

Appendix E

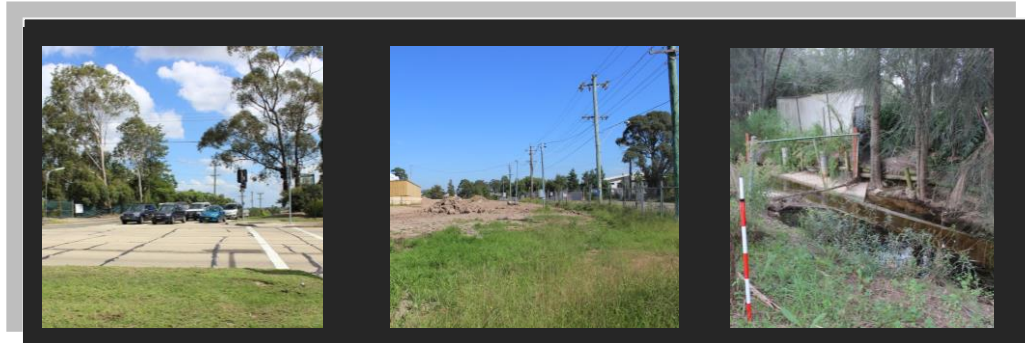
Cultural Heritage Assessment Report

Memorial Avenue, Kellyville

PACHCI Stage 2 Aboriginal Archaeological Report

Report to Roads and Maritime Services

May 2014



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Report Verification

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Name of project: Memorial Avenue, Kellyville: PACHCI Stage 2 Aboriginal Archaeological Report

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Project Director and Document approval: Dr Sandra Wallace

Name of organisation: Artefact Heritage



Executive Summary

Roads and Maritime Services (Roads and Maritime) has engaged Artefact Heritage to prepare an Aboriginal heritage assessment for the proposed road upgrade works along Memorial Avenue, Kellyville (the study area). This report has been prepared in accordance with the requirements for an archaeological assessment as set out in the Office of Environment and Heritage (OEH) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (2010) (The Code) and provides recommendations as to whether further archaeological investigation is required.

This investigation complies with Stage 2 of the Roads and Maritime *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI). If Aboriginal sites or archaeological deposits were to be impacted by the proposed works, Stage 3 PACHCI would be initiated by Roads and Maritime. Consultation for this assessment has been undertaken by Roads and Maritime in line with Stage 2 PACHCI requirements.

The study area is a linear transect approximately two kilometres in length along Memorial Avenue, Kellyville between Old Windsor Road and Windsor Road. The proposed design includes:

- Widening of the entire length of Memorial Avenue.
- Establishment of two new signalized intersections at Arnold Avenue West and at Severn Vale Drive.
- Upgrading of the existing intersections at Windsor Road and Old Windsor Road.

Severn Vale Drive the new road crossing the Memorial Avenue will be constructed as part of the Balmoral Road Release area precinct development.

This assessment found that:

- Duplicate AHIMS site recording 45-5-0981 / 45-5-0989 is registered within the study area. The site has been destroyed under Section 90 Consent to Destroy number 710.
- An intact portion of Aboriginal site 45-5-2652 is located within the study area. It is understood that intact portion of 45-5-2652 will not be impacted by the proposed works.
- One impacted portion of Aboriginal site 45-5-2652 is located within the study area. It appears that these impacts were conducted in accordance with permits 2002, 2013, 3636 and 3638.
- AHIMS site 45-5-3063, an area of Potential Archaeological Deposit (PAD), was located within the study area boundaries. This PAD has been disturbed under two Aboriginal Heritage Impact Permits (2241, 2319).
- AHIMS site 45-5-3844, an isolated find, was located within the study area boundaries. The site has been destroyed under the Part 3A development of a retirement facility.



- AHIMS site 45-5-3847 is located within the study area. The site has been destroyed under the Part 3A development of a retirement facility.
- The majority of the study area has been subject to high levels of ground disturbance.

This assessment recommends:

- There are no Aboriginal heritage constraints on the proposed upgrade works. This assessment has found that the Stage 3 PACHCI does not need to be implemented for the proposed Memorial Avenue upgrade.
- If it is determined during detailed design that there will be impacts to the intact portion of AHIMS site 45-5-2652, further advice from an archaeologist should be sought to determine appropriate recommendations.
- If Aboriginal objects or suspected human remains are located during works the Roads and Maritime Unexpected Finds Procedure would be adhered to.
- Site impact recording forms would be prepared for sites 45-5-3844 and 45-5-3063.



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1.0 Introduction and Background

1.1 Introduction

Roads and Maritime Services (Roads and Maritime) has engaged Artefact Heritage to prepare an Aboriginal heritage assessment for the proposed road upgrade works along Memorial Avenue, Kellyville (the study area). This report has been prepared in accordance with the requirements for an archaeological assessment as set out in the Office of Environment and Heritage (OEH) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (2010) (The Code) and provides recommendations as to whether further archaeological investigation is required.

This investigation complies with Stage 2 of the Roads and Maritime *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI). If Aboriginal sites or archaeological deposits were to be impacted by the proposed works, Stage 3 PACHCI would be initiated by Roads and Maritime. Consultation for this assessment has been undertaken by Roads and Maritime in line with the Stage 2 PACHCI.

1.2 Study area

The study area is a linear transect approximately two kilometres in length along Memorial Avenue, Kellyville between Old Windsor Road and Windsor Road. The proposed design includes the widening of the entire length of Memorial Avenue and the establishment of three new junctions along Memorial Avenue and upgrades of the T-intersections at Windsor Road and Old Windsor Road (Figure 1).

For the purposes of the report the study area is defined as the area outlined in yellow shown in Figure 1. It is assumed that apart from the proposed new intersection locations, impacts would be limited to the existing road corridor.

Memorial Avenue is situated within the suburb of Kellyville and is within The Hills Shire Local Government Area and located within the Deerubbin Local Aboriginal Land Council (DLALC) boundaries.

1.3 The proposal

The proposed upgrade would involve the construction of two east bound and two west bound lanes, with one future lane allowed for in both directions. The upgrade will also include a footway on either side of the road and a large median strip between the east and west bound lanes. The proposed works will also include the creation of four way signalized intersections at Arnold Avenue West/ Free Settlers Drive/



Memorial Avenue junction and at Severn Vale Drive/ Memorial Avenue junction. The existing intersections at Windsor Road and Old Windsor Road will also be upgraded (Figure 1).

1.4 Objectives of the assessment

The objectives of this study are to comply with the Stage 2 PACHCI, and OEH regulations and guidelines, including the Code of Practice. The main objectives of this study include providing:

- A description of the proposal and the extent of the study area.
- A description of Aboriginal community involvement and Aboriginal consultation.
- Discussion of the environmental context of the study area.
- Discussion of the Aboriginal historical context of the study area.
- A summary of the archaeological context of the study area including a discussion of previous archaeological work in the area.
- Development of an archaeological predictive model.
- Description of Aboriginal sites and areas of PAD within the study area.
- Development of a significance assessment for these sites addressing archaeological values.
- Recommendations for management and mitigation measures for Aboriginal sites and PADs.

1.5 Report authorship

This report was written by Joshua Madden and Josh Symons, Heritage Consultants with Artefact Heritage. Dr Sandra Wallace, Principal Archaeologist at Artefact Heritage, has reviewed the report and provided management input.

1.6 Aboriginal consultation

Aboriginal consultation for this study has been conducted by Roads and Maritime in accordance with Stage 2 of the PACHCI. The study area lies within the boundaries of the DLALC. Under the PACHCI guidelines Roads and Maritime has undertaken all consultation with the DLALC.

A Native Title register search was conducted by Artefact Heritage on 10 March 2014 with 'no relevant entries' identified.

The DLALC was contacted by the Roads and Maritime Aboriginal Cultural Heritage Advisor. Mr Steve Randall of the DLALC attended the study area survey. DLALC will provide a site survey report to Roads and Maritime. All responses from DLALC will be appended to the final report.



Figure 1: Study area boundary and proposed concept design (background aerial © Google 2014).





2.0 Statutory Context

2.1 Legislative requirements

There are several items of State legislation and Guidelines that are relevant to the current study. A summary of these Acts and the implications for the proposed development follow.

National Parks & Wildlife Act (1974)

The *National Parks & Wildlife Act 1974* (the NP&W Act) 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 90. Aboriginal objects are afforded automatic statutory protection in NSW whereby it is an offence to:

'damage, deface or destroy Aboriginal sites without the prior consent of the Director-General of the National Parks and Wildlife Service (now the OEH).'

The Act defines an Aboriginal 'object' as:

'any deposit, object or material evidence (not being a handicraft for sale) relating to indigenous and non-European habitation of the area that comprises New South Wales, being habitation before or concurrent with the occupation of that area by persons of non-Aboriginal European extraction, and includes Aboriginal remains'.

The Act was amended in 2010, with the legislative structure for seeking permission to impact on heritage items modified. A s90 permit is now the only Aboriginal Heritage Impact Permit (AHIP) available and may only be granted by OEH if the conditions of the 'due diligence guidelines', and/or an 'archaeological investigation' have been met. The penalties and fines for damaging or defacing an Aboriginal object have also increased.

The Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (the EP&A Act) establishes the framework for cultural heritage values to be formally assessed in the land use planning and development consent process. The EP&A Act requires that environmental impacts are considered prior to land development; this includes impacts on cultural heritage items and places as well as archaeological sites and deposits.



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.

3.0 Environmental Context

The purpose of this environmental context section is to provide information for use in developing a predictive model of Aboriginal site locations associated with the study area.

3.1 Geology

The study area is located within the Cumberland Plain which is typified by an undulating landscape of rolling hills and prominent rises. The study area is underlain by the Triassic Wianamatta Liverpool Sub-Group. The Liverpool Sub-Group is comprised of the Bringelly Shale over Minchinbury Sandstone and Ashfield Shale and consists of shale and some sandstone beds and outcrops. Local relief is between ten and fifty metres with undulating slopes to below ten per cent (Bryan, 1966).

3.2 Soils

Soils across the study area consist of the residual Blacktown soil landscape (Bannerman and Hazelton 1990). The Blacktown soils are shallow (<100cm) hard setting mottled red and brown podzolic soils on crests and yellow podzolic soils on lower slopes and along drainage lines. The Blacktown soil landscape is generally associated with gently undulating rises. The soils are primarily poorly drained with very little erosional activity with minor sheet and gully erosion in zones stripped of vegetation.

