Shepherd Street Precinct, Liverpool

Archaeological Survey Report

Coronation Property Co Pty Ltd

March 2016

artefact

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EXECUTIVE SUMMARY

City Plan Services has engaged Artefact Heritage, on behalf of Coronation Property Co Pty Ltd, to undertake an archaeological survey report (ASR) to accompany a planning proposal for a residential development at Shepherd Street, Liverpool (the study area). This report has been prepared in accordance with the requirements for an archaeological investigation 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 of Practice').

The aim of this survey report is to identify whether Aboriginal objects would be impacted by the proposed works and to recommend if any further management or mitigation measures are required

Overview of findings

It was found that:

- No Aboriginal sites and/or places were located within the study area.
- The study area has been subject to significant ground disturbance.
- The study area was assessed as demonstrating low archaeological potential.

It is therefore recommended that:

- The proposed 'Shepherd Street Precinct' development is able to proceed without the need for further archaeological and/or Aboriginal heritage assessment.
- If the project design should change or if areas not surveyed are added to the scope of proposed works, further archaeological assessment would be required.
- If Aboriginal objects are uncovered during works an archaeologist, the TLALC and OEH must be notified. Further investigation and approvals may be required.
- If human remains are identified during archaeological test excavation or during any stage of the proposed works, work should cease, the site should be secured and the NSW Police and the OEH should be notified. Further investigation and approvals may be required.
- A final copy of this report (with updated study area and proposed design) should be forwarded to TLALC for their records.

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1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

City Plan Services has engaged Artefact Heritage, on behalf of Coronation Property Co Pty Ltd, to undertake an archaeological survey report (ASR) to accompany a planning proposal for a residential development at Shepherd Street, Liverpool (the study area). This report has been prepared in accordance with the requirements for an archaeological investigation 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 of Practice').

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1.2 Study Area

The study area incudes land contained within 20, 26, 28, 32-34, 31 and 33 Shepherd Street, 2 and 5 Atkinson Street, Liverpool, and Mill Park, Casula NSW (Lot 1 DP247485, Lot 23 DP859055, Lot 22 DP859055, Lot 3 DP247485, Lot 4 DP247485, Lot 5 DP247485, Lot 6 DP247485, Lot 13 DP247485, Lot 15 DP1129945 and Lot 10 DP881265) (Figure 1). The study area is located within the Parish of St Luke, County of Cumberland.

1.3 Project Description

Coronation Property Co Pty Ltd have submitted a Planning Proposal for a residential development, in Shepherd Street, Liverpool (study area).

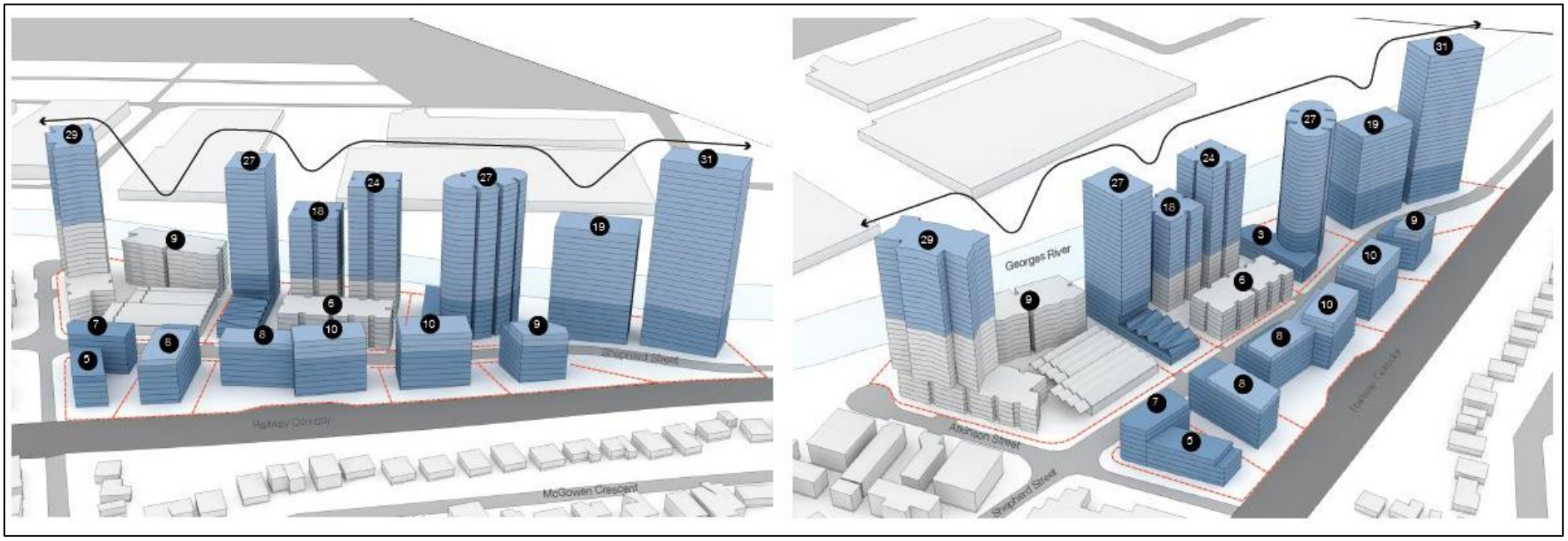
The Planning Proposal seeks an amendment to the Liverpool LEP 2008 to allow for a maximum building height of 103 metres and a maximum floor space ratio of between 3:5 and 4:5:1 across the sites within the precinct.

It is proposed that the Shepherd Street precinct will be developed into a residential precinct with local retail activities within the Heritage Mill Building. A concept plan has been developed for the site (Figure 1 and Figure 2), which includes:

- Construction of residential towers of various heights. The proposed number of units within the study area is approximately 1450.
- A new street network including new street connections from Shepherd Street down to the river frontage and realigning and upgrading the existing street connection through to the Casula Powerhouse. The new street network will include additional on-street parking;
- A riverfront boardwalk to connect to the Shepherd Street precinct with existing pedestrian cycle way infrastructure to the north and south of the development.

