATERIALS PTY LTD

Final Report

June 2012

AHMS

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GLOSSARY

Aboriginal Cultural Heritage Assessment	A document developed to assess the archaeological and cultural values of an area, generally required as part of an Environmental Assessment (EA).
Aboriginal Heritage Impact Permit (AHIP)	The statutory instrument that the Director General of the Office of Environment and Heritage (OEH) issues under 90 of the *National Parks and Wildlife Act 1974* to allow the investigation (when not in accordance with certain guidelines), impact and/or destruction of Aboriginal objects. AHIPs are not required for a project seeking approval under Part 3A or 4(4) of the *Environmental Planning and Assessment Act 1979.*
Aboriginal object	A statutory term defined under the *National Parks and Wildlife Act 1974* meaning, 'any deposit, object or material evidence (not being handicraft made for sale) relating to Aboriginal habitation of the area comprising NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.
Code of Practice for Archaeological Investigations of Aboriginal Objects in New South Wales 2010	A series of guidelines developed by OEH that form the structure and content of Aboriginal Cultural Heritage Assessments and associated archaeological investigations/excavations.
Department of Environment, Climate Change and Water (DECCW)	Now known as the Office of Environment and Heritage (OEH), Department of Premier and Cabinet Office.
Department of Planning (DoP)	The Consent Authority for Environmental Assessments (EA) considered under applications made in accordance with Part 3A of the *Environment Planning and Assessment Act 1979.*
Environmental Assessment (EA)	A document summarising the assessment of environmental impacts of a development which supports an application for approval under Part 3A of the *Environmental Planning and Assessment Act 1979.*

Environmental Planning and Assessment Act 1979	Statutory instrument that provides planning controls and requirements for environmental assessment in the development approval process. The Act is administered by DoP.
National Parks and Wildlife Act 1974	The primary piece of legislation for the protection of Aboriginal cultural heritage in NSW. Part 6 of this Act outlines the protection afforded to and offences relating to disturbance of Aboriginal objects. The Act is administered by OEH.
Office of Environment and Heritage (OEH)	The OEH is responsible for managing the Aboriginal Heritage (and other) provisions of the *National Parks and Wildlife Act 1974.*
Project	All activities proposed by the Proponent in relation to the modification of the concept masterplan for the Hanson Asphalt and Concrete Facility (Project Approval 06_0225).
Proponent	A corporate entity, Government agency or an individual in the private sector which proposes to undertake a development project. The proponent for this project is Hanson Construction Materials Pty Ltd.

ABBREVIATIONS

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AHMS	Archaeological and Heritage Management Solutions
BP	Before present (AD 1950)
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change and Water (now OEH)
DP	Deposited Plan
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERS	Eastern Regional Sequence
ka	Abbreviation for thousands of years ago (e.g. 1 ka equals 1,000 years ago)
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LTO	Land Titles Office
NHL	National Heritage List
NPW Act	*National Parks and Wildlife Act 1974*
OEH	Office of Environment and Heritage (formerly DECCW)
PAD	Potential Archaeological Deposit
REP	Regional Environmental Plan
RNE	Register of the National Estate
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
SHI	State Heritage Inventory
WHL	World Heritage List

ACKNOWLEDGMENTS

- Andrew Driver – Hanson Construction Materials Pty Ltd.
- John Lardis – Hanson Construction Materials Pty Ltd
- Deerubbin Local Aboriginal Land Council, Darug Tribal Aboriginal Corporation, Darug Custodial Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments, Gunjeewong Cultural Heritage Aboriginal Corporation and Tocomwall.

EXECUTIVE SUMMARY

Background

- Hanson Construction Materials Pty Ltd (the Proponent) proposes to modify the concept master plan for the Hanson Asphalt and Concrete Facility, which currently has approval (and Project Approval) under Part 3A of the *Environmental Planning and Assessment Act (CP 06-0225).*
- The modification includes undertaking works in an area that includes land;
    - established as an area of high Aboriginal archaeological sensitivity in *State Environmental Planning Policy 59 – Eastern Creek Precinct (Stage 3)* Precinct Plan (SEPP 59); and
    - subject to Condition 28 of the Project Approval of January 2010, which requires that '*the proponent shall not disturb those areas identified as 'High Sensitivity' in the Precinct Plan'*.
- In early 2012, Hanson Construction Materials engaged Archaeological & Heritage Management Solutions Pty Ltd (AHMS) to undertake an Aboriginal archaeological assessment of the subject land.
- Due to the heritage status of the land, the SEPP, the current Project Approval condition, and to ensure the applicability of the assessment in the event further modifications and/or proposed developments might be subject to a local approval, AHMS was engaged to undertake an Aboriginal Cultural Heritage Assessment (ACHA).
- The ACHA is generally consistent with the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005)* as well as those required for an ACHA - *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, April 2011), *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, April 2010), and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, September 2010).

Aboriginal Cultural Heritage

- One previously registered Aboriginal site is located within the subject area (site #45-5-0556).
- No new Aboriginal sites or areas of archaeological potential were identified during the survey.

- An archaeological (scientific) significance assessment is included in this Archaeological Report. Aesthetic, Historic and Social significance assessments are included in **Section 6** of the ACHA.

Potential Cultural Heritage Impact

- The proposed development includes bulk earthworks for the construction of roads, the creation of building lots and the installation of services;
- The registered site #45-5-0556 will be retained within a Riparian Corridor/Conservation Area. The proposed modifications do not include impacts that would affect the Riparian Corridor/Conservation Area.
- High levels of previous land use disturbance have removed the potential for archaeological deposits to remain elsewhere in the subject area. Consequently, there is no potential impact to Aboriginal heritage in the subject area outside the Riparian Corridor/Conservation Area.

Recommendations

The following recommendations are based upon the results of the assessment detailed in the Aboriginal Cultural Heritage Report (ACHA) and this Archaeological Report.

The recommendations are as follows:

- Aboriginal site #45-5-0556 should be conserved within the designated Riparian Corridor/Conservation Zone as shown on **Figure 3** of this assessment.
- The Riparian Corridor/Conservation Area should be managed as described in **Section 1.4.1** of this assessment and pedestrian and vehicle access should not occur during construction works or afterwards in the vicinity of site #45-5-0556.
- No Aboriginal heritage constraints have been identified outside the Riparian Corridor/Conservation Area in **Figure 3**. As such, no further Aboriginal heritage investigation or assessment is required in those areas.
- Should the location and/or method of the proposed works be altered, further investigation and assessment may be necessary.
- Consultation between Hanson and the Registered Aboriginal Parties should be maintained as appropriate throughout subsequent approvals and the construction of the project;
- In the event that previously undiscovered Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) are discovered during construction, all

works in the vicinity of the find should cease and Hanson should determine the subsequent course of action in consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency as appropriate;

- Should suspected Aboriginal skeletal material be identified, all works should cease and the NSW Police and the NSW Coroner's office contacted. Should the burial prove to be archaeological, consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency, should be undertaken by Hanson;
- Consideration should be given to amending the extent of the area identified as high Aboriginal archaeological sensitivity in State *Environmental Planning Policy 59 – Eastern Creek Precinct (Stage 3) Precinct Plan* (SEPP 59) as it affects the subject area; and
- The Project Approval application for the proposed modification works should seek, among other things, to delete Condition 28 of the Project Approval of January 2010, which requires that 'the proponent shall not disturb those areas identified as 'High Sensitivity' in the Precinct Plan' except as it applies to the Riparian/Conservation Area.

1. INTRODUCTION

1.1 Proponent Details

This report has been prepared by Archaeological & Heritage Management Solutions Pty Ltd (AHMS) for the Proponent, Hanson Construction Materials Pty Ltd:

Proponent	Archaeological Advisor
Hanson Construction Materials Pty Ltd Level 5, 75 George Street, Parramatta NSW 2150 **Contact Person:** Andrew Driver T. +61 (0) 2 9354 2644 F. +61 (0) 2 9354 2619 E. andrew.driver@hanson.com.au	**Archaeological & Heritage Management Solutions Pty Ltd** 349 Annandale Street Annandale NSW 2038 **Contact Person:** Lisa Murray T. 02 9555 4000 F. 02 9555 7005 E. lmurray@ahms.com.au

1.2 Purpose of the Archaeological Investigation

This archaeological report has been prepared by AHMS for Hanson to present the findings of an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed modification to the Hanson Asphalt and Concrete Facility (the Project) at Eastern Creek, NSW. The Hanson Asphalt and Concrete Facility has Concept Plan and Project Approval (06_0225) under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Hanson is now seeking to modify the Concept Masterplan under Section 75W of the EP&A Act. As the modification proposes works in an established as an area of high Aboriginal archaeological sensitivity in *State Environmental Planning Policy 59 – Eastern Creek Precinct (Stage 3) Precinct Plan* (SEPP 59) and subject to Condition 28 of the Project Approval of January 2010, which requires that '*the proponent shall not disturb those areas identified as 'High Sensitivity' in the Precinct* an Aboriginal Cultural Heritage Assessment (ACHA) has been undertaken.

As a project is subject to Part 3A of the *Environmental Planning and Assessment Act 1979,* the ACHA has been undertaken in accordance with *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005) as well as the *Guide*

to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, April 2011), *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, April 2010), and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, September 2010).

1.3 Subject Area

The subject area is within the Blacktown Local Government Area, off Wonderland Drive (Lot 5 DP 1145808). The location of the subject area is shown in **Figure 1** and **Figure 2**.

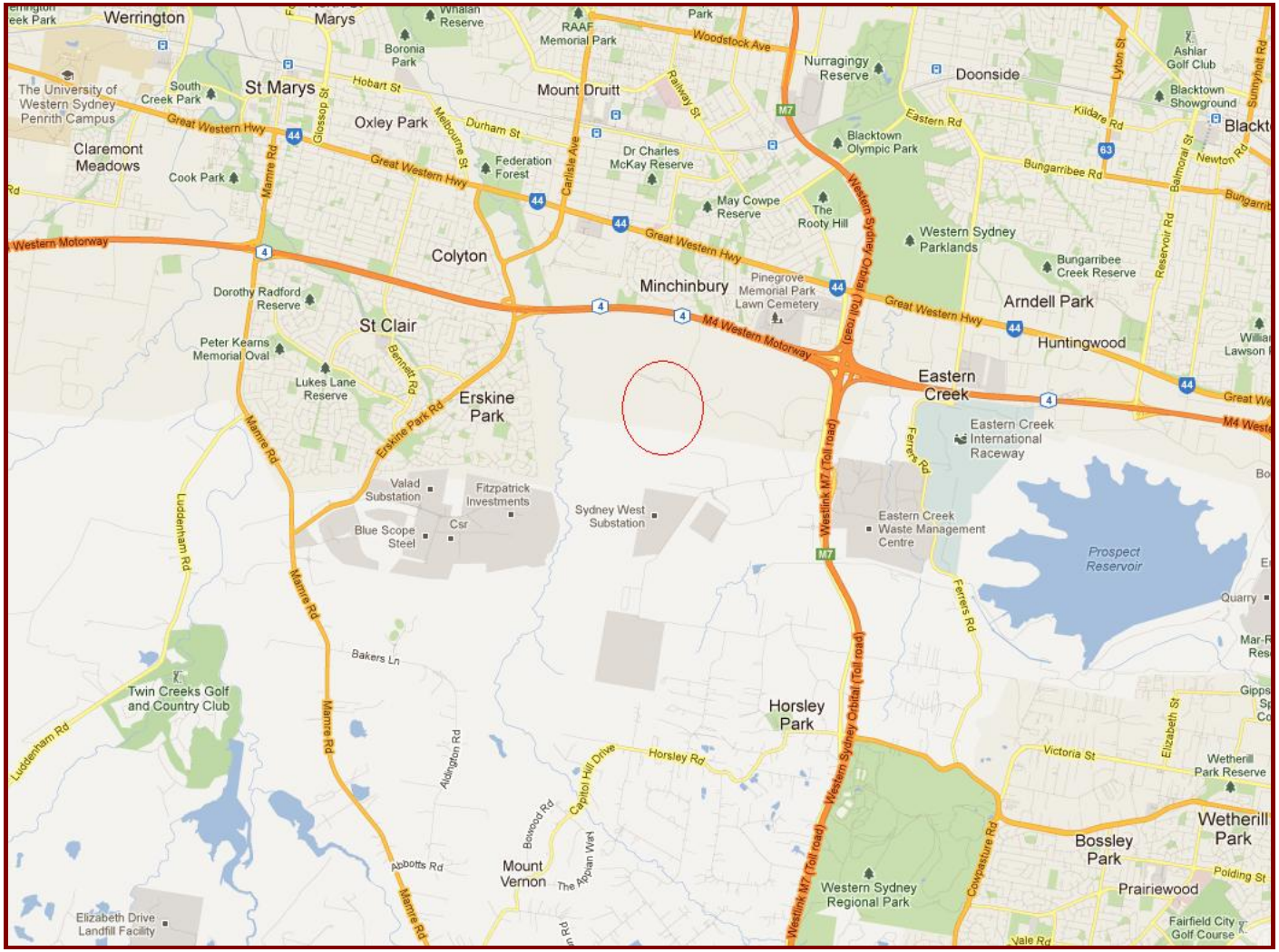

Figure 1. General location of the subject area, circled in red (source of map: Google Maps).