3.3 Hydrology

Landforms across the local area consist of broad crests with gently sloping inclines. The study area is located within a gently sloping landform context. Strangers Creek (a third order stream), a tributary of Strangers Creek and Elizabeth Macarthur Creek all bisect the study area. Caddies Creek, a major higher order watercourse, is located approximately 550 metres west of the study area. Smalls Creek is located approximately 1.2 kilometres east of the study area. Numerous lower order creek and drainage lines are located within a 1.5 kilometres of the study area, many of which flow toward the aforementioned creek lines.

3.4 Vegetation and resources

Prior to the settlement of the area by Europeans, the study area and the surrounds would have been covered by Cumberland Plain Woodland, typical in areas underlain by the Wianamatta Group geological unit. Cumberland Plain Woodland was dominated by eucalypt species such as Forest Red Gum (*Eucalyptus tereticornis*) and Grey Box (*Eucalyptus moluccana*) with ground cover consisting primarily of



Kangaroo Grass (*Themeda australis*) (Benson and Howell 1990).

Aboriginal people were highly mobile hunter-gatherers utilising different landform units and resource zones. Varying resources are likely to have only been available seasonally, this limitation of the resources utilised may have necessitated the need for movement and trade of resources across the landscape (Attenbrow 2010: 78).

Plants were an important source of nutrition and were also used in the manufacture of tools. Gum and sap were used for binding or for hafting, such as in the manufacture of stone hatchets and plant fibres were used to make baskets, nets, ropes and hammocks (Saunders 2003). Plant products were also used in the manufacture of shelters, shields and other weapons, coolamons, used to carry food and water, and digging sticks.

3.5 Historical land-use context

Following European settlement of Sydney, the study area has been used chiefly for agricultural and pastoral activities. Settlement in the region took place during the early nineteenth century with the district flourishing as an agriculture region. Farming across the Cumberland Plain consisted primarily of grazing and cropping. Significant development did not occur in the local area until the early 1990s.

By 1860 the current study area was a series of five rural allotments located between Old Windsor Road and Windsor Road, with much of the surrounding farmland described as dairy farms and orchards. By the early 1930's the area between Windsor Road and Old Windsor Road was steadily being sold off as smaller allotments. By this stage Burns Road, that would later be known as Memorial Avenue, had been constructed, which allowed for the sub-division of the larger farm allotments. In 1924 Kellyville Memorial Hall was opened on the corner of Windsor Road and Memorial Avenue to honour those who served in WWI (Artefact Heritage 2014).

The study area has remained rural in character, with the small lot semi-rural subdivision and market gardens evident today established in the mid twentieth century.

4.0 Archaeological Context

4.1 Aboriginal material culture

Aboriginal people have lived in the Sydney region for up to 30,000 years, as indicated by radiocarbon dating undertaken in Parramatta (JMcd CHM 2005). Evidence of Aboriginal occupation has been found dated to 50-60,000 years before present (yBP) at Lake Mungo in NSW so it is likely that Aboriginal people have lived in the Sydney region for even longer than indicated by the oldest recorded dates we have at present. The archaeological material record provides evidence of this long occupation, but also provides evidence of a dynamic culture that has changed through time.

The existing archaeological record is limited to certain materials and objects that were able to withstand degradation and decay. As a result the most common type of Aboriginal objects remaining in the archaeological record are stone artefacts. Archaeological analysis of these artefacts in their contexts has 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 4,000 yBP 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 & Attenbrow 2005, JMcdCHM 2005). 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 (JMcd CHM 2006a). 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 where flaked glass has been recorded, for example at Prospect (Ngara Consulting 2003) and Oran Park (JMcD CHM 2007a).

4.2 Aboriginal ethno-historical context

Aboriginal tribal boundaries within Australia have been reconstructed, primarily based on surviving linguistic evidence, and are therefore only approximations. Social interaction, tribal boundaries and linguistic evidence may not always correlate and it is likely boundaries and interaction levels varied and fluctuated over time. 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 & Everitt). 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 the 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 process of colonisation saw the appropriation of resources such as pasture, timber, fishing grounds and water sources, often at the expense of the local Aboriginal peoples.

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. The small pox epidemic of 1789 had a profound effect on the population of the Sydney region, and would have decimated groups and it is likely that over half of the Aboriginal people of the Sydney region died. The disease spread across throughout the Sydney region including the Cumberland Plain, with evidence to suggest that it spread farther afield and possibly 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 or had been forced to move from traditional areas, before Europeans could observe them, or record their clan names (Karskens 2010: 452).

4.3 OEH Aboriginal Heritage Information Management System (AHIMS)

A search of the OEH AHIMS site register was conducted on 13 February 2014 (Client ID: 125145). The coordinates for the search were:



Table 1: AHIMS Search Coordinates

GDA 94	MGA 55	307260	312915
		6265408	6268589
Buffer (meters)		–	

The register search identified a total of 69 registered Aboriginal sites in the vicinity of the study area (Figure 2). The predominant site features within the search area are open camp sites which include open artefact sites and isolated artefact sites (Table 1).

Table 2: AHIMS Search Results

Site Feature	Total Frequency of Sites	Destroyed Sites/Not Sites
Open Camp Sites (Isolated Finds / Artefact Scatters)	50	1 Destroyed 1 Deleted
Potential Archaeological Deposits	10	1 Not a Site
Grinding Groove	5	–
Aboriginal Resource and Gathering	3	–
Modified Tree	1	–
Total	69	3

The AHIMS site register search identified that six recorded Aboriginal sites are located within the study area and one additional Aboriginal site is likely to overlap with the study area. A summary of those recorded Aboriginal sites either within or overlapping with the study area is outlined below (see Figure 3).

AHIMS site 45-5-0981 / 45-5-0989

Site Old Windsor Road Isolated Find 2 (OWR IF2) is recorded in duplicate on the AHIMS site register with register numbers 45-5-0981 and 45-5-0989. Information included with the site card indicates that this site was recorded as part of an archaeological survey along Windsor Road and Old Windsor Road in 1992 by Tessa Corkill. The site consisted of one broken silcrete flake which may have been brought into the area with introduced gravels. Information attached to the site card for 45-5-0981 indicates that a Consent to Destroy under Section 90 of the *NPW Act 1974* was issued in 1995.

Site OWR IF2 (AHIMS site 45-5-0981 and 45-5-0989) has been destroyed.



AHIMS site 45-5-2365

The coordinates provided for site KV/CD1 (AHIMS site 45-5-2365) on the AHIMS site register indicate that the site is located approximately 75 metres east of Old Windsor Road and 20 metres east of residential house which has since been demolished. However, the aerial map provided with the site card recording indicate that the site indicate that the site was recorded approximately 209 metres to the northeast and approximately 225 metres east of Old Windsor Road. This is confirmed by a site update recording form submitted to the AHIMS site register by Paul Irish in 2010.

Site KV/CD1 (AHIMS site 45-5-2365) is located approximately 200 metres east of the current study area.

AHIMS site 45-5-2652

PAD 33 (AHIMS site 45-5-2652) was a Potential Archaeological Deposit (PAD) identified by Jo McDonald Cultural Heritage Management (JMcD CHM) in 2002. The site recording form indicates that PAD 33 comprised three distinct areas on both the western and eastern sides of Strangers Creek. The map attached the site card shows three areas of PAD, whereas the text in the site recording form suggests four areas.

The description on the site recording form suggests the PAD was associated with large extant trees which indicate areas of lower surface disturbance than the surrounding area. The trees were visible on 1947 aerial photos analysed by JMcD CHM for the site recording.

Attached to the site recording form on AHIMS is an Aboriginal Site Impact Recording Form submitted in 2010 by Mary Dallas Consulting Archaeologists (MDCA). The impact recording form provides information on archaeological test excavation that was conducted within PAD 33 by MDCA. The impact recording form indicates that the MDCA study area was on the eastern side of Strangers Creek and incorporated one of the three areas of PAD 33 shown on the original site recording form. Associated reporting for the test excavation was not available during preparation of the current document.

According to the impact recording form, MDCA completed five excavation squares within a portion of PAD 33. A sixth excavation square was abandoned due to large tree roots. One artefact was retrieved from archaeological test excavation. MDCA note on the impact recording form that no further archaeological investigation was considered necessary in the investigated portion of PAD 33.



There are four permits listed with AHIMS site 45-5-2652 on the AHIMS site register. These are permits 2002, 2013, 3636 and 3638. No information on these permits could be obtained from OEH during preparation of this report.

AHIMS site 45-5-3063

Burns Road Compound PAD (AHIMS site 45-5-3063) was recorded by Megan Mebberson. The area was used as a compound location during construction works for the T-Way along Old Windsor Road. Permits 2241 and 2319 are listed against the site on the AHIMS site register. These permits could not be obtained from OEH during the preparation of this report.

AHIMS site 45-5-3844

Site MA-1 (AHIMS site 45-5-3844) was recorded by JMcD CHM (2010: 20) during archaeological investigations in Lot 41 DP 10702 and Lot 401 DP 1125136. Site MA-1 was recorded on a driveway and consisted of one silcrete artefact. JMcD CHM (2010: 20) suggest that the artefact may have been introduced to the area with imported gravels for the driveway. This site has since been destroyed under a Part 3A approval.

AHIMS site 45-5-3847

Site MA-4 (AHIMS site 45-5-3847) was recorded by JMcD CHM (2010: 20) during archaeological investigations in Lot 41 DP 10702 and Lot 401 DP 1125136. Site MA-4 was recorded on a small surface exposure on an artificial earth mound associated with a motorcross track. Four artefacts were identified at site MA-4. This site has since been destroyed under a Part 3A approval.



Figure 2: AHIMS Map with approximate location of the study area in red.