Figure 1: 'Shepherd Street Precinct' residential development (SJB Architects 2016)

Figure 2: Shepherd Street Precinct visualisation (SJB Architects 2016)



1.4 Objectives of the Study

The objective of this study is to prepare an ASR in accordance with the OEH code of practice. This report includes the following:

- A description of the proposal and the extent of the study area.
- Discussion of the environmental context of the study area.
- Discussion of the Aboriginal and 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.
- Description and analysis of the identified Aboriginal site within the study area.
- Development of a significance and impact assessment of the identified Aboriginal site, addressing archaeological values.
- Development of management and mitigation measures.
- Recommendations relating to the further mitigation of potential impacts to the identified site.

1.5 Investigator and Contributors

Alexander Timms (Archaeologist) prepared this report. Dr Sandra Wallace (Principal Archaeologist) provided management input and completed the final review.

1.6 Aboriginal Community Involvement and Consultation

Artefact Heritage was in contact with the Tharawal Local Aboriginal Land Council (TLALC) throughout the Aboriginal heritage assessment process. A TLALC field representative was invited to attend the field survey on 21 August 2015. Donna Whillock represented TLALC during the field survey. A draft copy of this report was provided to TLALC for review and comment on 25 September 2015. TLALC reviewed the report and provided a cultural assessment letter report (Appendix 1).

It is recommended that a final copy of this report (with updated study area and proposed design) be forwarded to TLALC for their records.

2.0 LEGISLATIVE CONTEXT

This study has been undertaken in the context of several pieces of legislation that relate to Aboriginal heritage and its protection in New South Wales.

National Parks and Wildlife Act (1974) amended (2010)

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

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

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

As part of the administration of Part 6 of the Act, OEH has developed regulatory guidelines on Aboriginal consultation, which are outlined in *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010). Guidelines have also been developed for the processes of due diligence; *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (2010), and for investigation of Aboriginal objects - *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (2010) in accordance with the 2010 amendment to the Act.

Environmental Planning and Assessment Act (1979)

The *Environmental Planning and Assessment Act* (1979) (EP&A Act) is administered by the Department of the Premier and Cabinet and provides planning controls and requirements for environmental assessment in the development approval process. This Act has three main parts of direct relevance to Aboriginal cultural heritage. Namely, Part 3 which governs the preparation of planning instruments, Part 4 which relates to development assessment process for local government (consent) authorities and Part 5 which relates to activity approvals by governing (determining) authorities.

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

The study area is within the Liverpool City Council LGA.

The Liverpool LEP 2008 (Part 5, Clause 5.10) make standard provision for the protection of Aboriginal objects and Aboriginal places of heritage significance. There are no Aboriginal heritage items within the study area that are listed in the Liverpool LEP 2008.

Aboriginal Land Rights Act (1983)

The *Aboriginal Land Rights Act* 1983 (the Land Rights Act) is administered by the NSW Department of Human Services -Aboriginal Affairs. The Land Rights Act established Aboriginal Land Councils (at State and Local levels). These bodies have a statutory obligation under the Land Rights 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 AND HISTORICAL CONTEXT

3.1 Geology and Soils

The study area is located within the Cumberland Plain, which is part of the Sydney Basin bioregion. The underlying geology of the study area is Tertiary fluvial deposits consisting of clayey quartzose sand and clay (Figure 3); which sits on bedrock of shale or Hawkesbury Sandstone (Clark and Jones 1991).

The primary soil type across the area is the Blacktown soil landscape. The Blacktown soil landscape is typified by residual shallow friable brownish black loam over hard-set brown clay loam base. The western fringe of the study area is situated on the Luddenham soil landscape. The Luddenham soil landscape is typified by erosional shallow loams overlying sandy clay (eSpade 2015).

3.2 Landforms and Hydrology

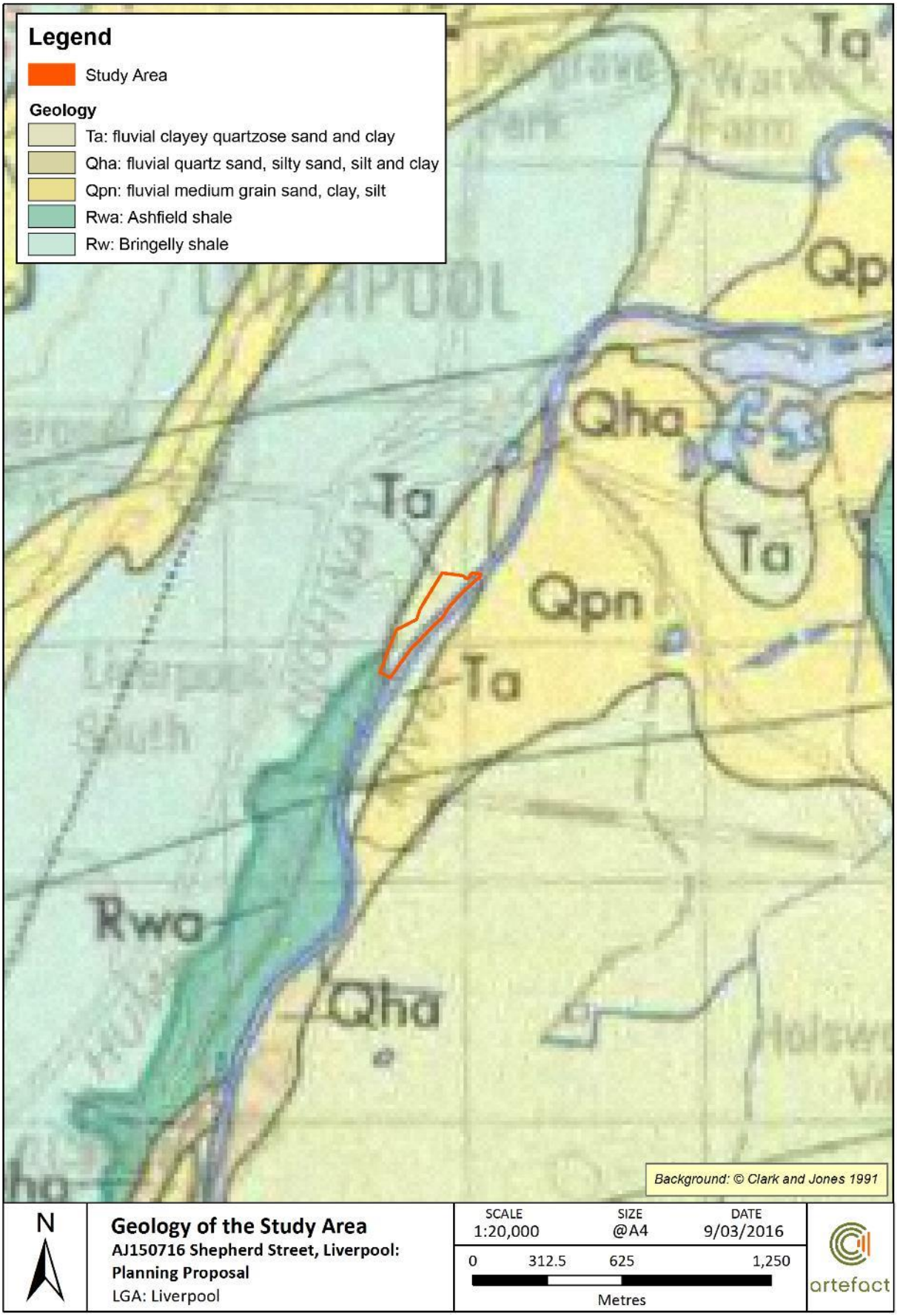
The Cumberland Plain is described as having low rolling hills and wide valleys (OEH 2011). The study area is located on relatively flat, raised banks of the Georges River; a fourth order stream. The source of the Georges River is located within the northwest Woronora Plateau and flows into Botany Bay. A review of historical imagery (Figure 8 to Figure 10) indicate that a number of shallow gullies and ephemeral first order tributaries ran perpendicular to the banks of the Georges River in the local region.