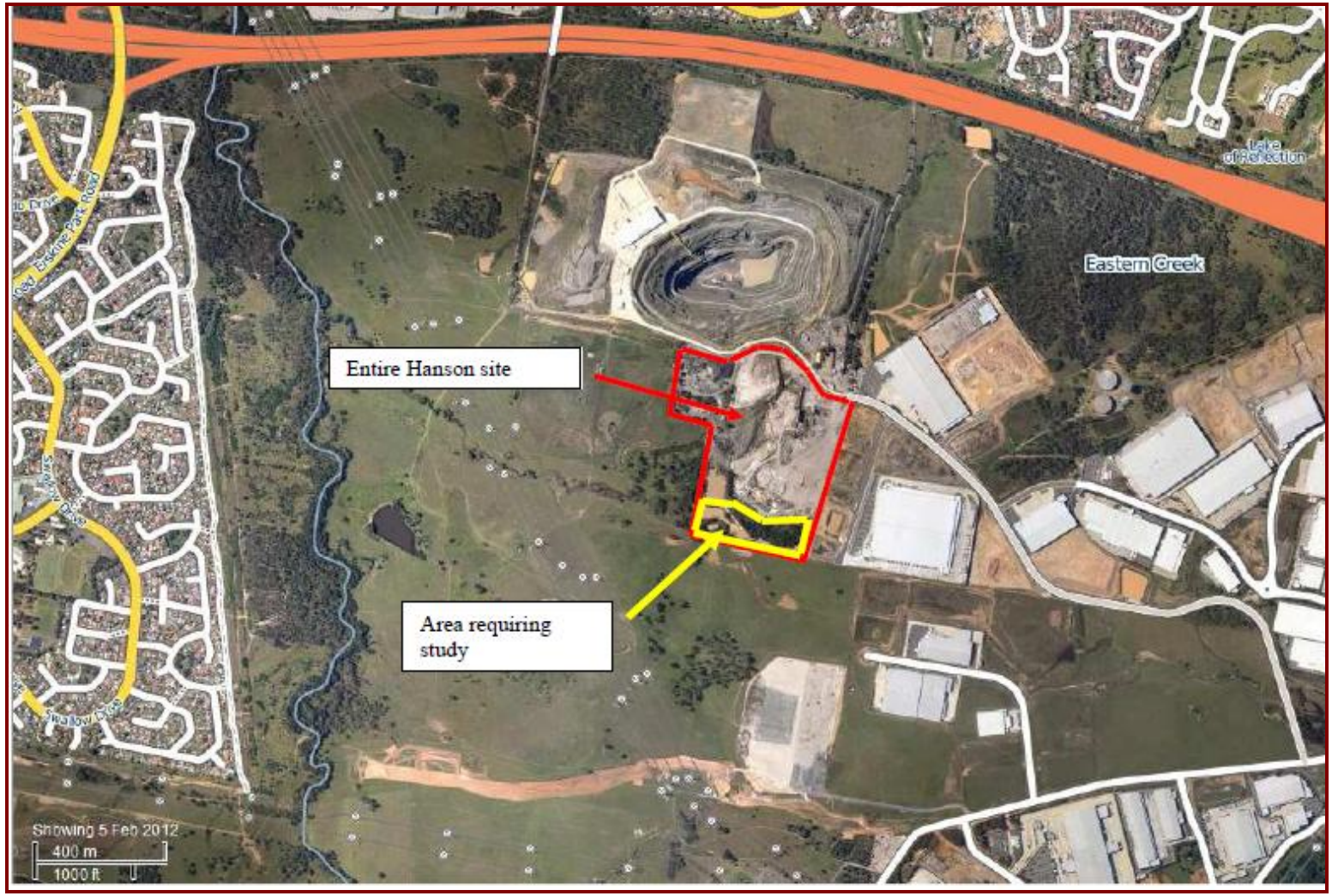

Figure 2. The subject area, outlined in yellow (source of map: Hanson).

1.4 Proposed Development & Approval Context

The proposed Hanson Asphalt and Concrete Facility has Concept and Project Approval (CP 06_0225) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Hanson Construction Materials Pty Ltd is seeking to modify the Concept Masterplan under Section 75W of the EP&A Act. The changes to the Concept Masterplan will not introduce any new development elements to the project but result in a change in the location of the respective facilities within Lot 5 DP1145808, some of which would be located in areas of high Aboriginal archaeological sensitivity in *State Environmental Planning Policy 59 – Eastern Creek Precinct (Stage 3) Precinct Plan* (SEPP 59) and subject to Condition 28 of the Project Approval of January 2010, which requires that *'the proponent shall not disturb those areas identified as 'High Sensitivity' in the Precinct Plan'*.

The Concept Approval allowed for the following elements:

- Concrete batching plant with a production capacity of up to 144,000m3 per annum;
- Office and laboratory;
- Logistics/Fuel depot and workshop;
- Materials storage depot (with import of up to 36,000 tonnes of material per annum);
- Asphalt/Emulsion plant with a production capacity up to 360,000 tonnes per annum;
- Office and plant;
- Subdivision of the site;
- Bulk earthworks across the site;
- Provision of a precinct plan collector road through the site; and
- Provision of a range of associated infrastructure to provide essential services to the development site.

1.4.1 Riparian Corridor / Conservation Area

Hanson Construction Materials Pty Ltd has committed to establishing a Riparian Corridor / Conservation Area within the subject area. This conservation area includes a sample of landscapes that have been identified in SEPP 59 as having Indigenous heritage conservation value. The landforms within the conservation area include a first order drainage line and hillslopes; note that these are the only types of landforms within the subject area and as such the conservation area contains a representative sample. The conservation area also represents an area of relatively undisturbed landscape, in comparison to the rest of the subject area which has been subject to significant disturbance in the past.

One registered Aboriginal site is situated within the subject area. This site will be protected from all potential impacts of the proposed development as it is located within the riparian/conservation area. The location of the riparian/conservation area, including the registered Aboriginal site, is shown on **Figure 3.** The registered site is also further discussed in **Section 3.4**.

Hanson will be managing the conservation area according to the following protocols:

- The riparian corridor will be cordoned off on the Hanson boundary with a "cyclone style" galvanised fence that will prevent from any un-authorised pedestrian or vehicle access from Lot 5. A pedestrian gate will be included on the fence for "authorised access only";
- The fence will be commissioned prior to construction works to Lot 5; and
- The fence will remain on site for the duration of the works and will remain erected for the continued operations on site following completion of the subdivision.

1.5 Assessment Aims and Objectives

The principle aims of the assessment are to:

- Outline the statutory requirements relevant to the subject area with regard to Aboriginal cultural heritage;
- Carry out background research to identify known Aboriginal objects, sites and places, and to identify the potential for any unknown objects and places of significance;
- Undertake Aboriginal Community Consultation in accordance with the OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*;
- Carry out a survey of the subject area to rediscover and assess known items, identify previously unrecorded items, and assess the Aboriginal archaeological potential of the subject area;
- Develop preliminary mapping of the known and potential Aboriginal cultural heritage sites in the subject area;
- Assess the archaeological (scientific) significance of any Aboriginal sites or objects that may be impacted by the proposed development;
- Identify any possible constraints to the proposed development;
- Assess the potential for direct and indirect impact to Aboriginal cultural heritage; and
- Identify and recommend measures to mitigate any potential adverse heritage impacts.

1.6 Limitations

Physical investigation of the subject area for the purposes of the ACHA has been limited to surface survey.

Information presented in the report reflects the scope and accuracy of the background data, which in some instances is limited. The investigation did not include any independent verification of the results and interpretations of externally sourced existing reports.

The report includes some predictions about the probability of subsurface archaeological materials occurring in certain landforms/landscapes of the subject area. The predictions have been based on environmental contexts, background research and the results of the survey. It is acknowledged, however, that sub-surface archaeological material may survive in certain contexts despite surface and environmental indicators that suggest otherwise, and that the converse also applies.

1.7 Investigator and Contributors

This report was written by Lisa Murray (Archaeologist, AHMS). Alan Williams, Senior Archaeologist, and Lisa Newell, Associate Director, AHMS, reviewed the report.

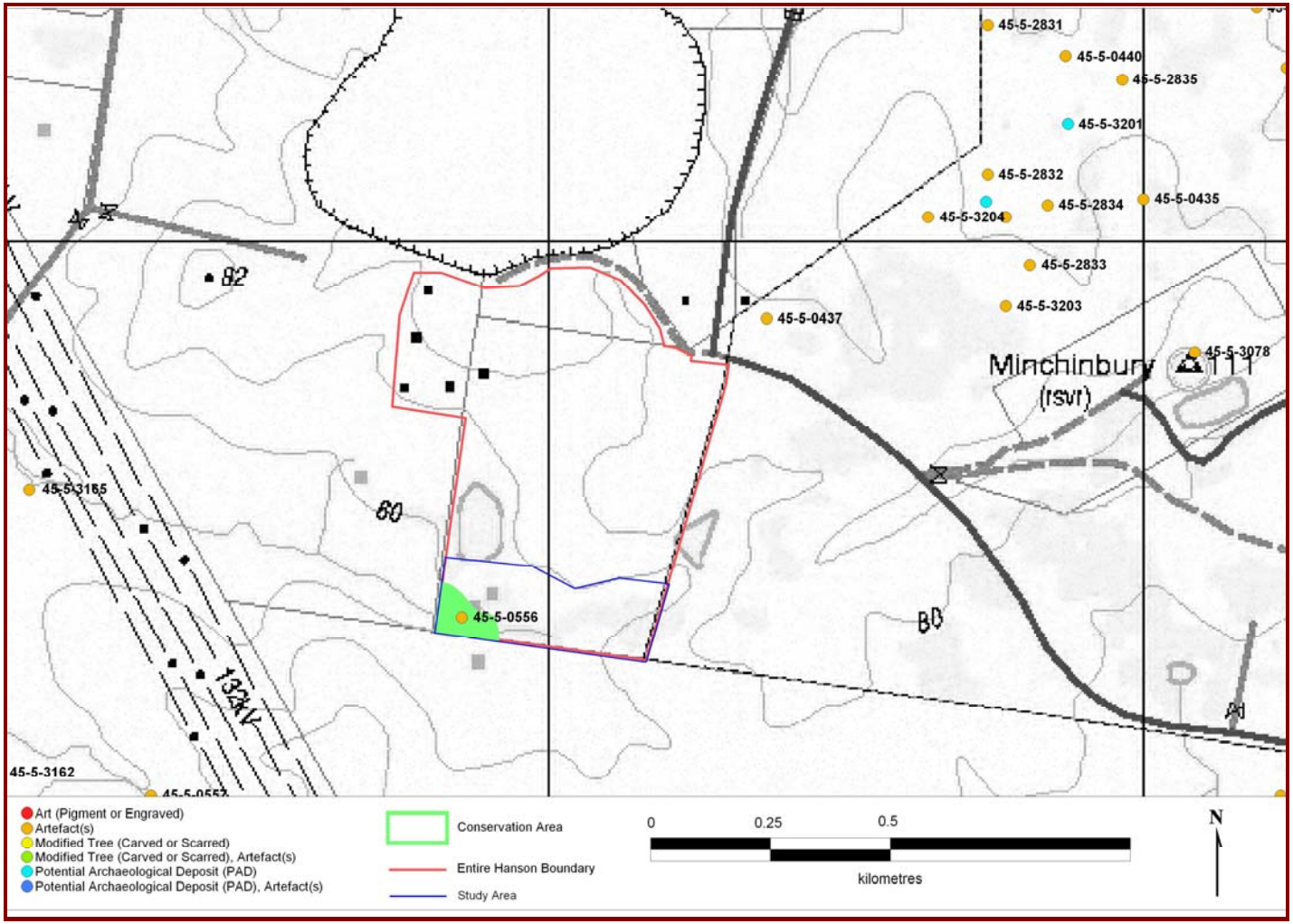

Figure 3. Location of the Riparian Corridor/Conservation Area including the registered Aboriginal site. (Data source: OEH AHIMS 26.03.12, Hanson Construction Materials Pty Ltd).

2. LANDSCAPE CONTEXT

2.1 Background

Archaeological assessment reports include information about the environmental context of subject areas because of the important role environmental characteristics played in influencing the types of archaeological sites in any given area. Physical environments influenced both the type and availability of natural resources and the types of cultural activities that were carried out in the past. As a result, this also influenced the types of archaeological sites that may be found. A determination of the former environmental context is essential to develop accurate models of cultural activity, site distribution patterns and the archaeological potential of any given area. The environmental context of the subject area is discussed below.

2.2 Geology and Soils

The study area is predominately located within the Blacktown soil landscape and borders on an area of disturbed soil landscape (Bannerman and Hazelton 1990). The topography of the Blacktown soil landscape is characterised by gently undulating rises with local relief between 10 – 30 metres, all situated on Wianamatta Group shales (Bannerman & Hazelton, 1990). Crests and ridges are broad and rounded with convex upper slopes grading into concave lower slopes. The soil profile consists of shallow to moderately deep (<100 centimetres) hard setting, mottled, texture contrast soils. The underlying geology consists of the Ashfield shale group which is comprised of laminate and dark grey siltstone.