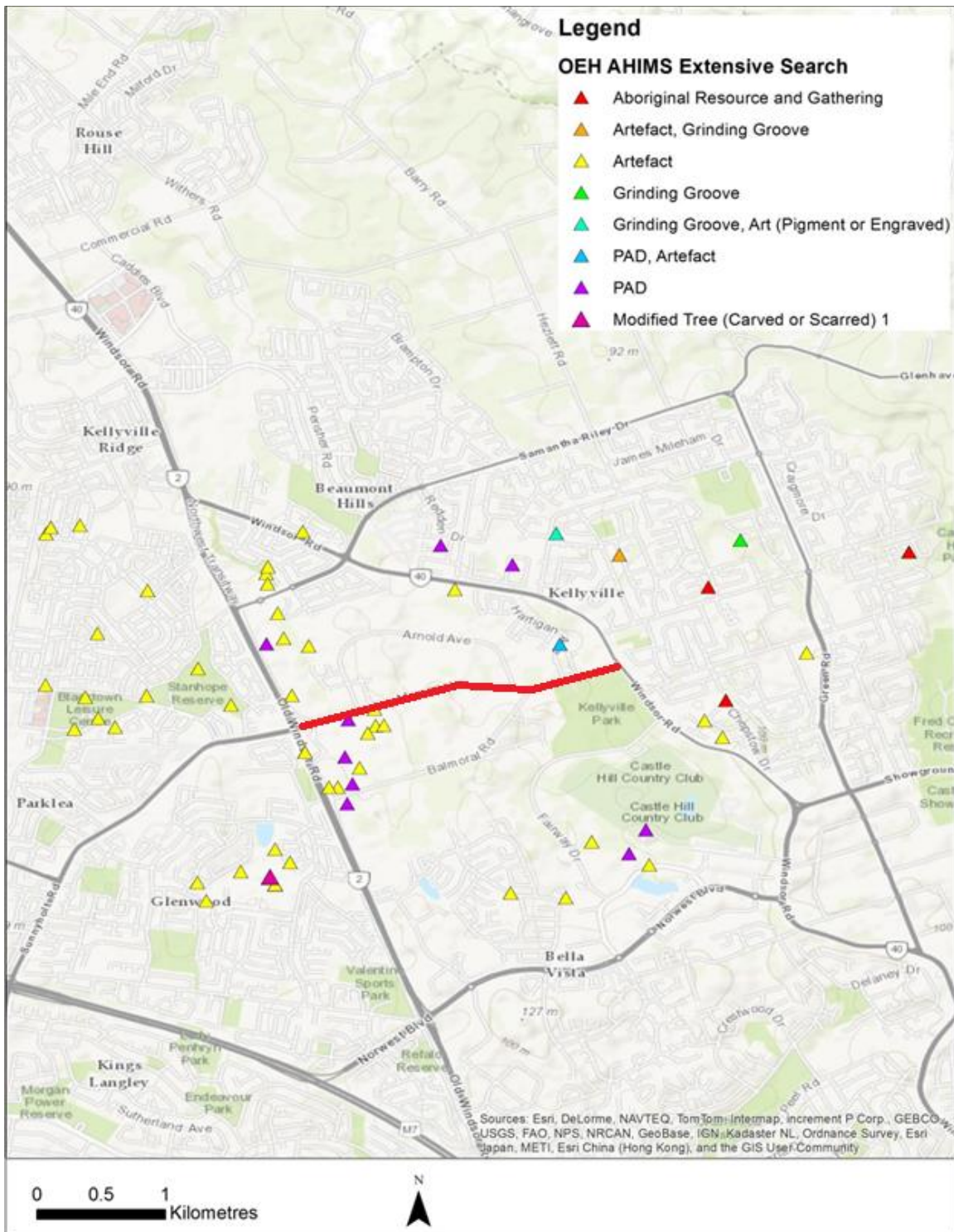
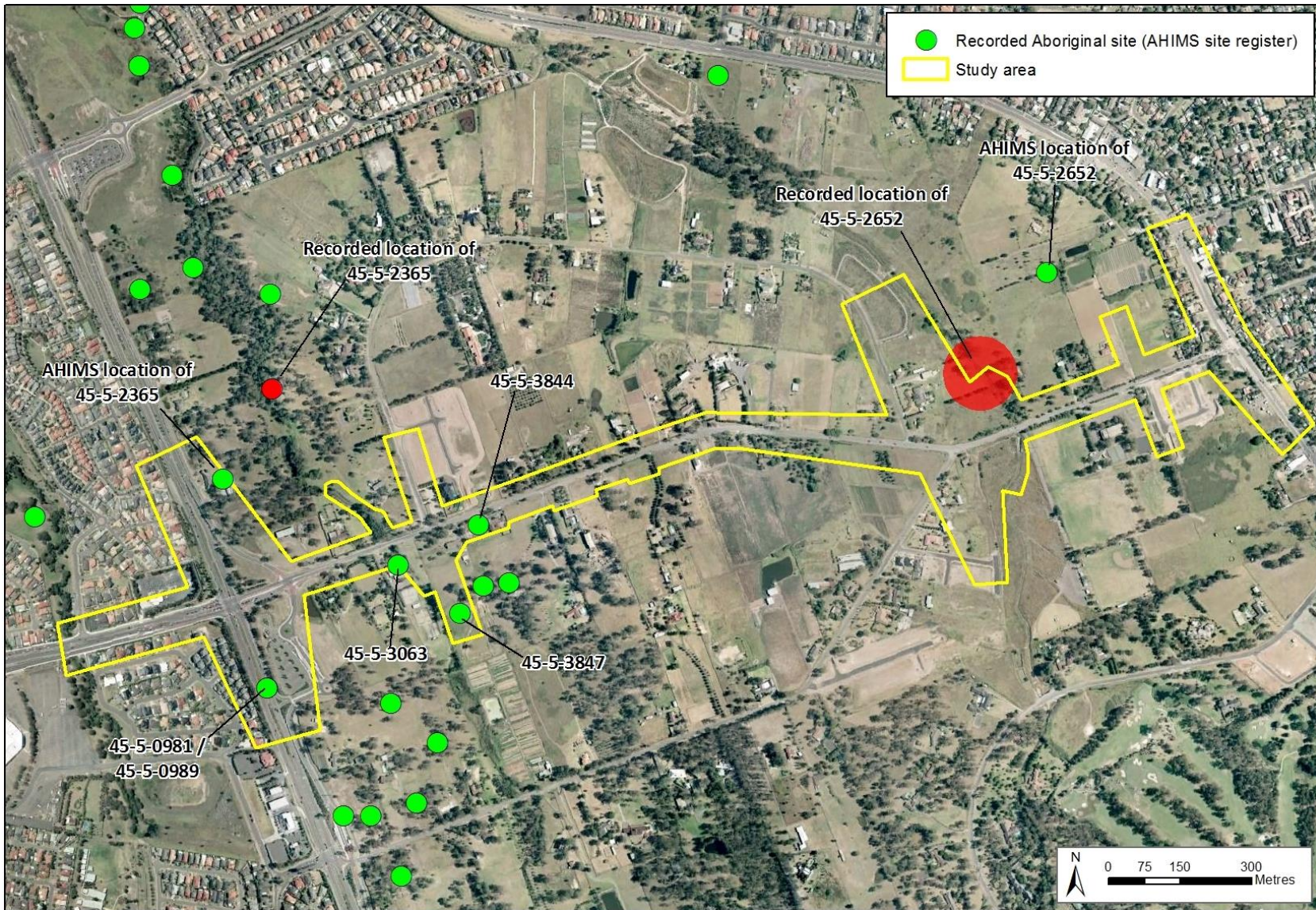


Figure 3: Detail of AHIMS results in relation to the study area (background aerial © Google 2014)





4.4 Previous archaeological investigations

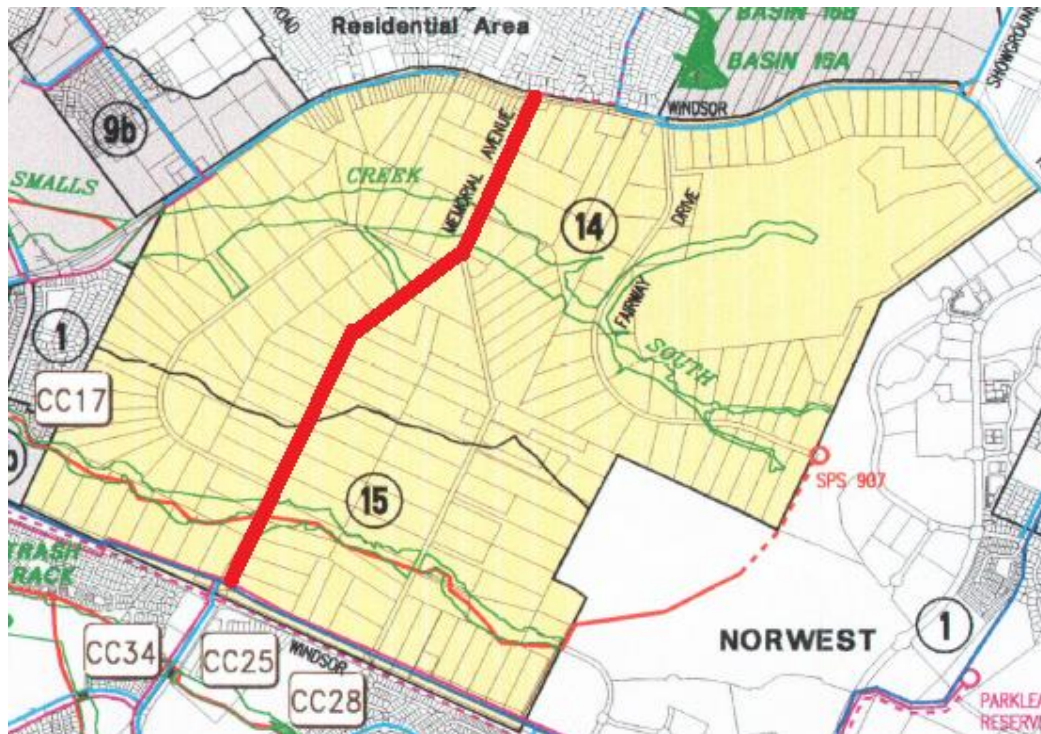
Over the last four decades a number of archaeological investigations have been conducted along the Cumberland Plain, some of which have been undertaken in close proximity to, or within, the current study area. A brief summary of the findings of key archaeological assessments and investigations is outlined below.

Jo McDonald Cultural Heritage Management (JMcd CHM) 2002:

In 2002 Jo McDonald Cultural Heritage Management Pty Ltd (JMcd CHM) undertook an assessment of the Indigenous and European Heritage values of the Rouse Hill Infrastructure Project (Stage 3), Balmoral Road Release Area. The current study area is located within the central portion of the JMcd CHM area of investigation (Figure 4).