3.3 Vegetation and Resources

The study area would once have been covered by open Cumberland Plain and Alluvial Woodland. Tree species would have included Forest Red Gum (*E. tereticornis*), and Grey Box (*E. moluccana*). Honey Myrtle (*Melaleuca decora*) and Prickly Leaf Paperbark (*Melaleuca nodosa*) (Benson and Howell 1990). Plants were an important source of nutrition for Aboriginal people, common edible species being *Macrozamia*, a cycad palm with poisonous seeds that were detoxified and ground into a paste and *Xanthorrhoea*, or grass tree. The grass tree nectar was a high-energy food, the resin a strong hafting glue, and the flower spikes used for spear barbs.

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

Figure 3: Geology of the region



3.4 Land Use History

The first land parcels in the Liverpool area were granted in 1798. In 1810 Governor Macquarie founded Liverpool and named it after the Earl of Liverpool. The road connecting Liverpool to Sydney was completed in 1813 and settlement grew rapidly. The rich soils on the floodplain of the Georges River provided for a growing agricultural industry (Figure 4). In the 1860s many small farmers moved away from the river after a particularly large inundation and the area became open to larger scale agriculture such as dairy farming. Up until the mid-twentieth century agriculture co-existed with suburban areas in the Liverpool region.

The study area was located within the Collingwood Estate (Bunkers Farm), a large agricultural estate, which had been granted to Captain Eber Bunker by Governor King on 18 August 1804 (HC NSW 2008) (Figure 5). The estate was purchased by James Henry Atkinson in 1853, who began to develop the area into an industrial estate (City Plan 2015a:11). The arrival of the Liverpool railway line in 1856 allowed new industries to be developed in Collingwood (HC NSW 2008). Atkinson developed Collingwood into a depot for the transfer of pastoral and agricultural produce; which included orchards/gardens, stockyards, an abattoir, wool washers and mill (Figure 6).

In 1864 The Australian Paper Company purchased a riverside block of the Collingwood estate and established the Collingwood Paper Mill in 1868. The site was developed over a number of decades, with additions overtime (HC NSW 2008). The property changed hands again when the paper mill closed in 1905 and was reopened as the Challenge Woollen Mills in 1910 (Figure 7). The woollen mills remained in operation until the 1970s. Historical aerial imagery from 1930 to 1961 (Figure 8 to Figure 10) show the disturbance generated by the mill. The study area has been cleared and flattened up to the river's edge. Over time the footprint of the mill spread southward with the addition of new buildings and holding ponds.

Figure 4: Liverpool, New South Wales. Joseph Lycett 1824 (SLV)

Figure 5: Parish of St Luke, Cumberland County – before construction of railway in 1856 (HLRV: nd). Study area in orange