Disturbed soil landscapes are areas where the original topography of a landscape has been modified by human action to depths of at least 100cm and slopes largely levelled to <5%. In these areas the original soil has been removed, greatly disturbed or buried and original vegetation has been completely cleared.

Geotechnical investigation carried out by Martens and Associates Pty Ltd (2012) provides additional information about the soil profile of the subject area. One test pit (TP 221) was excavated within the subject area. The soil profile recorded in this pit shows 60 centimetres of clay fill over 20 centimetres of organic silt, with natural clays encountered to a depth of 2.5 metres over natural siltstone. This profile indicates that the natural soil profile has been somewhat disturbed. Shallow silts such as this are typically encountered in areas where the natural A horizon soil has been removed by erosion and replaced with alluvium (silt) through water action.

Natural soil profiles are important to archaeologists because Aboriginal sites and objects typically remain intact within natural A-horizon soils (topsoils). The geotechnical results for

TP 221 indicate that, in this locality at least, the potential for Aboriginal sites or objects to remain intact is low because natural A-horizon soils are no longer present (Martens and Associates 2012).

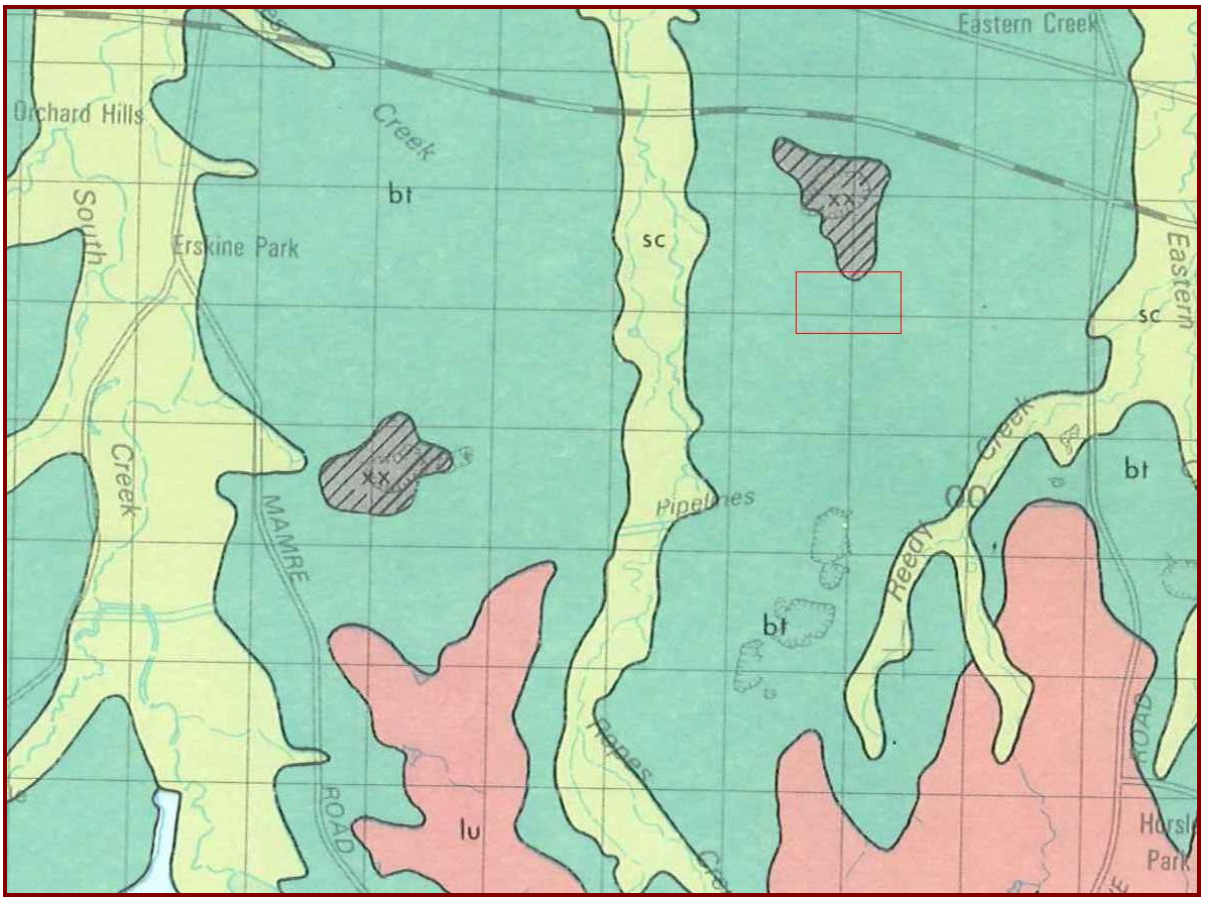

Figure 4. The approximate location of the subject area, marked in red, in relation to soil landscape mapping. Bt=Blacktown (source of map: Bannerman and Hazleton 1990).

2.3 Vegetation

The natural vegetation of a landscape is an important consideration, because it provided Aboriginal people with resources. Bark from trees could be stripped to make canoes, shields and other items. The vegetation itself provided food resources such as edible plants and also habitats for animals such as possums and birds which could be hunted.

The vegetation of the Blacktown soil landscape originally comprised of open dry sclerophyll forest, however much of the original vegetation has been cleared in the past. Common

species of the original vegetation are listed in Table 1, and indicate the variety of natural resources that were available to the local Aboriginal population.

Table 1. Common native plant species of the study area, listed according to soil landscape (source: Bannerman and Hazelton, 1990).

Blacktown Soil Landscape
Forest red gum (*Eucalyptus tereticornis*)
Narrow leaved iron bark (*Eucalyptus creba*)
Grey Box (*Eucalyptus moluccana*)
Spotted gum (*Eucalyptus maculate*)
Grey gum (*Eucalyptus punctata*)
White stringybark (*Eucalyptus globoidea*)
Broad leaved ironbark (*Eucalyptus fibrosa*)
Woollybutt (*Eucalyptus longifolia*)

2.4 Water

Ropes Creek is situated approximately 500 metres to the west of the subject area, and Eastern Creek is situated two kilometers to the east. A first order drainage line, which has been modified by rural land uses in the past, crosses the southern boundary of the study area. This drainage line is likely to have only contained water following periods of rain, and would not have been a reliable source of water. The most reliable source of fresh water for Aboriginal people in the past would have been Ropes Creek, to the west of the subject area.

2.5 Land-Use History

Historical and recent land uses have extensively disturbed several parts of the subject area. Original vegetation has been extensively removed from the subject area, except for a small pocket in the south west corner. The clearing for agricultural purposes is likely to have resulted in the removal of most or all of the old-growth trees from the subject area, reducing the potential for the existence of scarred trees.

Historical land uses have included early agricultural and pastoral activities. Ground disturbance is likely to have been caused by ploughing, grazing of farm animals and the construction of fences. More recent disturbances include the construction of a dam, unsealed roads and bulk earth works have occurred in the eastern portion of the study area, which has reworked the natural topography. The northern boundary of the subject area borders an area of land heavily disturbed by the current Hanson Construction Materials plant.

The construction of features such as dams and unsealed roads will have involved localised disturbance to soils. Ploughing is likely to have involved disturbance to the soil over larger areas, although to an unknown depth (and potentially quite shallow). Use of the land for pasture is also likely to have involved less substantial disturbance of the soil, through, for instance, tracks worn by cattle. Clearing is likely to have led to erosion in places, and the presence of livestock will have contributed to bioturbation. This long-term agricultural use is likely to have had some impact on the archaeological record; transporting artefacts from their primary contexts.

Historic aerial photographs were obtained from the NSW Department of Land and Property Information. The aerial photographs were analysed in order to understand the extent and nature of previous land use disturbance within the subject area. The aerial photographs indicate that the subject area has undergone a variety of impacts in the past, including erosion along the first order drainage line, vegetation clearance (which in turn disturbs the integrity of the natural soil profile) and a variety of earthworks such as fill movement and tracks. Such disturbances have occurred across almost the entirety of the study area and it is noted that the entire subject area has been subject to vegetation clearance at various times since 1947. The aerial photographs, along with disturbance overlays, are presented below.

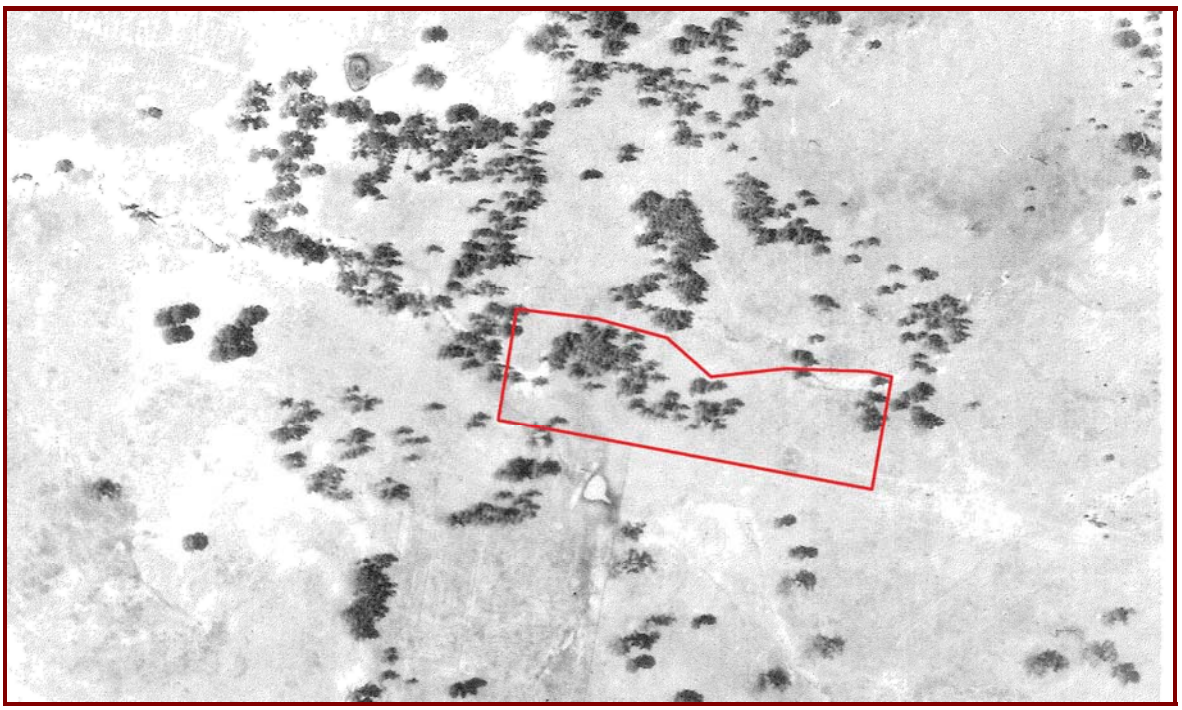

Figure 5. 1947 aerial photograph with the approximate location of the subject area marked in red. Map source: Land and Property Information Services.

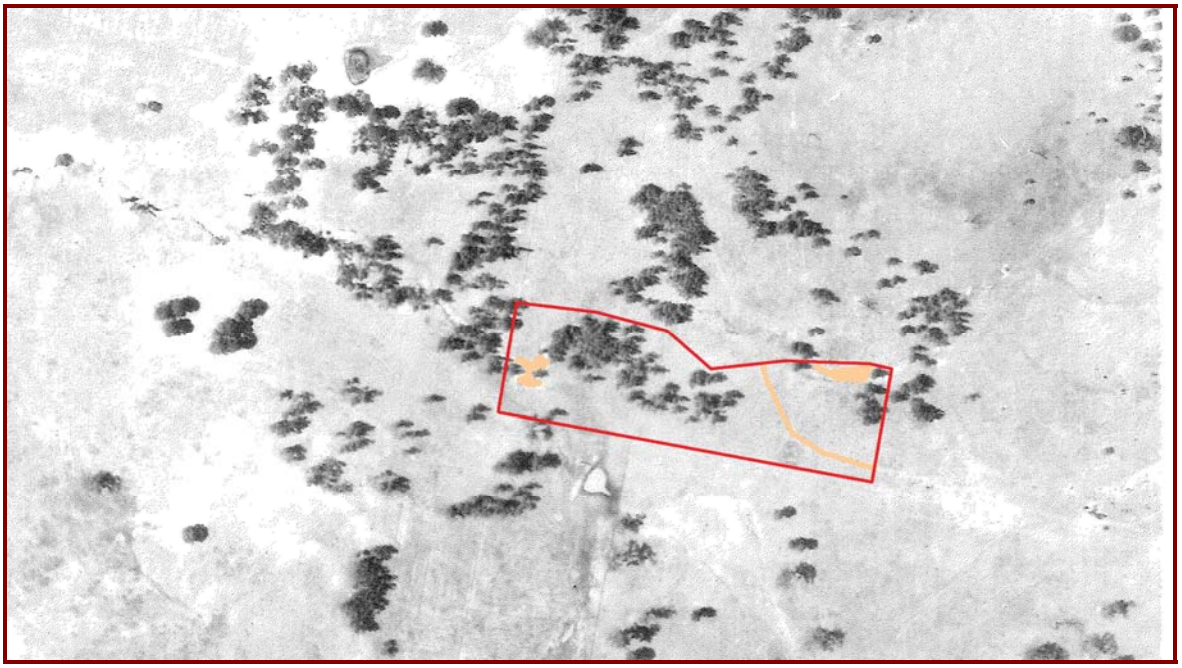

Figure 6. 1947 aerial photograph with heavy disturbances marked in orange. Map source: Land and Property Information Services.