JMcd CHM's investigation of the Balmoral Road release area identified one previously unrecorded Aboriginal site and one previously unrecorded PAD. Site 45-5-2653 is located on the northeastern side of Strangers Creek and approximately 750 metres north of the study area and is recorded as an open site and PAD. PAD 45-5-2652, called PAD 33, was likewise located along Strangers Creek and situated approximately 280 metres north of the study area. The PAD was identified along both sides of Strangers Creek and associated with alluvial flats that had been altered for channelling the creek line.

Figure 4: Location of JMcd CHM (2002:4) with the boundary of the current study area in red.





Based primarily on landscape analysis the JMcD CHM (2002) assessment identified various archaeological sensitivity zones across the wider Balmoral Road Release study area. The current study area was identified as having predominately high levels of disturbance (Figure 4) and low archaeological sensitivity. Two small zones of moderate disturbance and moderate sensitivity were identified bordering Memorial Avenue outside the road corridor, highlighted in blue (Figures 5 and 6). These areas have since been disturbed and were observed during the current site survey to be of low sensitivity. Areas of low archaeological sensitivity, like the majority of the current study area, were identified as having no constraints associated with the proposed release area.

Figure 5: JMcD CHM (2002:14) disturbance levels.

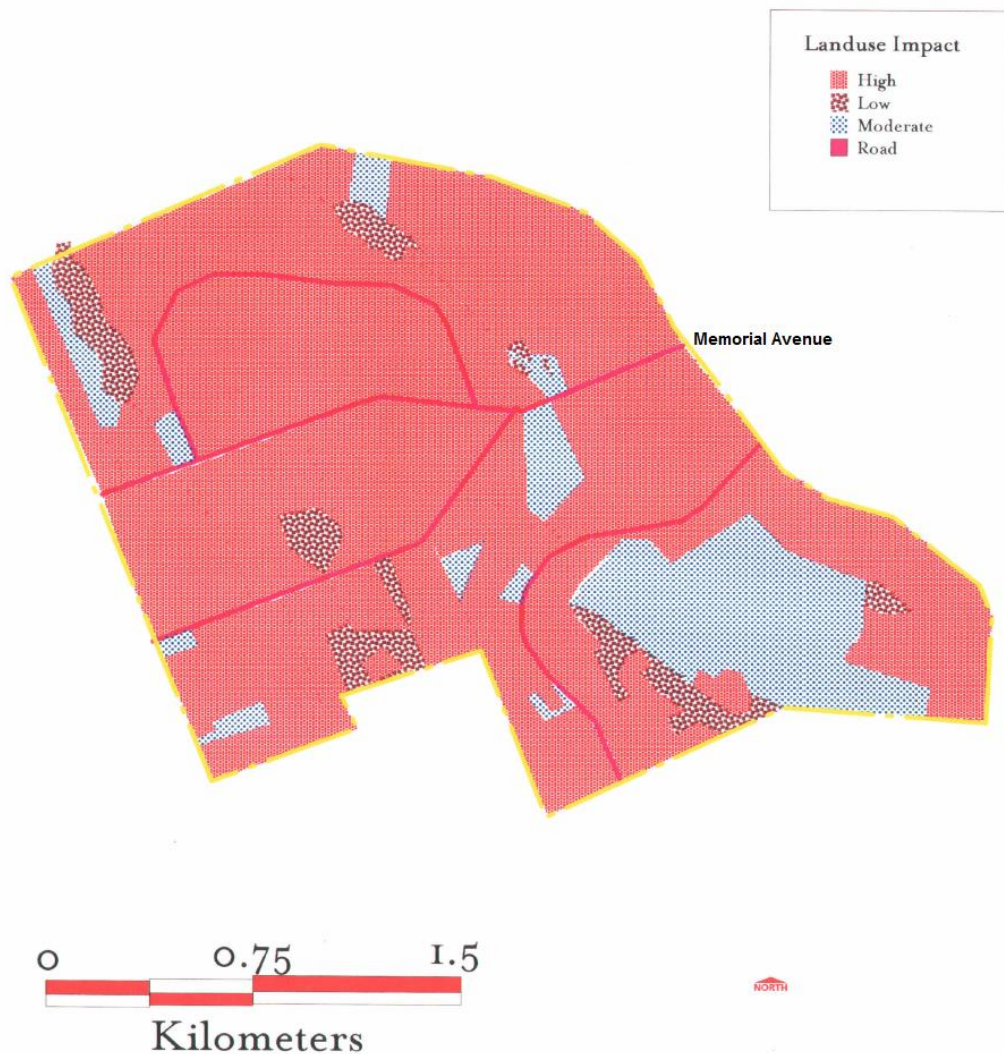
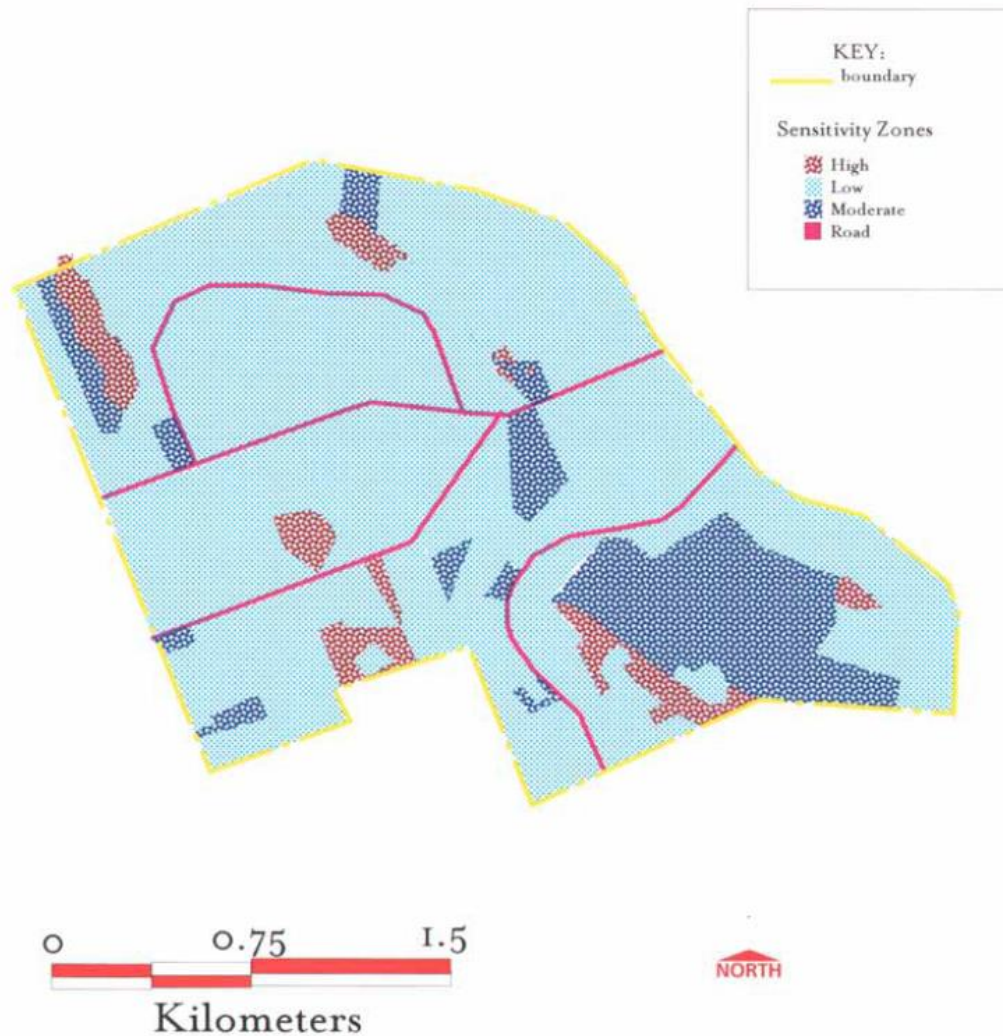




Figure 6: JMcD CHM (2002:34) Balmoral Rd Release area sensitivity zones.



JMcDCHM 2010

In 2010 JMcDCHM undertook an Aboriginal Heritage Assessment of Lot 41 DP10702 and Lot 401 DP1125136 at Memorial Avenue Kellyville, the site of a proposed retirement village. The assessment identified four Aboriginal sites, one isolated find and three artefact scatters. Two of these sites (MA-1 registered as 45-5-3844 and MA-4 registered as 45-5-3847) were located within the current study area.

The assessment recommended that a portion of the proposed development area should be conserved for its Aboriginal heritage values. If this conservation outcome was achieved the report recommended that destruction of the sites outside this conservation zone was acceptable. Site MA-1 was therefore approved



for impacts under the Part 3A approval for the retirement village. The current study area does not include the area recommended for conservation in the JMcDCHM 2010 assessment.

JMcDCHM 2002b and 2005:

JMcDCHM undertook an Aboriginal cultural heritage study for the Rouse Hill Development Area along the Second Ponds Creek Corridor. The assessment was undertaken for the proposed works which included the proposed installation of water, sewage and other sub-surface drainage related to the Rouse Hill Development Area. A total of twenty two archaeological sites and eight PADs were identified, many of which were previously recorded. The assessment area is located approximately 1.9 kilometres west of the current study area.

In 2005 JMcDCHM undertook excavations at a total of ten PADs surrounding Second Ponds Creek across representative landform units along the Cumberland Plain. The excavations were undertaken across undisturbed PADs that were located, usually, within 150 metres of Second Ponds Creek.

The study found that Aboriginal occupation of the Second Ponds Creek area dates back to at least 8000 yBP. Typological dating of the archaeological material asserted that greater intensity of occupation was undertaken in the last 3000 years. The assessment identified that the Second Ponds Creek area was characterised by 'background scatter' evident of transient movement across the landscape and low levels of activity over time. It was noted that this density of artefacts is typical of the Cumberland Plain. 'Knapping floors' were evident within the study area with the assessment classifying a knapping floor as a density of twenty lithics per square metre. The study also found that much of the silcrete found had been subject to 'heat treatment' prior to transport and knapping.

Kelleher Nightingale (KNC) 2010:

In 2010 Kelleher and Nightingale prepared an Aboriginal cultural heritage assessment for 'Area 20 Precinct' for the North West Growth Centre. The current study area is located approximately 3.7 kilometres south east of the KNC study area.