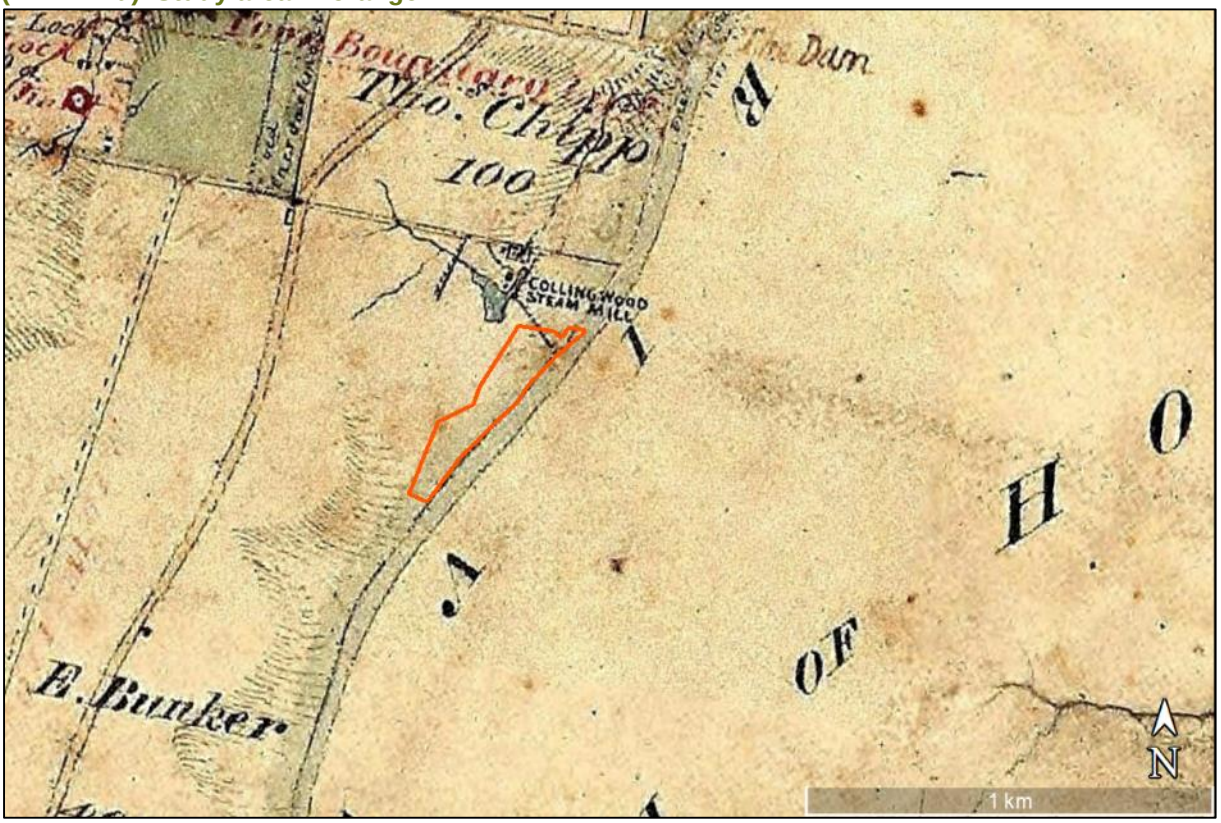


Figure 6: Village of Collingwood (NLA: 1856). Study area in orange

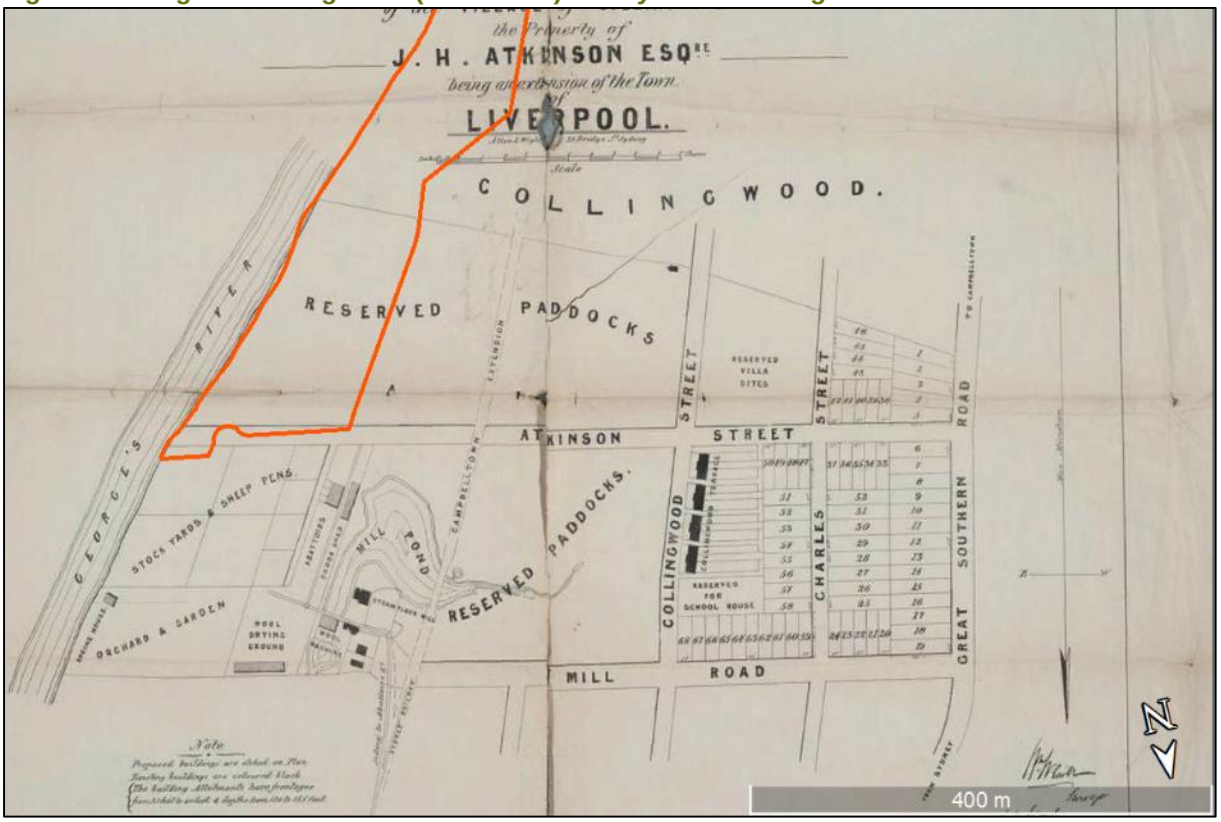


Figure 7: Challenge Woollen Mills from Liverpool Camp (Lennon 1932)