Figure 7. 1965 aerial photograph with the approximate location of the subject area marked in red. Map source: Land and Property Information Services.

Figure 8. 1965 aerial photograph with heavy disturbances marked in orange. Map source: Land and Property Information Services.

Figure 9. 1978 aerial photograph with the approximate location of the subject area marked in red. Map source: Land and Property Information Services.

Figure 10. 1978 aerial photograph with heavy disturbances marked in orange. Map source: Land and Property Information Services.

Figure 11. Current aerial photograph with the approximate location of the subject area marked in red. Map source: NearMap.

Figure 12. Current aerial photograph with heavy disturbances marked in orange. Map source: NearMap.

2.6 Summary

Several landscape types are identified in SEPP 59 as having potential Indigenous heritage conservation value. It is also noted in SEPP59 that the conservation value and significance of these landscapes is dependant on the level of disturbance and integrity of the remaining landscapes. The conservation strategy and management principles for Indigenous Heritage from SEPP 59 are outlined in **Section 3.3** of the ACHA. However for the purposes of this discussion it is noted that landscapes which have conservation value under SEPP 59 are those which have been minimally disturbed by land-use practices over the last 200 years in addition to being regionally significant and retaining Aboriginal heritage value and/or archaeological significance.

There are two landscape types within the subject area that are identified in SEPP 59 as having potential Indigenous heritage conservation value, these are hillslopes on the Ashfield Shale landscape and first order creek lines. Such landscapes may have conservation value since there are few archaeological sites remaining on these landform types across the Cumberland Plain. The landforms within the subject area are shown in **Figure 13.**

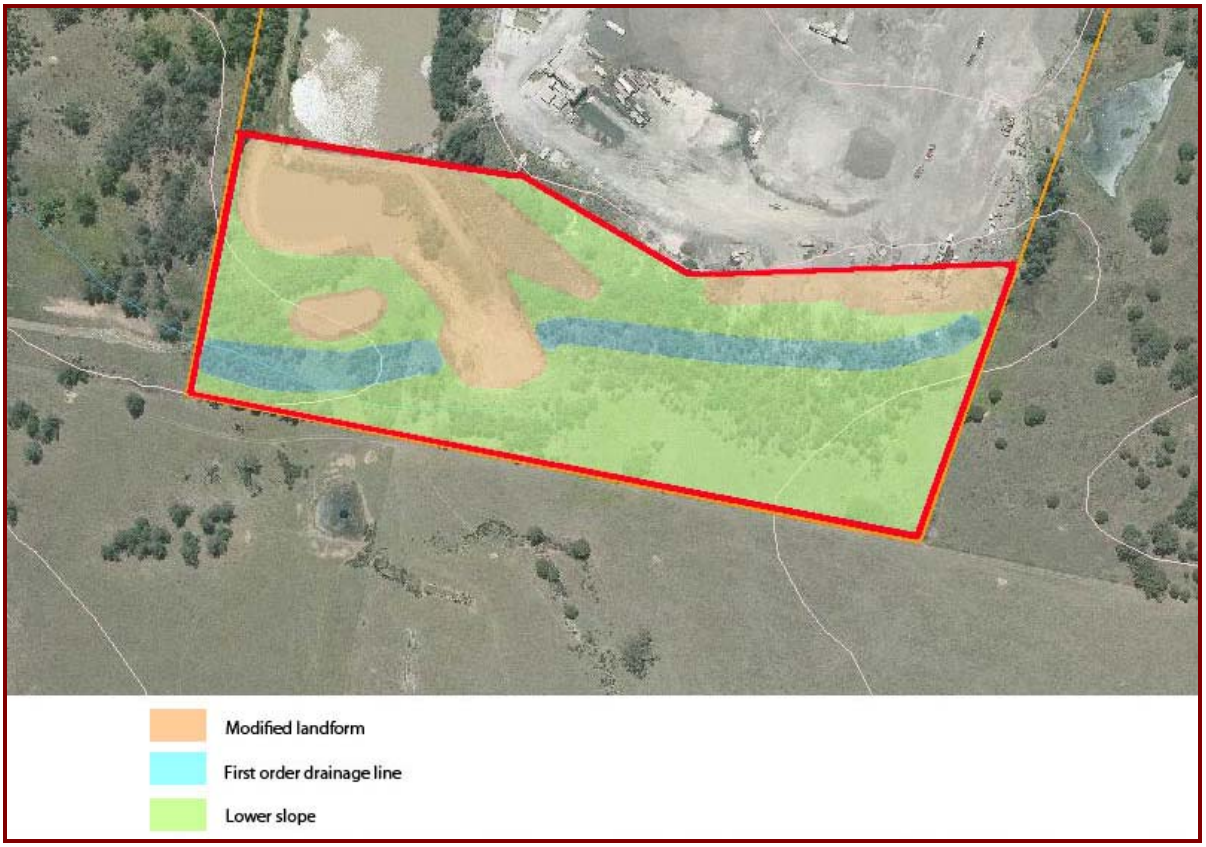

Figure 13. Landforms and drainage lines within the subject area (source of map: Lands and Property Information SIX Viewer).

From the review of landscape information presented in this section, it is evident that the subject area has been subject to significant land use disturbance in the past. From a review of historic aerials, it appears that the south west corner of the subject area has been disturbed less than other parts of the subject area, although erosion and vegetation clearance still occurred in this area. Such disturbances would have destroyed or compromised the integrity of any archaeological deposits that may have been located within that area.

3. REGIONAL AND LOCAL CHARACTER OF ABORIGINAL LAND USE

This section discusses the regional and local archaeological context within which the subject area is situated. For the purposes of determining settlement and site location patterns, archaeologists examine regional and local trends in the distribution of known sites in relation to environment and topography. This provides evidence about economic and social systems in the past and also assists archaeologists in predicting likely site types, site locations and the nature of the archaeological resource in any given area.

3.1.1 Early Occupation

Aboriginal occupation in the region dates back well into the Pleistocene period (i.e. before 10,000 years ago). This evidence comes from radiocarbon dates retrieved from excavated sites at Cranebrook Terrace (41,700 years before present [BP]), Shaw's Creek K2 (14,700 BP), and George & Charles St Parramatta (c.25,000 – 30,000 BP) (Jo McDonald Cultural Heritage Management Pty Ltd, 2005; Kohen et al., 1984; Nanson et al., 1987). Other sites include Burrill Lake and Bass Point on the south coast with dates >15,000, and Loggers Shelter and Tempe House, the latter a hearth on Cooks River, both dating to early Holocene (5-10,000 years BP) (Attenbrow, 1987; Bowdler, 1984; Lampert, 1971; Jo McDonald Cultural Heritage Management Pty Ltd, 2006a). More recently, AHMS has recently obtained ages of between 12, 000 – 15,000 years BP for PT12, an artefact scatter within a sand dune overlooking Hawkesbury River in Pitt Town (AHMS, 2010).

The dating of Cranebrook Terrace has been widely criticised, but has never been withdrawn from publication, and they are still considered the earliest in Sydney. It is, however, considered that the George and Charles Street site is the oldest reliable date for Aboriginal occupation in the Sydney region, although these dates similarly have interpretation issues.

The early occupation sites dating to the late Pleistocene /early Holocene have been found in deep stratified rockshelter deposits and within alluvial deposits, particularly on the margins of large rivers such as the Hawkesbury-Nepean and Parramatta Rivers. Drawing on this evidence, McDonald has recently argued that early occupation of the Sydney basin was focused on these primary river systems and characterised by a high degree of 'residential mobility' between a small number of sites (McDonald, 2008). However, the survivability and taphonomic loss of older sites in such a heavily urbanised environment must also be considered (Surovell et al. 2007) with these areas receiving only minimal impact from the coastal plains for example.

3.1.2 Intensification During the Holocene

The vast majority of dated sites in the Sydney region are less than 5,000 years old (35 out of a total of 48 dated sites) (Attenbrow, 2002). It has been argued that this is a result of increased populations and 'intensification' of cultural activity during this period. The prevalence of sites dating to the last 5, 000 years may also be a result of the last significant rise in sea level, about 7, 000 years ago (Sloss et al. 2007). The sea level rise would have submerged many of the older sites along the coastal fringe and forced Aboriginal groups westward to the current coastline.

In an attempt to better understand changes in use and occupation during the Holocene period, Val Attenbrow undertook a detailed study of the Upper Mangrove Creek catchment to the north of Sydney (Attenbrow, 2006). Attenbrow's study found significant changes in site patterning during the Holocene. She concluded that population was unlikely to have changed, but the use of sites, most notably in the last 2,000 years did. This increased use of sites appeared in the archaeological record as increasing population.

Smith et al. (2008) and Williams et al. (2010), both suggest that populations were far larger in the last 2,000 years than any preceding period. Using radiocarbon data and regional studies, they demonstrate that there is an increasing use of sites in all locations at this time, which cannot be explained by movement of people across the landscape, but rather increasing numbers of people using more of the landscape.

This issue is still widely contested in archaeological literature, but whatever the reason, archaeological sites within the Sydney Basin are dominated by late Holocene sites.

3.1.3 Regional Site Patterns

More than 4,500 sites have been recorded and registered with the OEH *Aboriginal Heritage Information Management System* (AHIMS) for Sydney, reflecting both the wealth of archaeology in the region and the number of archaeological investigations undertaken.

The dominant site types in the Sydney region (in the 15 - 20 percent frequency range) are rock shelters with midden deposit, rock shelters with art, rock art engravings and open artefact scatters (Attenbrow, 2002). Site types in the 5 - 15 percent range include rock shelters with artefacts, grinding grooves and open middens (Attenbrow, 2002). The distribution, density and size of sites is largely dependent on environmental context. For instance, middens are found in close proximity to marine, estuarine and less often,

freshwater bodies. Rockshelters are only found in areas of exposed sandstone escarpment and grinding grooves are found on areas of exposed flat bedded sandstone near a source of water.

A study of the regional archaeology of the Cumberland Plain by Kohen made a number of findings about site location patterns in the Sydney area. The study demonstrated that proximity to water was an important factor in site patterning. Kohen found that 65 percent of open artefact scatter sites were located within 100 metres of permanent fresh water (Kohen, 1986). Only 8 percent of sites were found more than 500 metres away from permanent fresh water. In short, Kohen argued that open artefact scatters are larger, more complex and more densely clustered along permanent creek and river lines. Kohen's study also found that silcrete (51 per cent) and chert (34 per cent) are the most common raw materials used to manufacture stone artefacts. Other raw materials include quartz, basalt and quartzite.

Although the patterns described above have been generally supported by subsequent investigations, Kohen's study was limited by a reliance on surface evidence. Extensive excavation across the Cumberland Plain has since shown that areas with no surface evidence often contain sub-surface deposits buried beneath current ground surfaces. This is a critical consideration in aggrading soil landscapes, such as those commonly found across the Cumberland Plain. In a 1997 study of the Cumberland Plain, McDonald (1997) found that:

- 17 out of 61 excavated sites had no surface artefacts prior to excavation.
- The ratio of recorded surface to excavated material was 1:25.
- None of the excavated sites could be properly characterised on the basis of surface evidence. In short, surface evidence (or the absence of surface evidence) does not necessarily indicate the potential, nature or density of sub-surface material.

The results of McDonald's study clearly highlight the limitations of surface survey in identifying archaeological deposits in this landscape. The study also shows the importance of test excavation in establishing the nature and density of archaeological material on the Cumberland Plain.

J. McDonald has undertaken over 20 years of consulting archaeology in the Cumberland Plain, and like Kohen has developed predictive models for the distribution of Aboriginal objects. In a recent publication, White & McDonald (2010:29) summarised this model as follows:

> *Topographic and stream order variables correlate with artefact density and distribution. High artefact density concentrations may have resulted from large*

number of artefact discard activities and/or from intensive stone flaking. Highest artefact densities occur on terraces and lower slopes associated with 4th and 2nd order streams, especially 50 – 100 metres from 4th order streams. Upper slopes have sparse discontinuous artefact distributions but artefacts are still found in these landscape settings.

3.2 Local Archaeological Context

Archaeological studies in the local area have been undertaken since the early 1980s (Haglund, 1980; McIntyre, 1984). The earliest investigations focused on Aboriginal archaeological surveys of the area. Several archaeological investigations have recently been undertaken in the local area for proposed developments and regarding the widening of local roadways. These investigations include desktop reviews, archaeological surveys and subsurface investigations.