The assessment identified nineteen Open Campsites, eleven of which were identified as isolated finds with eight artefact scatters. Eight PADs were likewise identified during the survey for the assessment. A number of the sites and PADs identified were previously recorded and the assessment altered the boundaries of these where necessary.

It was concluded that the majority of the sites and PADs were located within the Second Ponds Creek corridor however; artefacts were observed — albeit in low densities — along raised areas and along ridgelines away from the creek corridor. It was noted that these areas had lower visibility than zones closer to the creek line.



JMcDCHM 2011:

In 2010 JMcDCHM was commissioned by RPS, on behalf of Rawson Homes, to undertake an Aboriginal cultural heritage assessment of Lots 2/1103861 and 4/126309, approximately 700 metres to the north of the study area. The assessment re-located one Aboriginal site (45-5-2653). The assessment identified an area of PAD associated with the surface expression which extended beyond the third order section of Strangers Creek. It was identified that further archaeological works under an AHIP be undertaken to test and salvage the site and associated PAD.

The PAD and site were excavated by GML + JMcDCHM in January 2012 for RPS on behalf of Rawson Homes.

Artefact Heritage 2013:

In 2013 Artefact Heritage was engaged by Brown Consulting to undertake an Aboriginal Heritage Due Diligence assessment for a proposed subdivision of Lot 46 DP 224917, part Lot 2 DP 1103329 and part Lot 2 DP 1103318, approximately 450 metres northwest of the study area. Although the study area was located within 100 metres of Strangers Creek and along a gently sloping landform unit, the assessment found that the study area had been subject to high levels of historical disturbance. No Aboriginal objects and / or cultural material were identified during the site investigation. The assessment concluded that no further archaeological works were required.

Burns Road Compound PAD site

It should be noted that a survey and excavation programme has been undertaken at Burns Road Compound Site PAD along Memorial Avenue. This work is assumed to have been in relation to the construction of the T-Way. OEH has given advice that the PAD (AHIMS site 45-5-3063) was impacted under a section 87 test excavation permit and a section 90 consent to destroy permit. If these documents are obtained they will be discussed in the final version of this report.

4.5 Local archaeological context

During the last four decades, the Cumberland Plain has been subject to a large number of archaeological assessments both research and consultant based. As such, over 4000 Aboriginal sites are registered across the Cumberland Plain on the OEH AHIMS database. During the last twenty years, Cumberland Plain predictive modelling has been developed and refined as new data is collected. Beth White and Jo McDonald have recently contributed to the debate over site prediction in their discussion on the nature of Aboriginal site distribution (White and McDonald 2010). The paper provides a spatial and distributive analysis of Aboriginal objects in relation to freshwater resources and along varying landform units. The



findings of this study highlighted the relationship between proximity to freshwater and landscape with Aboriginal occupation.

This stream order model also identifies that the confluences of creek lines across the Cumberland Plain will likely have evidence of a foci of activity with archaeological expressions likely to have stratified deposits. It was found that artefacts were most likely within 50-100m of higher (fourth) order streams, within 50m 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).

The study also found that artefact density were most likely to be greatest on terraces and lower slopes within 100m of freshwater resources. The predictive model also identified that ridgelines and crests located between drainage lines will contain archaeological evidence though usually representative of background scatter similar to that identified for first and / or second order creek lines.

4.6 Archaeological implications for the study area

The study area is comprised of primarily crests, slopes, flats and open depressions. The study area is primarily located within a disturbed landform within the boundaries of the Memorial Avenue and associated road corridors. Two substantial creek lines bisect the study area to the west and east with the study area located within close proximity to a number of creek and drainage lines. The study area is located within close proximity to freshwater resources and approximately eight kilometres east of Plumpton Ridge, a significant silcrete quarry within the Cumberland Plain and Sydney Basin.

The vast majority of the sites identified within close proximity to the study area are “Open Campsites” which consist of Isolated Finds and Artefact Scatters. Other site types within close proximity to the study area include PAD’s and PAD’s with artefacts. Six previously recorded Aboriginal sites have been recorded within the study area boundaries (outlined in Section 4.3). The location of AHIMS sites 45-5-3844 and 45-5-3847 have since been developed under a Part 3A application. AHIMS site 45-5-3063 was recorded as Burns Road Compound PAD and has been previously impacted under section 87 and section 90 permits. Duplicate recording AHIMS site 45-5-0981 / 45-5-0989 has been impacted by works associated with development of Old Windsor Road. AHIMS site 45-5-2652 includes a portion of recorded PAD located within the study area.

5.0 Predictions

5.1 Aboriginal land use

The exact nature of Aboriginal land use patterns in the vicinity of the study area before colonisation is unknown. Assumptions about land use patterns are made on the basis of archaeological data, observations made by Europeans after their settlement in the area and knowledge of available natural resources.

As Aboriginal people were mobile hunter-gatherers, it is likely that they moved across the landscape between resources, movement across the landscape is also likely have been related to socio / cultural factors such as gatherings and ceremonial obligations. Campsites would have provided temporary residences such as the bark structures noted by Tench (Tench, 1793). 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 is likely that knapping would have occurred at a campsite, it is also likely that knapping would have occurred during movement across the landscape, as tools were prepared or repaired during hunting and gathering activities.

5.2 Predictive model

Predictive models are important and provide assessment on the most likely areas of archaeological potential within a given study area. These models also indicate the likely types of archaeological evidence, if present, within a given location and / or study area.

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.
- Historical disturbance and landscape modification.
- Results of previous archaeological work in the vicinity of the study area.
- Historical accounts of Aboriginal occupation, and landscape character.
- Predictive modelling proposed in previous archaeological investigations, particularly White and McDonald 2010.

A predictive statement for Aboriginal site types in the local area is as follows:



- 'Open Campsites' which consist of Artefact Scatters and / or Isolated Finds are the most likely Aboriginal site type within the study area.
- *In situ* artefacts would be located in areas of least ground disturbance.
- Areas along the road alignment will be disturbed. Artefacts with contextual evidence are unlikely to be located within these zones.
- Using the White and McDonald Cumberland Plain Predictive model (White and McDonald, 2010), archaeologically sensitive landforms are generally associated with terraces and lower slopes. Crests and ridgelines between drainage lines are likewise identified as archaeologically sensitive. The study area is a typical Cumberland Plain undulating landscape with crests, broad crests and slope landforms.
- The study area is likely to have been subject to high levels of disturbance and it is likely that sensitive landforms are located within the area but that any potential will have been removed by modern and European land use.
- Intact sub-surface archaeological deposits are only likely in areas that have not been subject to moderate and / or high levels of disturbance. Surface finds in highly disturbed areas are unlikely to be in their original context.
- Where old growth woodland remains there is a possibility that scarred trees will be identified.
- 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 been cleared and/or on tracks.
- Other Aboriginal site types such as shell middens, rock art and shelters are unlikely to occur within the study area.

6.0 Study Area Survey Methods

6.1 Site definition

An Aboriginal site is generally defined as an Aboriginal object or place. An Aboriginal object is the remnant 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 sites were defined as obvious physical boundaries.

6.2 Survey methodology

The aim of the study area survey was to establish the significance and integrity of the previously recorded sites located within the current study area. Further, the survey was undertaken to identify if Aboriginal cultural material and / or objects are present within the study area and, to establish the likelihood of Aboriginal objects occurring beneath the ground surface.

The survey was undertaken in accordance with the OEH *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (2010). All areas were covered on foot. A handheld Global Positioning System (GPS) was used to track the path of the surveyors, and to record the co-ordinates of sites, features and location of landform units within the study area. An aerial map of the study area was also carried by members of the survey team in the field. GDA94 coordinates for sites and PADs were taken with a handheld GPS.

All ground exposures were examined for stone artefacts, shell, or other traces of Aboriginal occupation. Old growth trees were examined for signs of cultural scarring or marking.



A photographic record was kept of representative sections of the study area. Photographs were taken to record the landform units within the study area, vegetation, levels of disturbance, and Aboriginal sites and PADs. Scales were used for photographs where appropriate.

Due to the size, varying levels of disturbance and landform units across the study area, the study area was broken down into nineteen survey units (see Figure 7). Many of the survey units were of a comparable nature in regards to disturbances, landform, visibility and exposure. As such some of the survey units are discussed and outlined concurrently. All survey units, where possible, were traversed in three survey lines with the survey team spaced between two and four metres apart.

The survey of the study area was undertaken on Wednesday 18 March and Thursday 19 March 2014. Table 3 provides the names of the individuals who undertook the survey.