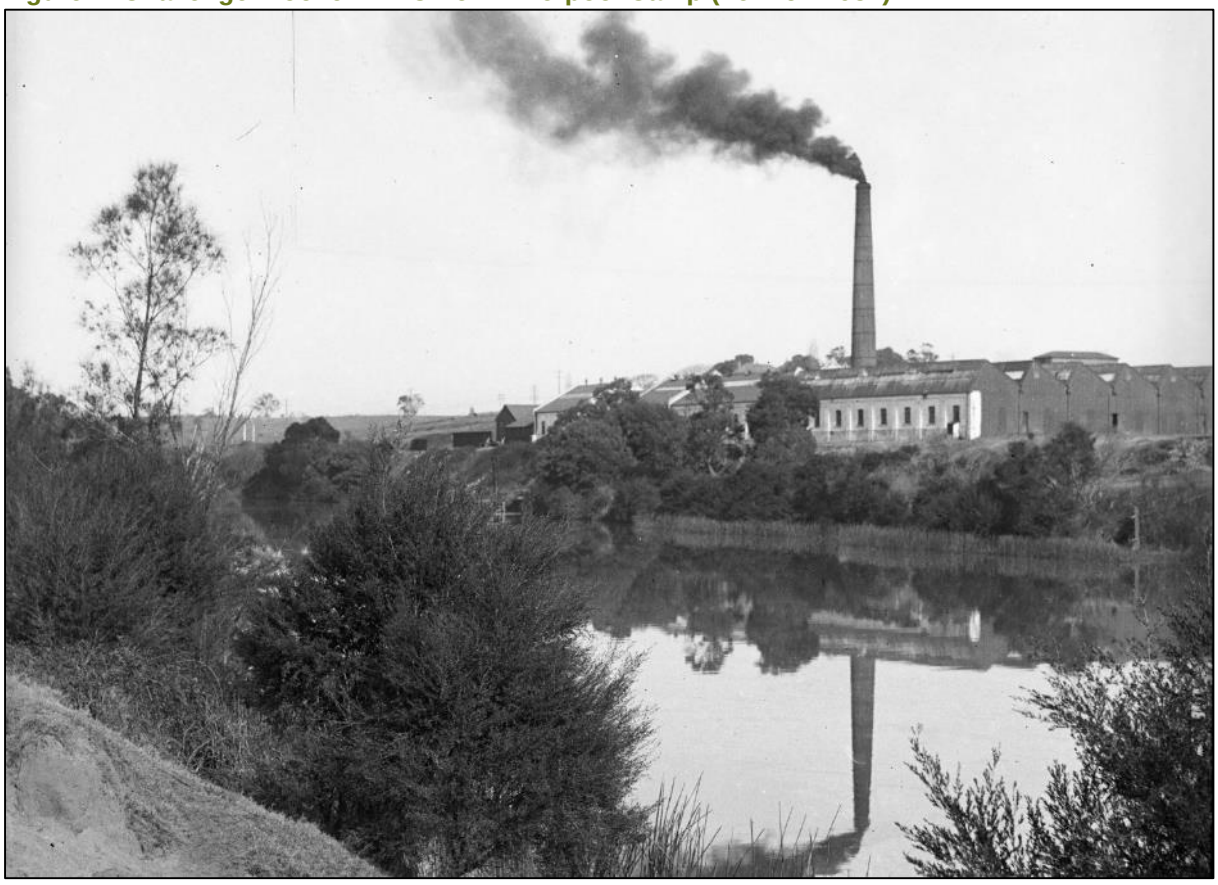


Figure 8: 1930 Aerial Image (LPI:1930). Study Area in orange.

Figure 9: 1943 Aerial Image (NSW Globe LPI:1943). Study Area in orange.

Figure 10: 1961 Aerial Image (LPI:1961). Study Area in orange.

4.0 ABORIGINAL HISTORICAL AND ARCHAEOLOGICAL CONTEXT

4.1 Aboriginal Material Culture

Early evidence of Aboriginal occupation within the Sydney Basin (which incorporates the Cumberland Plain) during the Pleistocene has been identified in several locations. A suite of radiometric dates (ANU – 3908; ANU – 4016 & ANU – 4017) taken from wood and charcoal samples were used to date deposits within the Cranebrook Terrace on the Nepean River, from which five stone artefacts recovered, to approximately 40, 000 years Before Present (yBP) (Nanson et al 1987). A large salvage excavation undertaken within a deep sand body at George Street, Parramatta identified a bi-model distribution of 4775 stone artefacts. Glossy heat treated silcrete artefacts were recovered from the upper 20 centimetres of the deposit while pre-Bondaian/Capertain stone artefacts, composed of silicified tuff, were recovered from the lower deposits (approximately 40-60 centimetres). Radiometric dating was applied to a charcoal sample retrieved from sediments below the concentration of the tuff artefacts, which was found during sieving. The date, therefore provides a maximum age of approximately 30, 000yBP for the site (WK – 17435) (Jo McDonald 2005a). Evidence of Late Pleistocene occupation has also been identified from a rockshelter at the foothills of the Blue Mountains (14,700 yBP) (Kohen et al 1981), and a coastal site south of Wollongong at Bass Point, which was dated to around 20,000 yBP (Lampert 1971).

Although there is evidence for Pleistocene occupation within the greater Sydney Basin the majority of Aboriginal archaeological sites, particularly within the Cumberland Plains, have been dated to the Holocene period within the last 5000 to 3000yBP. Many researchers propose that this reflects an increase in occupation intensity. The archaeological material record provides evidence of extended Aboriginal occupation of the Sydney Basin, but also provides evidence of a dynamic culture which has changed through time.

Ethno-historical observations along the south coast and the hinterlands demonstrate that the material culture of the local Aboriginal population would have included a wide range of items related to subsistence, shelter, and cultural practices (Kuskie 2008: 13). The existing archaeological record is limited to certain materials and objects that were able to withstand degradation and decay. As a result, the most common type of Aboriginal objects remaining in the archaeological record are stone artefacts, followed by bone and shell.

Archaeological analyses of these artefacts in their contexts have provided the basis for the interpretation of change in material culture over time. Technologies used for making tools changed, along with preference of raw material. Different types of tools appeared at certain times, for example ground stone hatchets are first observed in the archaeological record around 4,000yBP in the Sydney region (Attenbrow 2010: 102). It is argued that these changes in material culture are 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; Jo McDonald 2005b). 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 source, and bifacial flaking became the most common technique for tool manufacture.

From about 4,000 yBP to 1,000 yBP backed artefacts appear more frequently. Tool manufacture techniques become more complex and bipolar flaking increases. It has been argued that from 1,400 to 1,000 years before European contact there is evidence of a decline in tool manufacture. This is evidenced by the reduction in frequency of backed blades as a percentage of the entire stone artefact assemblage. 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).

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 a number of sites in Western Sydney were flaked glass has been recorded, for example at Prospect (Ngara Consulting 2003) and Oran Park (JMcD CHM 2007).

4.2 Aboriginal Ethno-historical Context

Prior to the appropriation of their land by Europeans, Aboriginal people lived in small family or clan groups that were associated with particular territories or places. It seems that territorial boundaries were fairly fluid, although details are not known. The language group spoken on the Cumberland Plain is known as Darug (Dharruk – alternative spelling). This term was used for the first time in 1900 (Matthews and Everitt) as before the late 1800s language groups or dialects were not discussed in the literature (Attenbrow 2010:31). The Darug language group is thought to have extended from Appin in the south to the Hawkesbury River, west of the Georges River, Parramatta, the Lane Cove River and to Berowra Creek (Attenbrow 2010:34). This area was home to a number of different clan groups throughout the Cumberland Plain.

British colonisation had a profound and devastating effect on the Aboriginal population of the Sydney region, including Darug speakers. In the early days of the colony Aboriginal people were disenfranchised from their land as the British claimed areas for settlement and agriculture. The colonists, often at the expense of the local Aboriginal groups, also claimed resources such as pasture, timber, fishing grounds and water sources. Overall the devastation of the Aboriginal culture did not come about through war with the British, but instead through disease and forced removal from traditional lands. It is thought that during the 1789 smallpox epidemic, over half of the Aboriginal people of the Sydney region died. The disease spread west to the Darug of the Cumberland Plain and north to the Hawkesbury. It may have in fact spread much further afield, over the Blue Mountains (Butlin 1983). This loss of life meant that some of the Aboriginal groups who lived away from the coastal settlement of Sydney may have disappeared entirely before Europeans could observe them, or record their clan names (Karskens 2010:452).