Outlined below is a summary of Aboriginal archaeological investigations of the local area, as shown in **Figure 14.**

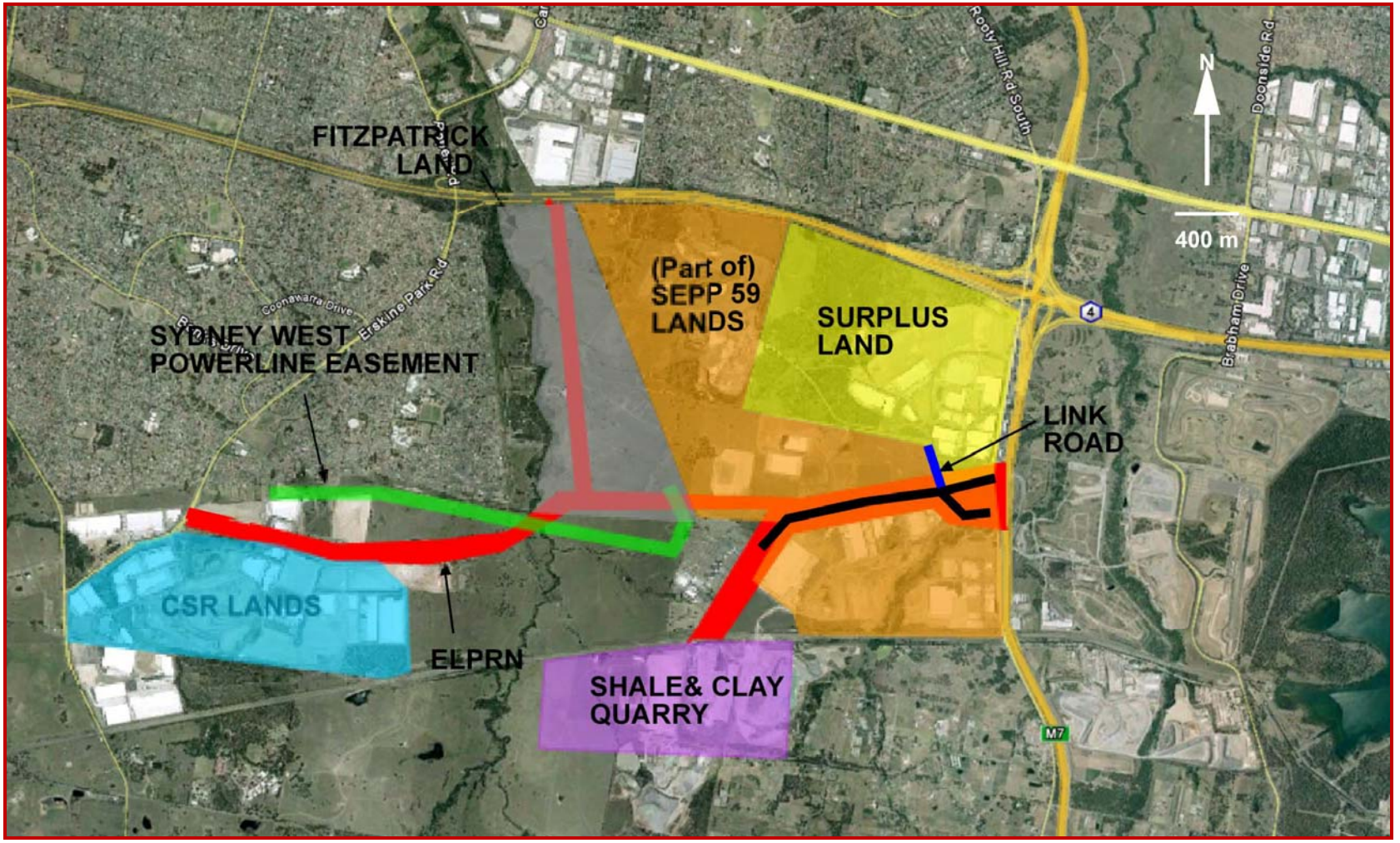

Figure 14. A map showing the locations of previous assessments in the vicinity of Old Wallgrove Road. Each of these areas is discussed in detail in the main text.

CSR Lands, Erskine Park

In 1998, Jo McDonald Cultural Heritage Management Pty Ltd (JMCHM 1998) undertook an archaeological survey at the CSR lands at Erskine Park (2 kilometres southwest of the subject area). During the survey six artefact scatters and one isolated find were identified. The assessment also identified areas of potential sub-surface archaeological sensitivity within the site.

Another archaeological assessment of the CSR lands at Erskine Park was undertaken in 2004, by HLA-Envirosciences to support a Development Application (HLA-Envirosciences Pty Ltd, 2004 cit. Navin Officer Heritage Consultants, 2008). The survey recorded no additional archaeological sites when compared with JMCHM's report. However, it was noted that the effectiveness of the survey at this time was hampered by low ground surface visibility.

In 2003, Navin Officer Heritage Consultants conducted subsurface investigations of the CSR lands. In total, 285 Aboriginal objects were recovered from 88 of the 250 test pits excavated at the site. Post excavation analysis identified 17 different types of lithic items within the assemblage and raw materials comprised silcrete and tuff with minor components of quartz, quartzite, chert, chalcedony and two unidentified stone types.

Navin Officer Heritage Consultants Pty Ltd undertook an additional program of subsurface test excavations in 2005 at the CSR site. A total of 172 Aboriginal objects were recovered from 21 out of 24 excavated test pits. The test pits were located on a low spur line.

An area of Aboriginal archaeological assessment and subsurface testing was undertaken in 2006 (JMCHM, 2002; 2006b; 2006c). The site was identified during an archaeological survey as an area of archaeological potential. Test excavation of the PAD recovered 126 Aboriginal objects from less than half of the 55 test pit locations. JMCHM concluded that the site was disturbed, had low artefact densities and low archaeological significance.

Sydney West Powerline Easement

An Aboriginal heritage assessment and survey was undertaken for a 3.5 kilometre 132kV power line easement from the Sydney West Substation (located to the south of the subject area) to Erskine Park (JMCHM, 2006c).

Two artefact scatters and an area of potential archaeological deposit were identified during the survey located in valley floor landforms in the vicinity of ephemeral drainage lines. The area of PAD was located at the junction of Ropes Creek and an un-named tributary.

Clay and Shale Quarry, Old Wallgrove Road

Several archaeological investigations have been undertaken for a clay and shale quarry on the corner of Old Wallgrove Road and Burley Road, Horsley Park (Haglund, 1987). Haglund undertook a survey and identified potentially modified (carved or scarred) trees. Avoidance of these potential archaeological sites was recommended.

In 2002, an archaeological investigation of the proposed quarry site was undertaken by John Appleton (Jon Appleton Archaeological Surveys and Reports Pty Ltd, 2002). During the site survey, two isolated finds and an area of PAD were identified. The artefacts were identified adjacent to the eastern bank of Ropes Creek, and on an eroded vehicular track. The area of PAD was identified on the bank adjacent to Ropes Creek. Two areas of archaeological sensitivity were identified in an area of proposed works for the quarry, and archaeological sub-surface testing and/or further assessment was recommended.

Surplus Land adjoining (former) Australia's Wonderland Theme Park

Several archaeological assessments and test excavations have been undertaken in an area of surplus land adjoining the former Australia's Wonderland Theme Park (east of the subject area).

The Archaeological Management Consulting Group (AMCG) conducted an Aboriginal archaeological survey of the surplus land in 1997 (AMCG, 1997). The investigation identified seven artefact scatters and eight isolated finds. The effectiveness of the survey, however, was hindered due to dense grass cover. The majority of the sites were found on exposed surfaces of the numerous vehicle tracks in the area. The artefacts consisted of red silcrete flakes, flaked pieces and possible quartz manuports.

AMCG identified the sites as having low to moderate archaeological integrity due to historical disturbance. AMCG identified that it was likely the archaeological sites were the result of limited stone knapping and discard undertaken by Aboriginal people in the past. The low densities of artefacts recovered from the study area may have been due to limited visitation of the area or due to maintenance activities involving the use of raw materials across the area. AMCG also indicated that the results of the survey are reflective of sporadic use by people moving between two favorable creek lines (Eastern and Ropes Creek).

In 2002, Dominic Steele undertook an Aboriginal survey and assessment of the site (Dominic Steele Consulting Archaeology, 2002). Based on his findings, and those of previous reports

undertaken in the area, he undertook an Aboriginal archaeological test excavation in 2003 at the surplus land site for a proposed business park development (Dominic Steele Consulting Archaeology, 2003). The program of test excavation focused upon five artefact scatters, two isolated finds, a potentially culturally modified tree and an area of PAD. Aboriginal artefactual material was recovered from seven of the 20 test pits excavated at the site. The total number of artefacts recovered from the excavation was 38, of these 33 were collected from the surface and five from sub-surface excavation. The assemblage comprised six artefacts, one potential edge ground axe and 29 manuports. Four raw materials were represented in the assemblage: silcrete, quartz, tuff and an un-identified volcanic rock. Steele interpreted the results of the excavation and artefact densities as reflecting sporadic use of the area.

In 2006, Jo McDonald undertook an assessment, survey and test excavation of Aboriginal archaeological sites within the area, including a PAD and seven artefact(s) (scatters and isolated finds) (JMCHM, 2006b). Test excavations revealed lithic density was similar in all landforms (e.g. hill slopes, drains, etc) at 0.8 lithics/metre^2. The results of the excavation of the PAD revealed the site was relatively undisturbed, however it had been truncated by naturally occurring erosional activity. A total of 1,550 Aboriginal objects were recovered from the test excavations. The predominant raw material was silcrete with some silicified tuff, quartz and petrified wood.

JMCHM interpreted the results of the excavation in terms of the area being used intermittently in the past by Aboriginal people. This pattern of behaviour would result in the slow accumulation of lithics discarded over a long time period as opposed to more intensive discard associated with domestic locations or tool production areas.

Fitzpatrick Lands

A number of assessments have been undertaken on land west of the subject area, known as the Fitzpatrick lands (e.g. Mary Dallas Consulting Archaeologists, 2005).

Assessments have identified artefact scatters and PADs in the area, particularly on spur lines and alluvial flats adjacent to Ropes Creek. The crest of the spur was noted as being broad and flat. It was predicted that the crests and upper slopes of the spur are likely to have Aboriginal archaeological potential in areas that have not been disturbed (for example due to the construction of electricity transmission lines).

Erskine Park Link Road Network

In 2008, Navin Officer Heritage Consultants Pty Ltd conducted an Aboriginal heritage literature review and site investigations of the proposed Erskine Park Link Road (EPLR) Network in the Western Sydney Employment Hub (Navin Officer Heritage Consultants, 2008). The EPLR Network is located to the south and west of the subject area.

The review identified that no known Aboriginal sites would be impacted by the proposed EPLR Network, however, certain areas were considered to have potential archaeological sensitivity for sub-surface artefactual material. These areas of sensitivity had not been substantially disturbed by historical activities.

In addition to the literature review, Navin Officer Heritage Consultants Pty Ltd surveyed the EPLR Network in order to re-locate known Aboriginal archaeological sites and identifying several previously unrecorded Aboriginal sites.

The Aboriginal archaeological sites (including artefact(s) and PAD) are located on a number of landforms including broad and flat ridge or spur lines (particularly in the vicinity or with views of Ropes Creek and/or Eastern Creek), slopes of spur or ridgelines adjacent to permanent or ephemeral watercourses usually exposed due to natural erosion (in alluvium or gullies) or disturbance (within vehicular track for example).

Aboriginal community representatives present during the field inspection indicated the EPLR Network had no sites or places of significant cultural heritage value, however, it was indicated that areas of potential archaeological sensitivity within the study area may contain as yet unknown archaeological sites, and which may have cultural significance to the Aboriginal community.

Link Road, Eastern Creek

Comber Consultants (2008) undertook an archaeological assessment of a proposed road in the vicinity of the existing Quarry Road, Eastern Creek. Part of the widening of the existing road excluded a riparian/bridge zone located adjacent to an un-named tributary of Reedy Creek. This assessment was undertaken approximately two kilometres east of the subject area.

Although no Aboriginal sites were found in the study area during survey, Comber recommended that subsurface testing should be undertaken prior to construction due to the presence of Aboriginal archaeological sites in the vicinity of the study area.

Based on the findings of Comber's report, test excavations were undertaken of the Link Road PAD, adjacent to Quarry Road. An area of 5 square metres was excavated in addition to testing with an auger (Oliver Brown Consulting Archaeologist, 2010). No Aboriginal archaeological material was discovered during excavations and it was found that the area was heavily disturbed due to the construction of the existing road. The deposits comprised of modern fill and road base overlying archaeologically sterile clays. Test excavations indicated disturbance in some areas exceeded 15 metres from the edge of the existing bitumen road.

It was recommended that no further archaeological investigation or permits were required prior to development of the existing roadway. It was noted that AHIMS was informed regarding the absence of archaeological potential at this registered site.

Valad and Sargents Lands, Eastern Creek

In 2005 Jo McDonald Cultural Heritage Management Pty Ltd (JMCHM) completed a Heritage Conservation Strategy for Aboriginal sites located within the lands owned by Valad Funds Management Ltd and Sargents Pty Ltd, which form part of the Eastern Creek Business Park. These lands formed part of the SEPP 59 Eastern Creek Precinct and is situated immediately to the west of the subject area. McDonald undertook an analysis of past land disturbances, and ground-truthed these during field survey. A variety areas were classified as having high, moderate and low disturbances. These areas of disturbances were also combined with the results of the survey and locations of know archaeological sites in order to determine areas of high, moderate and low archaeological sensitivity (zones 1, 2 and 3 respectively).