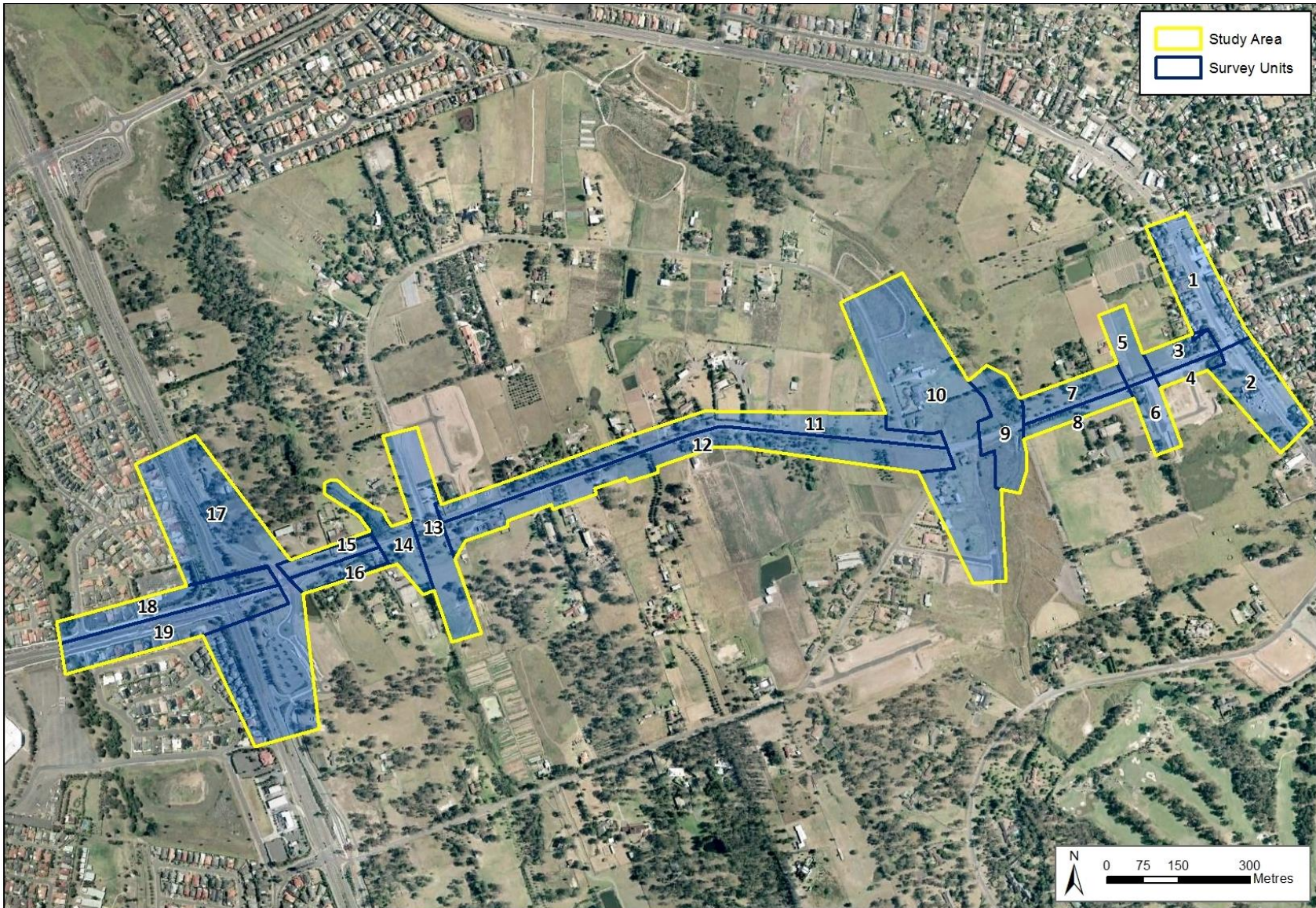
Table 3: Site Survey Register

Organisation	Individual	Date
DLALC	Steve Randall	Wednesday 19 and Thursday 20 March
Artefact Heritage	Joshua Madden	Wednesday 19 and Thursday 20 March
Artefact Heritage	Lyndon Patterson	Wednesday 19 and Thursday 20 March

The study area results are identified below in Section 7.



Figure 7: Survey Units (background image © Google 2013)





7.0 Study Area Survey Results

7.1 Survey observations

7.1.1 Survey Unit 1 and Survey Unit 2

Survey Units 1 and 2 incorporated the T-intersection between Memorial Avenue and Windsor Road (Figure 7). Survey Unit 1 is located on the northern side of Memorial Avenue while Survey Unit 2 is located along the southern side. Surface visibility was below ten per cent with overall exposure assessed below ten per cent.

The survey units are located along crest landform units with views to the west. Both survey units have been subject to severe disturbances which included landform alteration in the form of cutting and re-deposition of soils for a public park, a concrete slab (and a now demolished building) and above ground and sub-surface services. The survey units have been subject to high disturbance levels.

No Aboriginal objects or areas of PAD were identified in Survey Units 1 and 2.

Table 4: Survey Unit 1 and 2.

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Crest	7654	10	10	76.5	1

Plate 1: View W overlooking Memorial Avenue and park Survey Unit 1.



Plate 2: View S overlooking Survey Unit 1 toward T-Intersection of Memorial Avenue and Windsor Road.





Plate 3: View W overlooking Memorial Avenue at the T-intersection Survey Unit 2.



Plate 4: View S overlooking Survey Unit 2.



7.1.2 Survey Unit 3 and Survey Unit 4

Survey Unit 3 is located on the northern side of Memorial Avenue and Survey Unit 4 is located along the southern side (Figure 7). Surface visibility is only evident in areas of exposure with visibility below ten per cent with overall exposure assessed below ten per cent.

The survey units are located along an upper slope landform. Both survey units have been subject to severe disturbances which included landscape modification in the form of cutting and redistribution of soils, the construction of houses, roads, footpaths above ground and sub-surface services with evidence of older residential driveways. There is evidence of soil redistribution with blue metal observed throughout the area. The survey units have been subject to high levels of ground disturbance.

No Aboriginal objects and / or areas of PAD were identified in Survey Units 3 and 4 during the survey.

Table 5: Survey Units 3 and 4 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Upper Slope	7714	10	10	77.1	1



Plate 5: View E Survey Unit 3 undulating landform with zero visibility.



Plate 6: View E Survey Unit 3 of house frontage.



Plate 7: View W of Survey Unit 4 zero visibility.



Plate 8: View E of cut, road and service infrastructure Survey Unit 4.



7.1.3 Survey Unit 5 and Survey Unit 6

Survey Unit 5 is located on the northern side of Memorial Avenue and Survey Unit 6 is located along the southern side (Figure 7). Surface visibility is evident in areas of exposure with visibility below ten per cent with overall exposure assessed below ten per cent.

The survey units are located along a slope landform. Both survey units have been subject to severe disturbances which included; landscape modification in the form of cutting and soil benching / mounding, the construction of houses, roads, footpaths above ground and sub-surface services. In areas of visibility gravels were evident throughout. The survey units have been subject to high levels of ground disturbance.

No Aboriginal objects and / or areas of PAD were identified in Survey Units 5 and 6 during the survey.



Table 6: Survey Units 5 and 6 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Slope	11473	10	10	114.7	1

Plate 9: View S on W side of Survey Unit 5.



Plate 10: View S on E side of Survey Unit 5.



Plate 11: View S overlooking Survey Unit 6.



Plate 12: View N overlooking Survey Unit 6.



7.1.4 Survey Unit 7 and Survey Unit 8

Survey Unit 7 is located on the northern side of Memorial Avenue and Survey Unit 8 is located along the southern side (Figure 7). Surface visibility is evident in areas of exposure with visibility below five per cent with overall exposure assessed below ten per cent.

The survey units are located along a flat landform. Both survey units have been subject to ground disturbances which included; landscape modification in the form of cutting and soil benching / mounding, the construction of houses, roads, footpaths above ground and sub-surface services. In areas of visibility



gravels were evident throughout. The survey units have been subject to high levels of ground disturbance.

No Aboriginal objects and / or areas of PAD were identified in Survey Units 7 and 8 during the survey.

Table 7: Survey Unit 7 and 8 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Flat	17577	5	10	87.9	0.5

Plate 13: View E overlooking soil and builder’s rubble dump Survey Unit 7.



Plate 14: View E overlooking Memorial Avenue and area with services.



Plate 15: View E overlooking car park in Survey Unit 8.



Plate 16: View W overlooking football oval and services by Memorial Avenue.



7.1.5 Survey Unit 9

Survey Unit 9 is located on both sides of Memorial Avenue with Strangers Creek running north-south through the survey unit (Figure 7). No surface visibility was noted in areas outside of Strangers Creek.



The survey unit is located along flat and open depression landform units. The survey unit has been subject to severe disturbance which included; landscape modification in the form of cutting and soil benching / mounding, creek modification, the construction of roads, footpaths above ground and sub-surface services. The survey units have been subject to high levels of ground disturbance.

No Aboriginal objects and / or areas of PAD were identified during the survey.

Table 8: Survey Unit 9 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Flat	12000	0	0	0	0
Open Depression	7140	5	10	35.7	0.5

Plate 17: View E overlooking Creekline on N side of Memorial Avenue.



Plate 18: View N overlooking creekline and bank.



Plate 19: Strangers Creek modification S side of Memorial Avenue.



Plate 20: View W of Survey Unit with services evident.





7.1.6 Survey Unit 10

Survey Unit 10 is located on both sides of Memorial Avenue (Figure 7). No surface visibility was noted due to residential dwellings, gravels, soil dumps, long grasses and tree cover.

The survey unit is located along a slope landform. Sections of the survey unit have been subject to severe disturbance which included; landscape modification in the form of cutting and soil benching / mounding, the construction of roads, footpaths, the construction and demolition of residential dwellings, the construction of above ground and sub-surface services.

No Aboriginal objects and / or areas of PAD were identified during the survey.

Table 9: Survey Unit 10 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Slope	20690	0	0	0	0

Plate 21: View N overlooking N side of Memorial Avenue.



Plate 22: View E overlooking N side of memorial Avenue.





Plate 23: View W overlooking S side of Memorial Avenue.



Plate 24: View S overlooking Survey Unit.



7.1.7 Survey Unit 11

Survey Unit 11 is located on the northern side of Memorial Avenue (Figure 7). Surface visibility was below ten per cent with overall exposure assessed below ten per cent.

Landform units across the survey unit consisted of slopes, flats and open depressions. A tributary of Strangers Creek bisected the survey unit and had been subject to bank alterations in close proximity to the road. Disturbance across the survey unit include landscape modification, cutting and soil mounding, the construction of roads, footpaths, the construction of residential dwellings, fences and brick walls, the construction of above ground and sub-surface services. The survey unit has been subject to high levels of disturbance.

Table 10: Survey Unit 11 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Flat	10000	10	10	100	1
Slope	19000	10	10	190	1
Creek Line	4000	10	10	40	1



Plate 25: View W overlooking Survey Unit leading up to tributary of Strangers Creek.



Plate 26: View E from crest overlooking Memorial Avenue and Survey Unit 11.



Plate 27: View W overlooking houses within Survey Unit 11.



Plate 28: View W overlooking modifications to tributary of Strangers Creek.



7.1.8 Survey Unit 12

Survey Unit 12 is located on the southern side of Memorial Avenue (Figure 7). Surface visibility was below ten per cent with overall exposure assessed as approximately twenty per cent.

Landform units across the study area consisted of crests, slopes, a creek line and areas of severe landform modification. The survey unit has been subject to disturbance which include mass landscape modification, the construction of roads and footpaths, the construction of residential dwellings, fences concrete, and brick walls, the construction of above ground and sub-surface services.

One previously registered site (45-5-3844) is located within the boundaries of the survey unit (Section 7.3).