The British initially thought that Aboriginal people did not live inland, but were confined to the coast taking advantage of the abundant marine resources available. The first major expeditions into the interior did not witness any Aboriginal people, but evidence of their existence was noted. In April 1788 Governor Philip led an expedition west to Prospect Hill. It was noted, '…that these parts are frequented by the natives was undeniably proved by the temporary huts which were seen in several places. Near one of these huts, the bones of kangaroo were found, and several trees where seen on fire (Stockdale 1789).

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

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

It wasn't until rural settlement began in the western Cumberland Plain, around 1791 that the colonists and Aboriginal peoples came face to face. Relations quickly disintegrated, and tensions over land and resources spilled over. Governor King sanctioned the shooting of Aboriginal peoples in a General Order made in 1801 (Kohen 1986:24). Intermittent killings on both sides continued for over 15 years, including the Appin massacre and attacks at South Creek in 1816 (Karskens 2010: 225, Kohen 1986:23).

The Liverpool area is within Cabrogal land. The Cabrogal were Darug language speakers. The study area is located in close proximity to a high ridgeline which forms part of the Collingwood Aboriginal Place (Section 4.3.1). This area is said to be a meeting place for Darug, Dharrawal and Gandangara people at the boundary of their territories. The study area is seen to have an important place in Aboriginal history, which is reflected in its status as a registered Aboriginal Place.

The Aboriginal people were quickly disenfranchised from their traditional territories as colonists appropriated land and resources. The smallpox epidemics of 1789 killed a large portion of Aboriginal people of the Sydney region, even those who had not yet come into contact with Europeans. Despite this fragmentation of their culture Aboriginal people have continued to live along the Georges River to the present day. A large Aboriginal camp was located at Salt Pan Creek to the east of Liverpool until the 1930s when its people were forcibly removed to La Perouse.

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

4.3 Registered Aboriginal sites in the study area- AHIMS search results

An extensive search of the Aboriginal Heritage Information System (AHIMS) database was undertaken on the 21 July 2015. An updated AHIMS search was completed on the 8 March 2016. An area within a two kilometre radius of the study area was searched in order to gain information on the archaeological context of the area, and to ascertain whether there are any previously recorded Aboriginal sites within the study area. The details of the AHIMS search parameters are as follows:

GDA 1994 MGA 56	305005 - 311167, 6240246 - 6246582,
Buffer	50 m
Number of sites	30
AHIMS Search ID	182341

A total of thirty sites were identified by the extensive AHIMS search. The frequency of recorded site types is summarised in Table 1 below. The distribution of recorded sites within the AHIMS search area is shown in Figure 12.

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

Table 1: Frequency of site features from AHIMS data

Site Types	Frequency	Percentage
Artefact	14	47
Modified Tree (Carved or Scarred)	8	27
Artefact, Potential Archaeological Deposit (PAD)	6	20
Potential Archaeological Deposit (PAD)	2	6

The AHIMS search results reveal that a majority of site types in the area are artefact sites (n=14, 47%) and modified trees (n=8, 27%); followed by artefact with potential archaeological deposit (PAD) sites (n=6, 20%) and PADs (n=2, 6%).

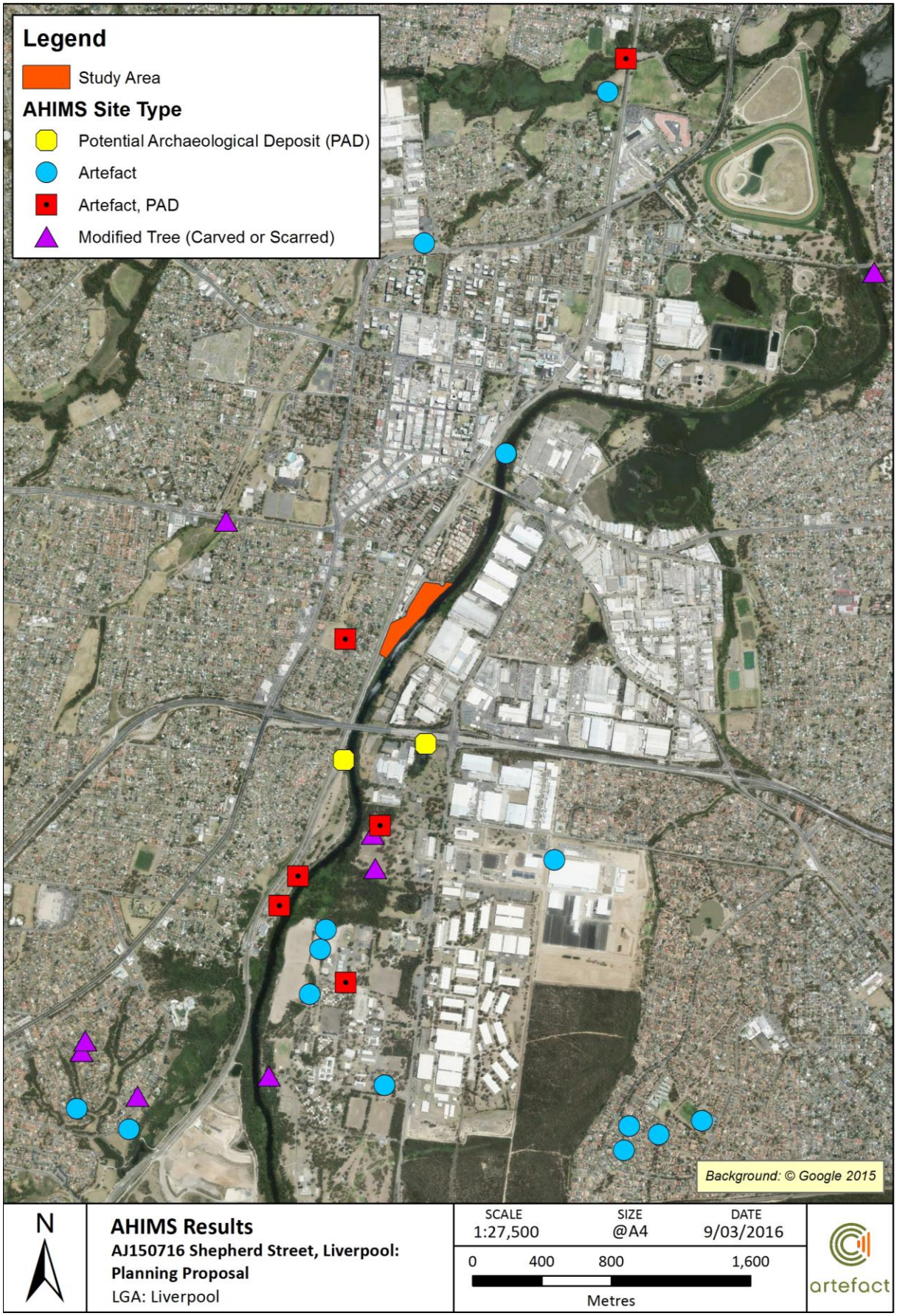
Spatial patterning of sites in the region have a close correlation to waterlines; most notable Georges River, which is the main water source in the area. Also areas that have been less impacted by development have a higher density of sites.