JMCHM developed a series of management strategies which were not only based on the location of known archaeological sites, but also the presence of landscapes with high conservation values identified by SEPP59. These management strategies recommended that sites and/or landscapes with high archaeological potential or Aboriginal significance (particularly in threatened landscapes) should be subject to further investigation, those of moderate potential/significance should be managed according to their assessed significance and areas/sites of low/no significance/potential did not require any further assessment.

McDonald identified two areas of high and moderate archaeological sensitivity in the south east corner of the Sargents study area, which overlaps with the current subject area. A riparian corridor/conservation area was also proposed along the first order drainage line which crosses the Sargents land and also the current subject area. More recent analysis of the landscape in the current subject area (see Section 2.5) indicates that disturbance has occurred in the area identified by JMCHM as being of high and moderate potential/sensitivity. However, it is noted that this area is included within the conservation

area proposed by Hanson Construction Materials incorporates, and also includes a representative sample of landforms within the current subject area.

3.3 AHIMS Sites

OEH maintains the Aboriginal Heritage Information Management System (AHIMS), a database of known and registered Aboriginal sites in NSW. A search of the AHIMS database was completed on 26 March 2012. The results indicate that there are 80 registered Aboriginal sites within a two kilometre radius of the study area, with artefact(s) being the most common site type in the local area. The majority of these sites are located in the vicinity of water courses, areas of vegetation, on land that has been minimally disturbed by historical land uses, and/or have been exposed due to human or natural processes (such as erosion). Data from the AHIMS search results is presented in **Table 2** and **Figure 15**.

Table 2. Aboriginal sites registered in AHIMS in the vicinity of the subject area.

Site ID	Site Name	Site Features	In Subject Area
45-5-1063	Miner Glen 1;MG 1;	Artefact(s)	No
45-5-1067	Ropes Creek	Artefact(s)	No
45-5-1068	Roper Road	Artefact(s)	No
45-5-0435	Eastern Creek W6	Artefact(s)	No
45-5-0436	Eastern Creek W3	Artefact(s)	No
45-5-0437	Eastern Creek W4	Artefact(s)	No
45-5-0438	Eastern Creek W2	Artefact(s)	No
45-5-0439	Eastern Creek W1	Artefact(s)	No
45-5-0440	Eastern Creek W5	Artefact(s)	No
45-5-0249	Wallgrove Wallgrove Road	Artefact(s)	No
45-5-0556	Blacktown Southwest 2 Eastern Creek	Artefact(s)	Yes
45-5-0557	Blacktown Southwest 3 Eastern Creek	Artefact(s)	No
45-5-0558	Blacktown Southwest 5 Eastern Creek	Artefact(s)	No
45-5-0559	Blacktown Southwest 7 Colyton	Artefact(s)	No
45-5-0560	Blacktown Southwest 8 Colyton	Artefact(s)	No
45-5-0563	Blacktown Southwest 11 Colyton	Artefact(s)	No
45-5-0564	Blacktown Southwest 12 Colyton	Artefact(s)	No
45-5-0565	Blacktown Southwest 13 Colyton	Artefact(s)	No
45-5-0588	Blacktown Southwest 1 Eastern Creek	Artefact(s)	No
45-5-0484	Colyton 1 Colyton	Artefact(s)	No
45-4-0206	RC 1;	Artefact(s)	No
45-5-2598	EC8 (Duplicate copy of 45-5-2582)	Artefact(s)	No
45-5-2832	IF:3	Artefact(s)	No

45-5-2833	IF:4	Artefact(s)	No
45-5-2834	IF:5	Artefact(s)	No
45-5-2835	IF:6	Artefact(s)	No
45-5-2836	IF:7	Artefact(s)	No
45-5-2837	IF:8	Artefact(s)	No
45-5-2806	AWL 5	Artefact(s)	No
45-5-2822	WBP 1	Modified Tree (Carved or Scarred)	No
45-5-2823	AWL 8	Art (Pigment or Engraved)	No
45-5-2824	AWL 1	Artefact(s)	No
45-5-2825	AWL 2	Artefact(s)	No
45-5-2826	AWL 3	Artefact(s)	No
45-5-2827	AWL 4	Artefact(s)	No
45-5-2828	AWL 6	Artefact(s)	No
45-5-2829	AWL 7	Artefact(s)	No
45-5-2830	IF:1	Artefact(s)	No
45-5-2831	IF:2	Artefact(s)	No
45-5-2861	DTAC 3	Artefact(s)	No
45-5-2987	AUS 1	Modified Tree (Carved or Scarred)	No
45-5-3062	EP PAD 1	Potential Archaeological Deposit (PAD), Artefact(s)	No
45-5-2983	Austral 1	Modified Tree (Carved or Scarred), Artefact(s)	No
45-5-2984	Austral 2	Artefact(s)	No
45-5-2985	Austral 3	Artefact(s)	No
45-5-2986	Austral PAD 1	Potential Archaeological Deposit (PAD)	No
45-5-3159	RCIF 2	Artefact(s)	No
45-5-3160	RCAS 8	Artefact(s)	No
45-5-3161	RCAS 7	Artefact(s)	No
45-5-3162	RCAS 4	Artefact(s)	No
45-5-3163	RCAS 5	Artefact(s)	No
45-5-3164	RCAS 3	Artefact(s)	No
45-5-3165	RCAS 1	Artefact(s)	No
45-5-3076	Austral 4	Potential Archaeological Deposit (PAD), Artefact(s)	No
45-5-3078	Minchinbury Reservoir Artefact Scatter	Artefact(s)	No
45-5-3201	EC3-PAD1	Potential Archaeological Deposit (PAD)	No

45-5-3202	EC3-PAD2	Potential Archaeological Deposit (PAD)	No
45-5-3203	AWL9	Artefact(s)	No
45-5-3204	ISF9	Artefact(s)	No
45-5-3205	ISF10	Artefact(s)	No
45-5-3206	ISF11	Artefact(s)	No
45-5-3286	ISF2 Jacfin	Artefact(s)	No
45-5-3311	Erksine Park 2 (EP2)	Artefact(s)	No
45-5-3312	EPRC2	Artefact(s)	No
45-4-0205	RC 2;	Artefact(s)	No
45-5-0562	Blacktown Southwest 10 Colyton	Artefact(s)	No
45-5-3434	Parramatta SWC PAD	Potential Archaeological Deposit (PAD)	No
45-5-3684	WR1 (Prospect)	Artefact(s)	No
45-5-0561	Blacktown Southwest 9 Colyton	Artefact(s)	No
45-5-3779	Link Road PAD	Potential Archaeological Deposit (PAD)	No
45-5-3842	EPLR1	Artefact(s)	No
45-5-3843	RCIF1	Artefact(s)	No
45-5-3810	Q1 (Prospect)	Artefact(s)	No
45-5-3936	ROPES CREEK AS4	Artefact(s)	No
45-5-3935	Erskine Park 2 (EP2)	Artefact(s)	No
45-5-3992	ROPES CREEK AS5	Artefact(s)	No
45-5-3937	ROPES CREEK AS3	Artefact(s)	No
45-5-3938	ROPES CREEK AS2	Artefact(s)	No
45-5-3939	ROPES CREEK AS1	Artefact(s)	No
45-5-3942	Erskine Park AS1	Artefact(s)	No

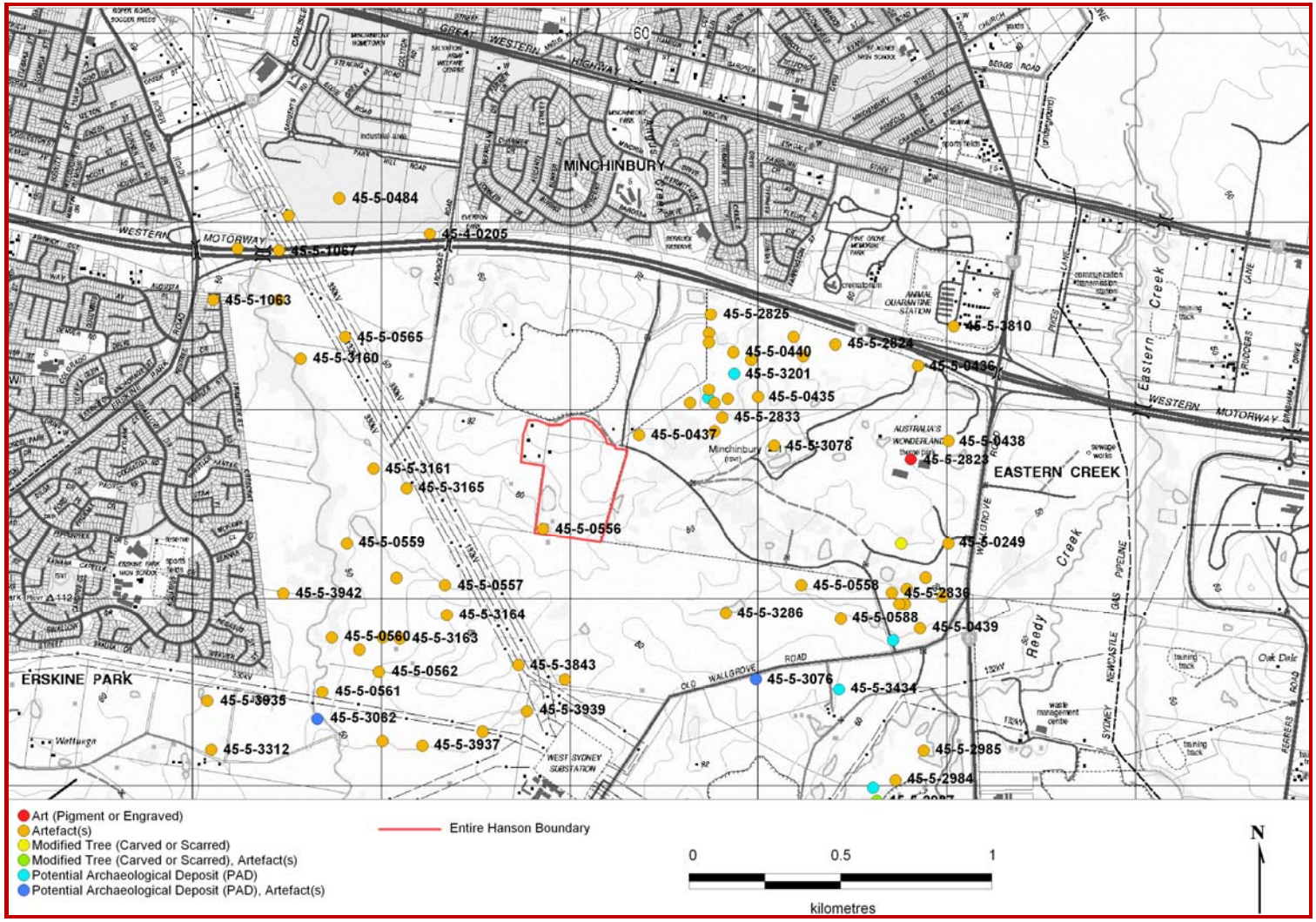

Figure 15. AHIMS sites within and in the vicinity of the subject area.

3.4 Aboriginal Sites within the Subject Area

There is one Aboriginal site, Blacktown Southwest 2 (#45-5-0556), registered within the boundary of the subject area. The site was recorded as part of the archaeological survey of Aboriginal sites within the City of Blacktown (Kohen, 1986). The site is described as being in an erosion scar adjacent to a dam on the eastern side of a ridge top. The site comprises one utilised silcrete flake, five silcrete waste flakes, three quartz flakes, a broken chert blade and a quartzite flake. The location of the site is shown on **Figure 16** and the site card for site 45-5-0556 is included in **Appendix 1**.

Table 3. Previously recorded Aboriginal sites within the subject area.