Table 11: Survey Unit 12 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Crest	10500	10	20	210	2
Slope	21000	10	20	220	2
Creek Line	4500	10	20	90	2

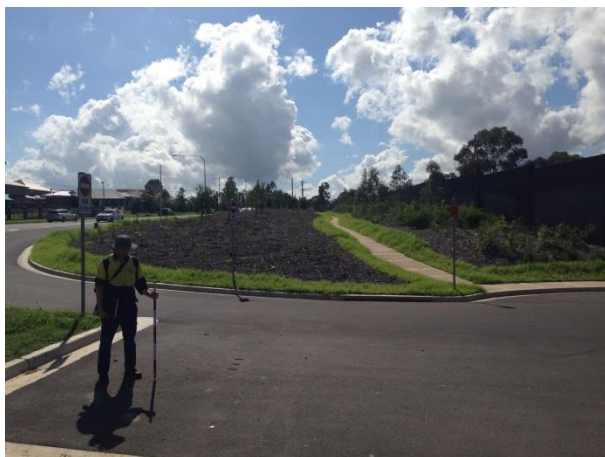
Plate 29: View W overlooking new development.

Plate 30: View E overlooking soil benching, new road, Memorial Avenue and new housing development.



Plate 31: View W from Survey Unit 13 overlooking recent disturbance of Survey Unit 12.

Plate 32: View E overlooking area of disturbance in Survey Unit 12.



7.1.9 Survey Unit 13

Survey Unit 13 is located on the northern and southern side of Memorial Avenue (Figure 7). Surface visibility was identified at five per cent with exposure to ten per cent.



The survey unit is located along a flat and has been subject to severe landform modification. The survey unit has been subject to disturbances which include mass landscape modification, the construction of roads and footpaths, the construction of residential dwellings, fences and the construction of above ground and sub-surface services.

No Aboriginal objects and / or areas of PAD were identified during the survey.

Table 12: Survey Unit 13 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Flat	23000	5	10	115	0.5

Plate 33: View S overlooking Survey Unit 13.



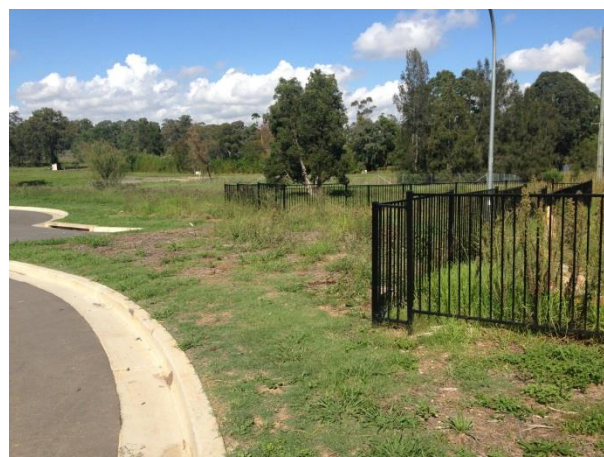
Plate 34: Close up of the number of services within Survey Unit 13.



Plate 35: View S of southern area of Survey Unit 13.



Plate 36: View S of southern area of Survey Unit 13.





7.1.10 Survey Unit 14

Survey Unit 14 is located on both side of Memorial Avenue and incorporates Elizabeth Macarthur Creek and associated creek banks (Figure 7). Surface visibility was to twenty per cent with exposure identified as being thirty per cent.

The survey unit was located along flat and creek bank landform units. The survey unit has been subject to severe disturbances which included; landscape modification in the form of cutting and soil rotating (which was undertaken during the current survey), creek modification, the construction of roads, footpaths above ground and sub-surface services.

One previously recorded PAD (45-5-3063) was identified during the survey.

Table 13: Survey Unit 14 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Flat	16000	20	30	960	9.6
Creek Line	10000	20	30	600	6

Plate 37: Elizabeth Macarthur Creek modifications.



Plate 38: Area of disturbance which was subject to soil rotation while the survey was being undertaken.





Plate 39: Soil dumping along the creek flat.



Plate 40: View S overlooking survey unit.



7.1.11 Survey Unit 15 and Survey Unit 16

Survey Unit 15 is located on the northern side of Memorial Avenue and Survey Unit 16 is located along the southern side (Figure 7). Surface visibility is evident in areas in areas of exposure with visibility below five per cent.

The survey units are located along flat and slope landform units. Disturbances across the survey units included; landscape modification in the form of cutting and soil benching / mounding, the construction of roads, footpaths above ground and sub-surface services and the construction and demolition of residential properties and associated fences. In areas of visibility gravels and iron stones were evident throughout.

No Aboriginal objects and / or areas of PAD were identified in Survey Units 15 and 16 during the survey.

Table 14: Survey Unit 15 and 16 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Flat	7000	5	10	35	0.5
Slope	6200	5	10	31	0.5



Plate 41: View W overlooking Survey Unit 15.



Plate 42: Area of exposure around sub-surface services in Survey Unit 15.



Plate 43: View E overlooking areas of disturbance in Survey Unit 16.



Plate 44: View of soil benching within Survey Unit 16.



7.1.12 Survey Unit 17

Survey Unit 17 is located on both side of Memorial Avenue and incorporates the northern and southern bus T-Way entrances and exits from Memorial Avenue to Old Windsor Road (Figure 7). Surface visibility was below ten per cent with exposures below five per cent.

The survey unit was located along slope and crest landform units. The survey units has been subject to severe disturbances which included; landscape modification in the form of cutting and benching, the construction of roads, footpaths above ground and sub-surface services.

No Aboriginal objects and / or areas of PAD were identified during the survey.



Table 15: Survey Unit 17 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Slope	4000	10	5	20	0.5
Crest	2490	10	5	12.5	0.5

Plate 45: View N overlooking Northern T-Way.



Plate 46: View S overlooking Northern T-Way.



Plate 47: View S overlooking southern T-Way.



Plate 48: View E overlooking southern T-Way entrance.



7.1.13 Survey Unit 18 and Survey Unit 19

Survey Unit 18 is located on the northern side of Memorial Avenue and Survey Unit 19 is located along the southern side (Figure 7). Surface visibility is evident in areas in areas of exposure with visibility below five per cent.

The survey units are located along a heavily disturbed crest landform unit. Disturbances across the survey units included; landscape modification in the form of cutting and soil benching, the construction of



roads, footpaths above ground and sub-surface services and the construction of gardens. Both survey units have been subject to extensive landform modifications that are likely to have impacted topsoil which may have contained archaeological deposits.

No Aboriginal objects and / or areas of PAD were identified in Survey Units 18 and 19 during the survey.

Table 16: Survey Unit 18 and 19 Survey Coverage

Landform	Survey Unit Area (sq. m)	Visibility (%)	Exposure	Effective Coverage (sq. m)	Effective Coverage (%)
Crest	6800	5	5	17	0.5

Plate 49: View S overlooking Survey Unit 18 at the T-Intersection between Memorial Avenue and Old Windsor Road.



Plate 50: View W overlooking T-intersection and soil benching and cutting in Survey Unit 18.



Plate 51: Intersection of Old Windsor Road and Memorial Avenue and disturbances in Survey Unit 19.



Plate 52: Intersection of Old Windsor Road and Memorial Avenue and disturbances in Survey Unit 19.





7.2 Effective survey coverage

In accordance with the OEH code of practice, a summary of survey coverage is outlined in Table 17 below.

Table 17: Landform Summary.

Landform	Survey Unit Area (sq. m)	Landform effectively surveyed (sq. m)	% of landform effectively surveyed	Number of sites	Number of artefact features
Creek Line	18500	730	3.9	1	–
Flat	87577	1298	1.5	–	–
Slope	82363	576	0.7	1	–
Crest	27444	316	1.2	–	–
Upper Slope	7714	77	1	–	–
Open Depression	7140	35.7	0.5	–	–

7.3 Previously recorded sites

The locations of six previously recorded Aboriginal sites within the study area were visited during the field survey. A summary of observations at each site location is included below.

AHIMS site 45-5-0981 / 45-5-0989 (OWR IF2)

Information included with the AHIMS site recording form for duplicate site recording 45-5-0981 / 45-5-0989 indicates the site was issued a Section 90 Consent to Destroy permit under the *NPW Act 1974* in 1995. Significant upgrade works to Old Windsor Road have occurred since that date and the site is likely to have been destroyed. The site survey visited the general location of AHIMS site 45-5-0981 / 45-5-0989 and observed the area has been impacted by widening of Old Windsor Road and associated T-Way and installation of a large car park for the T-Way. These observations support the assessment that AHIMS site 45-5-0981 / 45-5-0989 has been destroyed.

AHIMS site 45-5-2652 (PAD 33)

As outlined in Section 4.3, the southeastern and western portions of PAD 33 (AHIMS site 45-5-2652) are located within the study area. The location of PAD 33 was visited during the site survey. Observations made during the site survey indicate that the western portion of PAD 33, which is associated with a small stand of mature Eucalypts, has not been impacted since the original recording in 2002. The stand of



Eucalypts remains in an area of zero per cent surface visibility due to dense grass cover and adjacent to a channelised section of Strangers Creek.

The southeastern portion of PAD 33 appears to have been impacted by residential development and associated road infrastructure. Observations in that area during the field survey include landscaping, construction of a bitumen road, and housing. This is the portion of PAD 33 which was investigated by MDCA as part of an archaeological test excavation program, and is likely to have been impacted with an Aboriginal Heritage Impact Permit (AHIP) from OEH. This is an assumption, as the nature of the four permits listed with PAD 33 on the AHIMS site register (2002, 2013, 3636 and 3638) are not known.

Plate 53: View north towards stand of trees associated with western portion of PAD 33



Plate 54: View north across western portion of PAD 33, with Eucalypts to right of photo.



Plate 55: View west across southeastern portion of PAD 33.



Plate 56: View east across Strangers Creek to eastern portions of PAD 33.



AHIMS site 45-5-3063 (Burns Road Compound PAD)

The coordinates place the site within a recently altered landscape which includes the demolition of a tennis club house and tennis courts and the use of the area as a compound for the construction of the nearby T-Way car park. The PAD is associated with Permits 2241 and 2319 and has been previously impacted.



Plate 57: View E overlooking 45-5-3063.



Plate 58: View SE overlooking 45-5-3063.



AHIMS site 45-5-3844 (MA-1 Isolated Find)

The location of the site was revisited during the current survey. JMCD CHM described the site as being located within a gravel driveway. The coordinates place the site within a recently altered landscape which includes the demolition of an existing residential dwelling and the construction of a concrete wall, footpath with soil benching evident across the entire site location. It is understood this site has been destroyed under the Part 3A development of a Baptist Community Services retirement facility.

Plate 59: View N overlooking original recording of 45-5-3844.



Plate 60: View N overlooking original recording of 45-5-3844.