4.3.1 Collingwood Aboriginal Place

Collingwood Aboriginal Place is located 210 metres to the west of the study area. The site was gazetted in 2009 (OEH 2013). The site consists of a hilltop and ridgeline formation, which was used as a meeting place for Aboriginal people. Therefore, the Collingwood Precinct is a significant part of the landscape for Dharawal, Gandangara and Dharug people. As the area is a registered Aboriginal Place, all the protections and legislative obligations that apply to an Aboriginal site are in force for the land within the boundary of the Aboriginal Place.

Figure 11: Location and extent of Collingwood Aboriginal Place (Background: NSW Globe LPI)

Figure 12: AHIMS search results



4.4 Previous Archaeological Investigations

Smith 1989, Liverpool Release Areas: archaeological site survey and planning study

Smith found that generally the location of sites and site densities in the Liverpool area appeared to reflect the distribution and abundance of water. The absence of known stone sources within the Liverpool region suggests that stone was being transported over some distance to reach that area. This was reflected in the relatively small size of the artefacts and the low frequency of cortex. Using the results of the Liverpool assessment and building on previous predictive models the following predictive statements were proposed:

- Artefact scatters and isolated artefacts will be the most common site types recorded.
- Scarred trees are likely to occur where mature native vegetation has not been cleared.
- Sites will be concentrated primarily around creek lines followed by crests of hills with less sites located along hill slopes.
- Sites are likely to occur in higher frequencies at the confluence of two creek lines.
- Sites will generally be identified within 50 metres to 100 metres of water sources.
- The densities of artefact scatters will be related to the distance of the site from water sources.
- Silcrete will be the dominant raw material present.

Given the poor visibility of the assessment area Smith considered it likely that many more sites than those identified would occur within the study area.

Central West Archaeological and Heritage Services Pty Ltd 2002, an Aboriginal Archaeological Study of the Proposed Hoxton Park Partial Sewerage Transfer via Liverpool Submain

Central West Archaeological and Heritage Services (2002) completed an Aboriginal archaeological of the area between the Hoxton Park Release area and the Liverpool sewerage treatment plant (STP). The survey was completed in response to a proposal to transfer sewerage from Hoxton Park to the Liverpool STP requiring the development of a 7km pipe corridor. Archaeological survey was required for four kilometres of the corridor with an average width of 10-20 metres. Alignment runs approximately 800 metres north of the current study area.

Desktop analysis identified areas that may have had potential based on predictive modelling, namely areas close to creek lines on elevated flood free land. Upon inspection it was noted that the study area was heavily disturbed both in relation to previous construction and the flood prone nature of the area.

No sites were identified within the study area, however as a precaution archaeological monitoring was suggested for further works.

Biosis 2003, an Archaeological Assessment of a Proposed School Site, Horningsea Park, NSW

Biosis prepared an Aboriginal archaeological assessment of the proposed John Edmondson High School site approximately 8 kilometres southwest of the study area. The assessment built on previous predictive models for the Cumberland plain and predicted that stone artefacts would be the most common site type either in isolation or as a scatter and these would generally consist of silcrete artefacts whilst quartz may also be identified. The relationship between site frequency and distance to water was acknowledged however it was suggested that not enough it known about visibility bias and other resources to restrict areas of high potential to creek lines. The area may have been attractive as a local vantage point still in easy access of water.

The assessment did not identify any Aboriginal sites or objects within the investigation area. The area had been significantly impacted by market gardening and visibility was generally nil to 5 per cent. The investigation area was considered to have the potential to contain archaeological deposits however, given the location of the investigation area near watercourses and on a ridgeline.

Total Earth Care Pty Ltd 2008, Aboriginal Cultural Heritage and Archaeological Assessment of Collingwood and Discovery Parks, Liverpool

Total Earth Care completed an Aboriginal archaeological survey of Collingwood and Discovery Park in Liverpool; located to the west of the study area (See section 4.3.1). The survey was completed in response to a proposal to subdivide the park area into two lots, with one lot being developed into residential housing while the other was to remain as public land.

A single area of PAD was delineated as part of the survey, largely recorded given the regional views of the area based on previous predictive models. No current archaeological material was recorded.

While no AHIMS sites had been officially recorded in relation to the area, a previous report completed by McDonald (McDonald and Garling 1997) had recorded a hatchet located within the study area. While the hatchet had since been removed and placed in a museum, the original site area was relocated as part of the survey. McDonald's report also highlighted the potential of the underfloor deposit related to Collingwood house, a colonial property which was considered to have largely intact subsurface potential.

Based on the survey and the previous omission of the hatchet in heritage listing, Total Care registered AHIMS site CM1 as a conglomerate site encompassing the hatchet, based on its prior location and areas of potential recorded by both McDonald and during their survey.

Given that the archaeological site was located in the lot that would remain public land no further archaeological investigation was required.

Kayandel 2010, the Georges River Estuary Cultural Heritage Desktop Assessment.

Kayandel Archaeological Services prepared a desktop study of the archaeological and heritage sites located within the vicinity of Georges River Estuary. The desktop study was commissioned as part of the development of an estuary management plan which included the bank of the George River from Liverpool weir to Botany Bay. Assessment aimed to identify and collate existing information on the Georges river estuary and provide management recommendations of the heritage values of the area. Research was limited to sites located within 80m of the river bank with an upper cap of 120 sites for the report.

Assessment included searches of a variety of sources including AHIMS, heritage and shipwreck databases as well as general interest searches. 26 reports, books or web links were analysed as directly relevant to Aboriginal heritage in the area with 112 sites recorded within the study area.