Site Name	AHIMS Number	Site Type	AGD Easting	AGD Northing
Blacktown Southwest 2	45-5-0556	Artefact(s)	298750	6257180

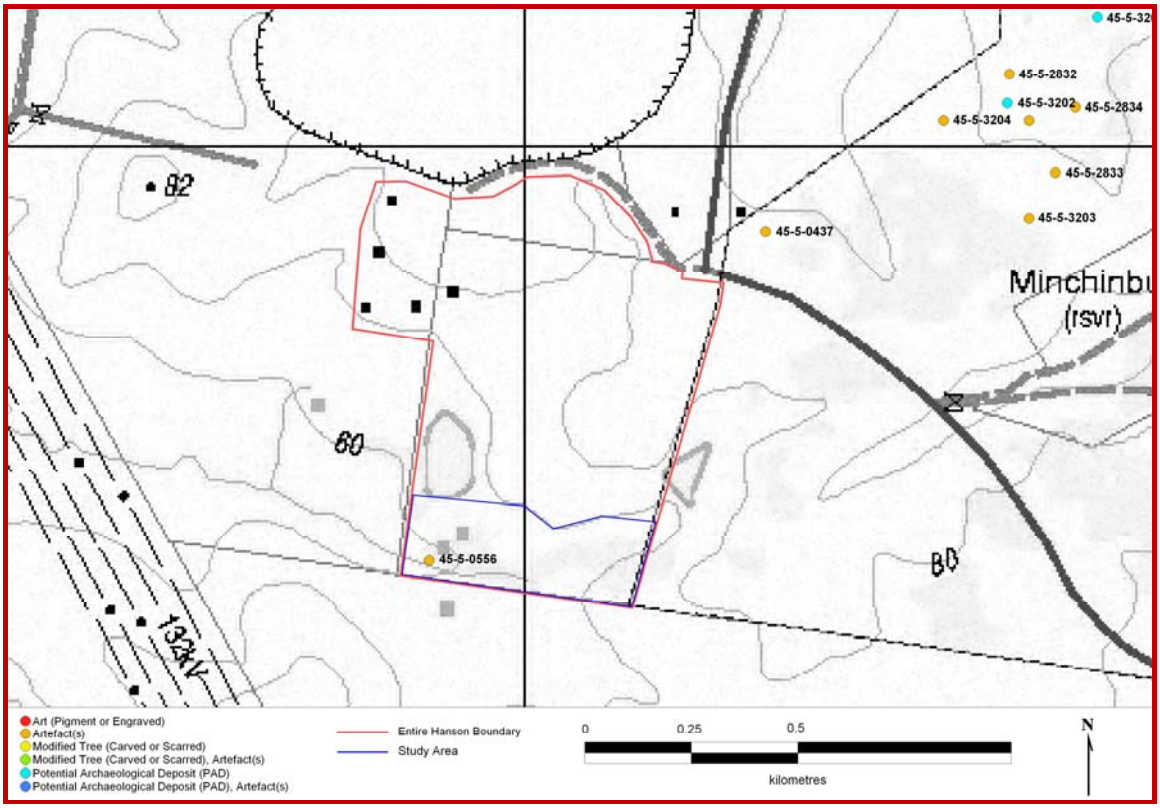

Figure 16. The location of site 45-5-0556 in relation to the subject area (source: AHMS, March 2012)

3.5 Archaeological Predictions

Based upon information compiled within the AHIMS, and the background data reviewed above, a number of conclusions can be made about the Aboriginal archaeology of the study area. A review of the regional and local archaeological record demonstrates that the most common site types in the local area are artefact scatters and isolated finds. The sites are often found situated on large exposures, gullies or other scours that occur due to the high erodibility of shallow soils common across the region. The early European occupation and extensive agriculture and pastoral activities since the early 1800s increased such erosion.

Artefact scatters are predominantly located on terraces, elevated ridges or gentle hill slopes adjacent to watercourses. In general, sites will be <100 metres from the nearest watercourse. Artefact scatters are dominated by silcrete raw materials. These raw materials tend to originate from primary silcrete outcrops, such as the nearby Plumpton Ridge quarry. Other raw materials may include chert, mudstone and to a lesser extent quartz. The assemblages are generally of Bondaian age (<5,000 years BP) and contain frequent backed blades, retouched flakes and other small debitage. Heat treatment of the raw material is also common. Several Pleistocene sites have also been identified in the broader region, with the oldest reliable date in the Sydney region being from the George & Charles Street site in Parramatta dating to c.25,000 – 30,000 BP (Jo McDonald Cultural Heritage Management Pty Ltd, 2005; Kohen et al., 1984; Nanson et al., 1987).

The study area is situated on a lower slope, adjacent to an unnamed first order tributary of Ropes Creek. The subject area slopes gently towards the southwest corner, which appears to be waterlogged (although this may be the result of modern dam overflow). The topography of the study area has been modified by historical land uses that have included earthworks. Vegetation clearance in the past would also have accelerated erosion and subsequently the movement of any artefacts contained within the upper soil layers.

Based on the information above, it is predicted that artefact scatters and isolated finds are the most likely site type that may occur within the study area. Such sites, if any, are likely to exist along elevated flat landforms within 50 metres of the drainage line within the subject area. However, it is noted that the drainage line within the subject area is ephemeral and does not offer a permanent source of water. Therefore, any archaeological sites that may be located near this watercourse are likely to be of low density and low complexity in comparison to those which are situated nearer t major water sources such as Ropes Creek and Eastern Creek. Archaeological deposits are more likely to remain intact in the southwestern corner of the subject area, near registered site #45-5-0556, since this area has been subject to fewer disturbances in the past. It is considered unlikely that intact archaeological evidence will remain elsewhere in the subject area because of high levels of disturbance.

4. SURVEY

A survey of the subject area was undertaken on 9 May 2012 by Lisa Murray (Senior Archaeologist, AHMS) and representatives of the Registered Aboriginal Parties (RAPs): Steve Randall (DLALC), Dennis Hardy (DTAC), Alyce Mervin (DCAC), Gordon Morton (DACHA), Steven Verey (Tocomwall), Danny Franks (Tocomwall). The survey was undertaken in accordance with the methodology provided to the RAPs during the consultation process and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, September 2010).

Ground visibility across the subject area was generally low because of dense grass cover. Transects covered landforms within the subject area as well as targeted the following:

- Sites registered on AHIMS within the subject area;
- Areas with exposed soil, such as around dams, along tracks and in cuttings; and
- Areas identified in the predictive modeling as having higher potential, such as along creek lines.

The topography of the subject area comprises three landform types, a first order drainage line, lower hillslopes and modified lands (such as dam walls and mounds). Generally the subject area slopes gently towards the south west corner, where the first order drainage line is located. The first order drainage line is a tributary of Ropes Creek to the west. The drainage line is ephemeral and is considered to only hold water following periods of heavy rain. A swampy area is situated in the south west corner of the subject area, although this is a result of dam overflow and the drainage line failing to flow properly**.**

In general, the entire subject area appeared to be disturbed to varying degrees. Vegetation clearance has occurred extensively and no old growth trees were observed during the survey, as such the potential for culturally modified trees to be located within the subject area is considered to be nil. Heavy disturbance was noted along the unformed road which crosses the subject area east-west and in the vicinity of the dams in the west and earth mounds in the east of the subject area (**Figure 17, Figure 18, Figure 19**). It is considered unlikely that any intact archaeological deposits would remain in those areas of high disturbance.

Soils observed across the subject area comprised eroded silty clays and compact clays with mixed aggregate inclusions. The soils observed appear to be introduced fill or mixed upcast clays with introduced gravels. No natural soils were observed during the survey, although it

is noted that some natural soils may be retained in the south west corner beneath dense vegetation cover.

One known site is located within the subject area. Registered site #45-5-0556 is an artefact scatter recorded in 1986 by Jim Kohen. The scatter was described as being in a badly disturbed condition, situated beneath a dam wall. The location of the artefact scatter was visited, although the artefacts were not observed. The location of the site was in a swampy waterlogged area surrounded by dense vegetation, which restricted visibility completely **Figure 20.** The conservation area was also inspected and discussed with the RAP representatives present.

Survey transects covered all landforms within the subject area, including slopes, the first order drainage line and modified landforms. A summary of transect information for the survey is provided in **Table 4.**

Figure 17. Example of earth movement disturbance within the subject area.

Figure 18. Example of unformed road disturbance within the subject area.

Figure 19. Example of cut/fill and dam construction disturbance within the subject area.

Figure 20. Example of vegetation cover within the conservation area.

Table 4. Survey transect data.

Transect	Easting (GDA 94, 56)	Northing (GDA 94, 56)	Description	Landform	Condition	Area (m^2)	Exposure (%)	Visibility (%)	Effective coverage % (m^2)
1	Start: 298990 End: 298818	 6257342 6257374	Southern boundary of subject area including conservation area	First order drainage line	This transect included the first order drainage line crossing the southern boundary, and the south west corner of the subject area where the conservation area is located. The first order drainage line has been heavily disturbed across the eastern portion of the subject area by earth moving works. The south west corner has been subject to fewer disturbances. The area was observed to be low lying and waterlogged, with dense regrowth vegetation cover. The location of site #45-5-0556 was visited, although the site could not be relocated. It is considered unlikely that intact archaeological deposits would remain outside the south west corner of the subject area in this transect unit.	1,920	5	20	1 (19.2)

Transect	Easting (GDA 94, 56)	Northing (GDA 94, 56)	Description	Landform	Condition	Area (m^2)	Exposure (%)	Visibility (%)	Effective coverage % (m^2)
2	Start: 298980 End: 299156	 6257370 6257376	Lower slopes across the subject area	Slope	This transect encompasses the lower slopes across eastern portion of the subject area. The slopes have been entirely cleared of original vegetation, which would have accelerated erosion. The slopes are now vegetated with sparse *casuarina* regrowth. Extensive disturbance such as earth movement, erosion and unformed roads were noted in this transect. Such disturbances would have moved or destroyed any Aboriginal objects that may have been located here. Visibility was good, along the unformed roads and eroded areas. Clay sub soils were observed in addition to introduced fill/slope wash. It is considered very unlikely that any Aboriginal sites would remain intact within this transect.	3,750	10	80	8 (300)

Transect	Easting (GDA 94, 56)	Northing (GDA 94, 56)	Description	Landform	Condition	Area (m^2)	Exposure (%)	Visibility (%)	Effective coverage % (m^2)
3	Start: 298854 End: 298956	 6257586 6257382	Dams and earth mounds in the north / north west of the subject area	Modified	This survey transect included the modified landscapes in the north east portion of the subject area. This area represents a modified topography, comprising cuts, banks and dams. Such heavy disturbance would have removed any archaeological deposits which may have originally been located in this area.	2,890	10	90	9 (260.10)

4.1.1 Summary of Results

During the survey the location of site #45-5-0556 was visited, although the site could not be relocated due to water logging and vegetation cover. The general condition of the subject area indicates that there is low potential for further archaeological evidence in the south west corner, beyond the previously recorded site, due to disturbance to the original soil profile in this area.

The remainder of the subject area has been subject to extensive disturbance and in some areas the topography has been completely modified. There is considered to be very low to nil potential for archaeological deposits to remain within the subject area outside the south west corner.

Predictive modeling for the Cumberland Plain indicates that lower slopes adjacent to ephemeral first order drainage lines (i.e. the landform types within the subject area) were not typically intensively used by Aboriginal people in the past. However, higher order streams, such as Ropes Creek to the west and flat elevated banks were favored occupation areas, due to the presence of reliable fresh water and associated resources. In the past, it is unlikely that the subject area would have been used extensively by Aboriginal people and the site #45-5-0556 is likely to represent a low intensity background scatter.

5. SCIENTIFIC VALUES AND SIGNIFICANCE ASSESSMENT

The heritage significance of Aboriginal archaeological sites can be assessed using the four criteria outlined in the *Burra Charter*; aesthetic, historic, scientific, and social or spiritual (Australia ICOMOS, 1999). The present assessment is confined to the scientific (archaeological) significance of the subject area. The aesthetic, historic and social or spiritual values are addressed in the Aboriginal Cultural Heritage Assessment.

5.1 Scientific Significance

Scientific value is associated with the research potential of a site. Rarity and representativeness are also related concepts that are taken into account. Research potential or demonstrated research importance, is considered according to the contribution that a heritage site can make to present understanding of human society and the human past. Heritage sites, objects or places of high scientific significance are those which provide an uncommon opportunity to provide information about the specific age of people in an area, or a rare glimpse of artistic endeavour or a chronological record of changing life through deep archaeological stratigraphy.

The comparative rarity of a site is a consideration in assessing scientific significance. A certain site type may be "one of a kind" in one region, but very common in another. Artefacts of a particular type may be common in one region, but outside the known distribution in another.

The integrity of a site is also a consideration in determining scientific significance. While disturbance of a topsoil deposit with artefacts does not entirely diminish research value, it may limit the types of questions that may be addressed. A heavily cultivated paddock may be unsuited to addressing research questions of small-scale site structure, but it may still be suitable for answering more general questions of implement distribution in a region and raw material logistics.

The capacity of a site to address research questions is predicated on a definition of what the key research issues are for a region. In the region including the subject area, the key research issues revolve around the chronology of Aboriginal occupation and variability in stone artefact manufacturing technology. Sites with certain backed implements from the Holocene are very common, but sites with definite Pleistocene evidence are extremely rare, and hence of extremely high significance if found.

5.2 Significance Assessment

One known archaeological site is situated within the subject area. Site Blacktown Southwest 2 (#45-5-0556) is an artefact scatter comprising 11 artefacts of silcrete, chert and quartz. The site is recorded as being situated in an erosion scar adjacent to a dam wall on the eastern side of a ridge top. The condition of the site was badly disturbed when first recorded in 1986.

Site #45-5-0556 was not relocated during the current survey due to dense vegetation and water logging. As such, it was not possible to assess the current condition and validity of the site. However, since the site was originally recorded in a disturbed context, it is unlikely that the site would be of archaeological significance based on its integrity. The site is situated on a first order tributary, which has been identified as a landform of significance in SEPP 59, since few remain in undisturbed condition within the Cumberland Plain. The presence of the site in this context may be of further research value, due to its rarity in the local landscape context and potential to contribute information about Aboriginal use of this type of landform in the past. Although disturbed, the site may have research potential and as such the site is assessed as having moderate scientific significance. This assessment is based on circumstantial evidence and may not reflect the actual significance of the site, which could not be assessed due to restricted visibility.

The remainder of the subject area, outside the south west corner, has been heavily disturbed. The original soil profile has been extensively disturbed by activities such as vegetation removal, unformed roads, tracks, dams and earth moving. The original condition or topography of the landscape is no longer represented within the subject area, with the exception of the south west corner. As such, the potential for archaeological deposits to remain within the subject area (excluding the south west corner), is considered to be low to nil. The scientific significance of the remainder of the subject area, is also considered to be nil.