AHIMS site 45-5-3847 (MA-4)

As outlined in Section 4.6, AHIMS sites 45-5-3844 and 45-5-3847 have been impacted by construction of retirement community housing under a Part 3A approval. The recorded location of AHIMS site 45-5-3847 was visited during the current survey, and observations indicate that the site has been impacted. A bitumen road is now located where the site was recorded.



Plate 61: View west across location of AHIMS site 45-5-3847



Plate 62: View north across location of AHIMS site 45-5-3847



8.0 Discussion and Analysis of Potential

8.1 Analysis of survey results

A full survey in accordance with the OEH 2010 Code of Practice was undertaken across the entire study area. Due to the length of the study area and the fact the study area is located along an established road corridor associated with pockets of new residential development, the study area was broken down into 19 arbitrary survey units.

Overall surface visibility and exposure was low, with the average below ten per cent. Visibility and areas of exposure were generally associated with modified landform units and creek lines. All of the survey units have been subject to high levels of disturbances.

No Aboriginal sites and / or PADs were identified during the survey.

8.2 Archaeological implications

The current study area is located along the Cumberland Plain in the west of Sydney and is located within a typical Cumberland Plain undulating landscape. The study area is confined to the east to west alignment of Memorial Avenue and bordered by Old Windsor Road in the west and Windsor Road in the East. Elizabeth Macquarie Creek, Strangers Creek, a third order water course, and a tributary of Strangers Creek, bisect the study area.

Regional predictive models (White and McDonald, 2010) suggest that areas within close proximity to major freshwater resources were utilised more regularly than other areas. These areas are often identified as high resource zones. Predictive models also identified that lower slopes and terraces are more often foci for Aboriginal material culture and / or objects and as such, are more likely to be identifiable as archaeological sensitive landform units. Predictive models also stated that an increased number of sensitive land forms were identified closer to major freshwater resources / high resource zones.

The current study area is located within an area that has been subject to landform modification and ground disturbance as a result of the construction of the road, development and agriculture. The current assessment has identified that the study area is located within close proximity to resources including Strangers Creek, a third order water way.



8.2 Analysis of potential

Archaeological potential is closely related to the levels of ground disturbance within a given area. However, other factors are also taken into account when assessing archaeological potential, such as; whether artefacts were located on the surface or, whether the area is within a sensitive landform unit according to the predictive statements.

The study area has been subject generally high levels of disturbances. The study area is located along an existing road corridor that is bordered by rural allotments and market gardens and recent residential development.

A portion of one identified area of archaeological potential, PAD 33 (AHIMS site 45-5-2652) is located within the study area. The southeastern portion of PAD 33 has been impacted by residential development works. That portion of the PAD was investigated during an archaeological test excavation program. The results of that excavation indicated that there is a very low density of Aboriginal objects beneath the surface and no further archaeological investigation was recommended (see Figure 8).

The western portion of PAD 33, also within the study area, has not been impacted and appears to be in the same condition as when it was originally recorded in 2002 (see Figure 8). As the subsurface investigation in the southeastern portion of PAD 33 retrieved very few artefacts, it is likely that by association the overall archaeological potential of PAD 33 is low.

The study area has therefore been assessed as having a low archaeological potential.



Figure 8: Detail of AHIMS site 45-5-2652 (background aerial © Google 2013)



9.0 Significance Assessment

9.1 Assessment criteria

Archaeological significance refers to the archaeological or scientific importance of a landscape or area. This is characterised 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 subject area) exists, what is already conserved, how much connectivity is there?
- Rarity: is the subject area important in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practiced? 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?

Cultural values and significance can only be addressed by Aboriginal peoples who have cultural knowledge of the area. No areas of particular cultural significance have been addressed by DLALC in their survey report (Appendix 1).

9.2 Archaeological significance assessment

The archaeological significance of the study area has been determined based on observations of each survey unit during the field survey and the results of previous archaeological investigations.

Archaeological significance values refer to the archaeological or scientific importance of a landscape or area. This is characterised using archaeological criteria such as archaeological potential, rarity of the archaeological resource, and disturbances to the landscape.

Duplicate site 45-5-0981 / 45-5-0989 has been destroyed.

A portion of site 45-5-2652 has been destroyed and the remaining portion, which consists of a PAD with no identified Aboriginal objects, has been assessed as demonstrating low archaeological potential.



Site 45-5-3063 has been subject to impacts associated with a section 87 and a section 90 permit. The current assessment has identified disturbances relating to soil movement and the demolition of buildings associated with the area surrounding the coordinate available on the extensive AHIMS search results. This PAD possesses no archaeological significance.

Sites 45-5-3844 and 45-5-3847 have been destroyed by recent development and as such, possesses no archaeological significance.

Table 18 provides a summary of the significance assessment.

Table 18: Summary of Significance Values for Previously Recorded Sites

Survey Unit	Site name	Research Potential	Scientific / Archaeological Value	Representative Value	Rarity Value	Overall Significance
17	45-5-0981 / 45-5-0989	N/A	N/A	N/A	N/A	N/A
9	45-5-2652	Low	Low	Low	Low	Low
14	45-5-3063	N/A	N/A	N/A	N/A	N/A
13	45-5-3844	N/A	N/A	N/A	N/A	N/A
13	45-5-3847	N/A	N/A	N/A	N/A	N/A

The remainder of the study area does not provide good research potential as there were no identified areas of archaeological potential. Representativeness values are low and it is not an area of rarity within the local regional context. The area does not have Aboriginal heritage and/or archaeological educational potential.

The study area is therefore assessed as having low archaeological significance.

9.3 Cultural heritage assessment

During the study area survey Mr Steve Randall of the DLALC noted a sensitive landform unit along the flat associated with a tributary of Strangers Creek but agreed that due to disturbance levels it should not be designated as a PAD.



10.0 Impact Assessment

Six Aboriginal sites listed on the AHIMS site register are located within the study area. Sites 45-5-0981 / 45-5-0989, 45-5-3063, 45-5-3844, 45-5-3847 and a portion of 45-5-2652 have been destroyed.

An intact portion of AHIMS site 45-5-2652 is located within the study area. That portion of 45-5-2652 consists of recorded Potential Archaeological Deposit (PAD), however archaeological investigation in the southeast corner of 45-5-2652 indicates that archaeological potential of the PAD is low. It is understood that the intact portion of AHIMS site 45-5-2652 is not located within the current road design and will not be impacted.

It has been identified that the proposed works will be contained within areas specified as having high levels of disturbance and low archaeological potential. The study area has been assessed as having a low archaeological potential and a low archaeological significance.

The impact assessment has therefore found that there will be no impact to known Aboriginal sites and/or places or areas of potential under the proposed works by Roads and Maritime.



11.0 Management and Mitigation Measures

11.1 Guiding principles

Conservation of Aboriginal sites is best practice cultural heritage management. Retaining Aboriginal archaeological material within a natural landscape setting enables the continuation of past cultural associations with the landscape.

The nature of mitigation measures recommended is primarily based on an assessment of archaeological significance. The recommendations are also informed by cultural significance, which would be discussed by the DLALC.

11.2 Mitigation and management measures

This investigation has determined that there are five destroyed Aboriginal sites located within the study area:

- AHIMS site 45-5-0981 / 45-5-0989 (duplicate recording)
- AHIMS site 45-5-3063
- AHIMS site 45-5-3844
- AHIMS site 45-5-3847

These recorded sites have been impacted and no further archaeological investigation is recommended.

AHIMS site 45-5-2652 is located within the study area. One portion of the site has been impacted by residential development. Impact to that portion of the site is likely to have been subject to Aboriginal Heritage Impact Permits 2002, 2013, 3636 and 3638. Copies of these permits were not accessible during preparation of this document, and it is not clear from the AHIMS site register results whether those permits cover the impacted portion of 45-5-2652, or the entire site area.

One portion of AHIMS site 45-5-2652 located within the study area remains in the same condition as when the Potential Archaeological Deposit (PAD) was first recorded in 2002. It is understood that portion of 45-5-2652 will not be impacted by the proposed works. Where it is determined during detailed design



that there will be impact to the intact portion of 45-5-2652 further advice from an archaeologist should be sought to determined appropriate recommendations.

If unforeseen Aboriginal objects are uncovered during development, work must cease. If unexpected finds are identified, the Roads and Maritime *Standard Management Procedure: Unexpected Archaeological Finds* (July 2012) would be adhered to.



12.0 Recommendations

The following recommendations were based on consideration of:

- Statutory requirements under the *National Parks and Wildlife Act 1974* as amended.
- The *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* DECCW (24 September 2010).
- The results of the background research, site survey and assessment.
- The interests of the DLALC.
- The likely impacts of the proposed development.

This assessment found that:

- Duplicate AHIMS site recording 45-5-0981 / 45-5-0989 is located within the study area. The site has been destroyed under Section 90 Consent to Destroy number 710.
- An intact portion of Aboriginal site 45-5-2652 is located within the study area. It is understood that intact portion of 45-5-2652 will not be impacted by the proposed works.
- One impacted portion of Aboriginal site 45-5-2652 is located within the study area. It appears that these impacts were conducted in accordance with permits 2002, 2013, 3636 and 3638, although this cannot be verified as copies of these permits were not accessible during preparation of this document.
- AHIMS site 45-5-3063, an area of Potential Archaeological Deposit (PAD), was located within the study area boundaries. This PAD has been disturbed under two Aboriginal Heritage Impact Permits (2241, 2319).
- AHIMS site 45-5-3844, an isolated find, was located within the study area boundaries. The site has been destroyed under the Part 3A development of a retirement facility.
- AHIMS site 45-5-3847 is located within the study area. The site has been destroyed under the Part 3A development of a retirement facility.
- The majority of the study area has been subject to high levels of ground disturbance.

This assessment recommends:

- There are no Aboriginal heritage constraints on the proposed upgrade works. This assessment has found that the Stage 3 PACHCI does not need to be implemented for the proposed Memorial Avenue upgrade.



- If it is determined during detailed design that there will be impacts to the intact portion of AHIMS site 45-5-2652, further advice from an archaeologist should be sought to determine appropriate recommendations.
- If Aboriginal objects or suspected human remains are located during works the Roads and Maritime Unexpected Finds Procedure would be adhered to.
- Site impact recording forms would be prepared for sites 45-5-3844 and 45-5-3063.



13.0 References

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