6. IMPACT ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

6.1 Proposed Development

Hanson Construction Materials Pty Ltd proposes to relocate infrastructure which has previously received Project Approval (CP 06_0225) under Part 3A of the *Environmental Planning and Assessment Act 1979*. The precise location of the re-located infrastructure and therefore the footprint of its likely ground disturbance is unclear at this stage, however it is understood that the following general impacts will occur across the subject area (with the exception of the conservation area):

- Clearing of vegetation,
- Vehicle movement and operation,
- Bulk earthworks,
- Drainage works including filling and diversion of watercourses, and
- Grading for access roads and building sites.

6.2 Potential Archaeological Impact

There is one registered Aboriginal site within the subject area, site Blacktown Southwest 2 (#45-5-0556). This site is to be protected within a Riparian Corridor/Conservation area, as discussed in **Section 1.4.1** and shown in **Figure 3**. This area will be fenced off during construction works and as such, there is likely to be no potential impact to the Aboriginal site from the proposed development.

No other Aboriginal sites or areas of archaeological potential were identified during this assessment. Background research and survey of the subject area confirmed that heavy disturbance has removed the potential for archaeological deposits to remain within the subject area (outside the conservation zone). As such, there is little to no potential impact for Aboriginal heritage to occur within the subject area (outside the conservation zone).

The high levels of disturbance observed across the subject area indicate that it does not include land with high archaeological sensitivity, as indicated in the SEPP59 – Eastern Creek Precinct (Stage 3), except for the land within the identified riparian/conservation area.

Table 5. Summary of potential archaeological impacts

Site Name	Type of harm	Degree of harm	Consequence of harm
Blacktown Southwest 2 (45-5-0556)	None	None	No loss of value

6.3 Mitigation and Management Recommendations

The following recommendations are based upon:

- The results of the assessment detailed in the Aboriginal Cultural Heritage Report (ACHA) and this Archaeological Report;

The recommendations are as follows:

- All impacts to the Aboriginal site #45-5-0556 should be avoided through conservation of the site within the designated Riparian Corridor/Conservation Zone as shown on **Figure 3** of this assessment.

- The Riparian Corridor/Conservation Area should be managed as described in **Section 1.4.1** of this assessment. No pedestrian or vehicle access to the conservation area should occur at any stage during the construction works in order to avoid all potential impacts to the site #45-5-0556.

- No Aboriginal heritage constraints have been identified within the areas not marked as a conservation zone on **Figure 3** of this assessment. As such, no further investigation or assessment is required in relation to Aboriginal heritage in this area.

- Should the location and/or method of the proposed works be altered, including the boundary of the conservation area, further investigation and assessment may be necessary.

- Consultation between Hanson and the Registered Aboriginal Parties should be maintained as appropriate throughout the construction of the project;
- In the event that previously undiscovered Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) are discovered during construction, all works in the vicinity of the find should cease and Hanson should determine the subsequent course of action in consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency as appropriate;

- Should suspected Aboriginal skeletal material be identified, all works should cease and the NSW Police and the NSW Coroner's office contacted. Should the burial prove to be archaeological, consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency, should be undertaken by Hanson;
- Consideration should be given to amending the extent of the area identified as high Aboriginal archaeological sensitivity in State *Environmental Planning Policy 59 – Eastern Creek Precinct (Stage 3) Precinct Plan* (SEPP 59) as it affects the subject area; and
- The Project Approval application for the proposed modification works should seek, among other things, to delete Condition 28 of the Project Approval of January 2010, which requires that 'the proponent shall not disturb those areas identified as 'High Sensitivity' in the Precinct Plan' except as it applies to the Riparian/Conservation Area.

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APPENDIX 1 – AHIMS SITE CARD: #45-5-0556

National Parks and Wildlife Service

BOX N189, GROSVENOR STREET POST OFFICE, SYDNEY, NSW 2000. TEL (02) 237 6500

Standard Site Recording Form

45-5-0556

REGISTER COPY

MAP NAME	EDITION	SCALE	REFERENCE
SYDNEY	Imperial	1:250,000	3819 8231
PENRITH	1975	1:100000	5718 9875 N62 E3
PROSPECT	First Edition	1:25,000	5718 9875

HEAD OFFICE USE ONLY:
NWPS site no: 45-5-556
Site types: OPEN SITE
File nos:
Date 10-12-86.
Filed by: S.W.

Site name: BLACKTOWN SOUTHWEST 2
Locality/property name: EASTERN CREEK
Owner/Manager: MRS WATERHOUSE
Address: 12 DANTROPE RD KILLARA
Local post office:
NPWS District: SYDNEY
Region: WESTERN

Reason for investigation (give R.O. instruction no. where applicable):

HERITAGE STUDY OF ABORIGINAL SITES IN THE CITY OF BLACKTOWN

Portion no:
Parish:
Other land category:
County: CUMBERLAND
Plan/sketch/section of site attached? Yes/No.
How many?

Air photo refs. (for stereo pair)
Photos taken? Yes/No
How many attached?

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff. (Draw diagram on separate sheet.)

ACCESS TO SITE FROM OLD WALLGROVE ROAD. CREEK RUNS ON NORTH SIDE OF THE ROAD. THE SITE IS BESIDE A DAM ON THE WESTERN END OF THE CREEK BELOW A RIDGE.

Other sites in locality? Yes/No.
Are sites in NPWS Register? Yes/No.
Site Types include:
Unregistered sites — plans for future recording? Yes/No.

Have artefacts been removed from site? Yes/No/don't know. When?
By whom?
Deposited where?

Is site important to local Aborigines? Yes/No/don't know.
Give contact(s) name(s) + address(es)
DARUK LOCAL ABORIGINAL LAND COUNCIL
FORRESTERS RD., ST. MARYS
Contacted for this recording? Yes/No.
(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report).

KOHEN, J.L. 1986. AN ARCHAEOLOGICAL SURVEY OF ABORIGINAL SITES WITHIN THE CITY OF BLACKTOWN C-1007

Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site:
BADLY DISTURBED

Recommendations for management & protection (attach separate sheet if necessary):

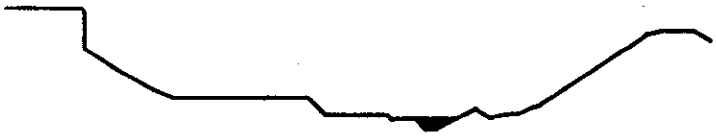
SEE REPORT

Site recorded by: J. L. KOHEN
Address/institution: 123 KILLARNEY AVE, BLACKTOWN
Date: JUNE 1986

SITE POSITION & ENVIRONMENT **REGISTER COPY** OFFICE USE ONLY: NPWS site no: 45-5-556

1. Land form a. beach/hill slope/ridge top, etc: b. site aspect: c. slope:

d. mark on diagram provided *or* on your own sketch the position of the site: e. Describe briefly:



f. Local rock type: g. Land use/effect:

2. Distance from drinking water: 0 METRES Source: TRIBUTARY OF REEDY CREEK

3. Resource Zone associated with site (estuarine, riverine, forest etc): CREEK/FOREST

4. Vegetation: CLEARED

5. Edible plants noted: NONE IDENTIFIED

6. Faunal resources (include shellfish): ?

7. Other exploitable resources (river pebbles, ochre, etc):

Site type:

OPEN SCATTER

CHECKLIST TO HELP: length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock.

DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types.

ART: area of surface decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.

BURIALS: number & condition of bone, position, age, sex, associated artefacts.

TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth.

QUARRIES: rock type, debris, recognisable artefacts, percentage quarried.

OTHER SITES EG. structures (fish traps, stone arrangements, bora rings, mia mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate

DESCRIPTION OF SITE & CONTENTS.

Note state of preservation of site & contents. Do **NOT** dig,disturb,damage site or contents.

In an erosion scar adjacent to a dam on the eastern side of a ridgetop near the fenceline, a scatter of artefacts were found over an area 10 metres long and 4 metres wide. They were one utilised silcrete flake, 5 silcrete waste flakes, three quartz flakes, a broken chert blade and a quartzite flake.

Attach sketches etc, eg. plan & section of shelter, show relation between site contents, indicate north, show scale.

Attach annotated photos (stereo where useful) showing scale, particularly for art sites.

NATIONAL PARKS AND WILDLIFE SERVICE

Cultural Resources

Database Update Sheet

[ ] REGISTER — Site register

[ ] CATALOG — Reports catalogue

[ ] FOTODEX — Photographic catalogue

Record ID [redacted] Field/variable New or revised value(s)

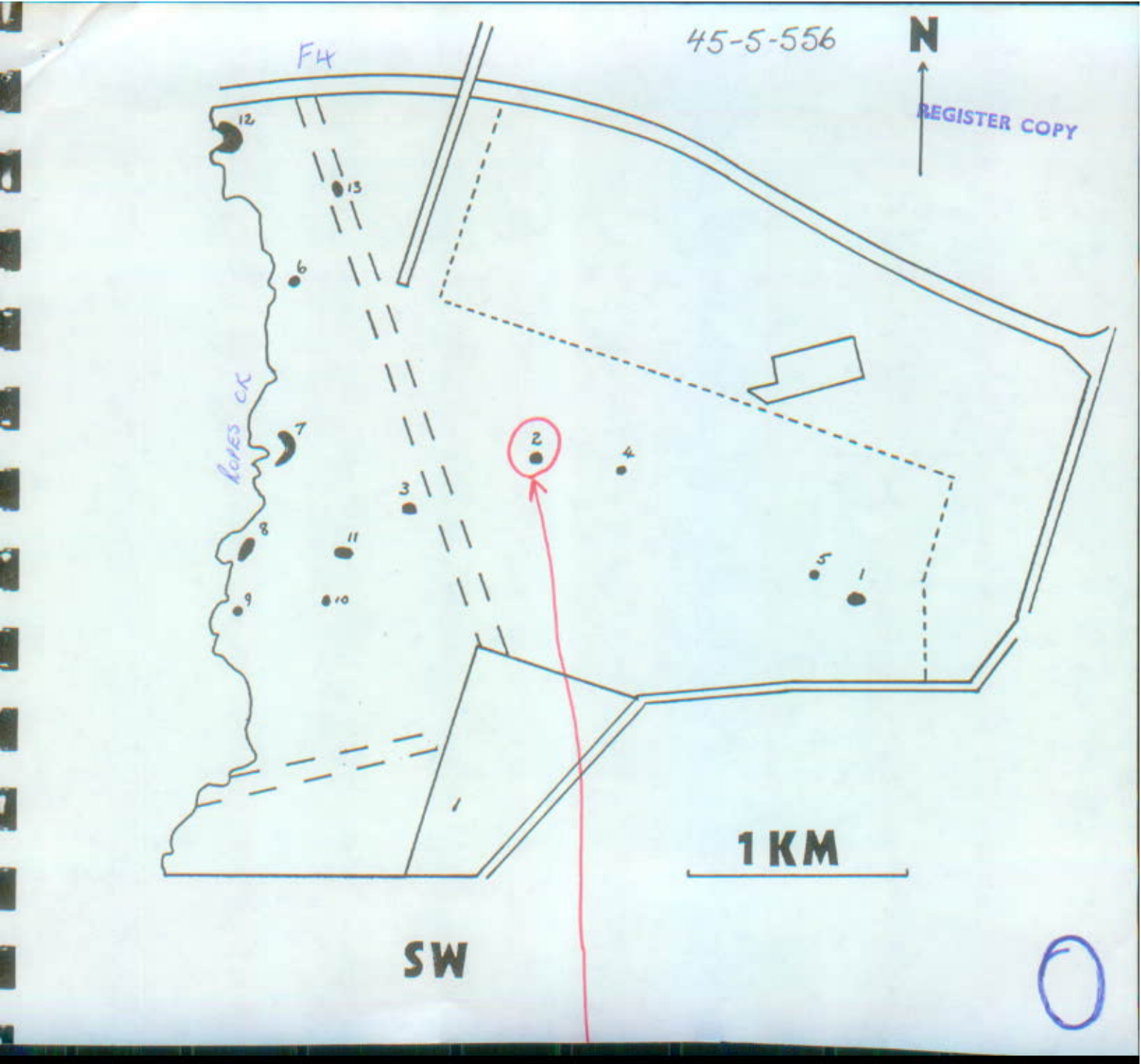
45-5-0556

1	SITENAME	Blacktown Southwest 2	
2	SITENAME	Eastern Creek	
3	SITETYPE	2	= Open camp site
4	RECTYPE	2	= Standard site record
5	RECORDER	Kohen [redacted]	
6	RECDATE	00Jun[redacted]	
7	DISTRICT	2	= North Metropolitan
8	STATUS	1	= Present in N.P.
9	ZONE	56	= AMG Zone 56
10	AMG_E	298750	
11	AMG_N	6257180	
12	MAPSCALE	7	= 1:25/50/100K convrt
13	ASSOCREP	[redacted]	
14	DATEUPD		
15	CONDITN		
16	LNDSTAT	1 [redacted]	
17	(Sub-rec)		

Filled in by: [redacted] Date: 12/12/91

Entered by: [redacted] Date: 11/12/91

LJ: Feb 89


45-5-556
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