Review highlighted that there was insufficient knowledge of both Aboriginal and historic heritage in the study area. Kayandel recommended that field inspections of previous sites be undertaken as a priority given the insufficient detail recorded particularly in reference to early recordings.

Artefact 2011, Light Horse Park, Liverpool: Aboriginal Heritage Due Diligence Assessment and Statement of Heritage Impacts for non-Indigenous heritage for the proposed route of electricity feeder lines.

Artefact completed both a due diligence assessment and non-Indigenous heritage assessment for the site of a proposed electricity feeder line within Light Horse Park, Liverpool; located 500 metres north of the study area.

The due diligence assessment did not locate any Aboriginal sites and/or places within the study area and identified a high degree of ground disturbance due to landscaping, infrastructure and historical agriculture. In addition, it was noted that Light Horse Park was the site of a formal municipal landfill. The due diligence assessment concluded that the study area within Light Horse Park contained low archaeological potential and that no further Aboriginal heritage work was required.

Navin Officer 2014. Moorebank Intermodal Terminal Aboriginal Heritage Assessment

Navin Officer (2014) completed an Aboriginal Heritage Assessment for the proposed development of the Moorebank Intermodal Terminal (MIT). The archaeological investigations at the MIT are directly relevant to the current constraints analysis; as the MIT project was located approximately 800 metres to the south of the current study area; bordered by the M5 to the north, Moorebank Avenue to the east, East Hills railway line to the south and Georges River to the west. Therefore, the MIT is located on the same alluvial terrace/flats landform associate with the eastern side of Georges River.

An archaeological survey was conducted across the area in 2010. The survey identified eight new Aboriginal sites and one PAD. Five of the sites consisted of surface isolated artefacts and low density (<3) artefact scatters. Three of the sites represented potential scarred trees. The PAD area was based on the potential for natural deposits below fill, adjacent around a small lake basin.

Navin Officer conducted an archaeological test excavation within the MIT site in 2012. The subsurface testing program used a combination of mechanic and hand excavated test pits. A total of 59 test pits were excavated, targeting areas where surface artefacts or PADs that had been identified. The three major zones of archaeological potential identified by Navin Officer (2014:54) were the Georges River Riparian Corridor (100 metres either side of the river), minor tributary zones (100m either side of tributaries, including prior waterlines identified on historical aerial imagery) and elevated slopes and riverside margin of the alluvial terrace located at the edge of Georges River. During the test excavation, a total of 264 artefacts were identified within 26 test pits.

Further test excavations were undertaken in the area referred to as LCC Northern Powerhouse land in 2013; which is located to the southwest of the current study area, in proximity to Georges River. Mechanical and manual test excavation took place across the PAD. During the test excavations, a total of 14 artefacts were identified within 9 of the 45 test pits excavated (Navin Officer 2014:54).

From the results of the survey and two phases of excavation, it was concluded:

- Where intact deposits occur, artefact density is highest on the tertiary terrace edge along Georges River. Aboriginal occupation appears focused in this area.
- The results reflected the findings of the potential at the tertiary terrace within the river corridor. Landforms further removed from the river corridor had lower archaeological sensitivity.
- Minor tributaries are more likely to have Archaeological material, if they are associated with other resources zones (i.e. Georges River corridor).

AHMS 2015. SIMTA Intermodal Terminal Facility – Stage 1: Aboriginal Heritage Impact Assessment.

AHMS completed an Aboriginal heritage impact assessment as part of concept approval of stage 1 of the SIMTA intermodal terminal facility project, located next to the MIT site (Navin Officer 2014). As part of the approval process for stage 1 of the project the Secretary's Environmental Assessment Requirements (SEARS) required further investigation of PADs delineated in the original survey report completed by AHMS in 2012.

Assessment involved the excavation of 13 one x one metre test pits spaced at 20 metre intervals with a focus on the banks of the George River and either side of Anzac Creek.

28 artefacts were recovered from the site associated with the Georges River (MA14) which was interpreted to represent low level activity on the upper slope and ridge areas within the area. The test excavations identified silty deposits (exceeded 1 metre in some areas), with evidence of disturbance limited to the upper soil profile. Occupation was dated using OSL dating and recorded as representing occupation at 3.4ka and 18ka. Based on the antiquity associated with the site, MA14 was considered to have high research potential and of local if not state significance. Assessment recommended salvage of up to 100m^2 of the site if impact could not be avoided.

4.4.1 Previous Archaeological Investigations within the Study Area

City Plan Services completed two Aboriginal cultural heritage due diligence assessments for 20 and 28 Shepherd Street, Liverpool (within the current study area) in 2015. The due diligence assessments were completed as a requirement of the DA consultation requirements.

City Plan Services 2015a, 20 Shepherd Street, Liverpool

City Plan Services completed a due diligence assessment for 20 Shepherd Street, Liverpool (2015a). The due diligence assessment was related to the proposed residential development associated with the proposal for this letter report. The due diligence assessment did not locate any Aboriginal sites and/or places within the property, but identified that the Georges River was a major resource within the region. Due to the proximity of the study area to the Georges River it was concluded that Aboriginal settlement within the area was likely. However, the due diligence identified a high degree of ground disturbance due to the establishment of the Collingwood Paper Mill and subsequent decades of development. The due diligence assessment concluded that 20 Shepherd Street had low archaeological potential and that no further Aboriginal heritage work was required.

City Plan Services 2015b, 28 Shepherd Street, Liverpool

City Plan Services completed a due diligence assessment for 28 Shepherd Street, Liverpool (2015b). The due diligence assessment was related to the proposed residential development associated with the proposal for this letter report. The due diligence assessment did not locate any Aboriginal sites and/or places within the property and identified a high degree of ground disturbance associated with previous development, across most of the site. However, it was noted that land located close to Georges River had evidence of only minimal ground disturbance (referred to as ‘Zone 5’). Due to the archaeological sensitivity of land located close to Georges River, it was concluded that Zone 5 was likely to contain unidentified Aboriginal cultural material. As a result, further archaeological investigation was recommended for 28 Shepherd Street.

4.5 Geotechnical Surveys within the Study Area

Two properties contained within the study area were subject to a geotechnical assessment by Asset Geotechnical. The assessment included both 20 Shepherd Street (Asset Geotechnical 2014) and 28 Shepherd Street (Asset Geotechnical 2015). The location of the geotechnical boreholes is shown in Figure 13 and a summary of results of testing are presented in Table 2 and Table 3. The results of the investigation are discussed below.

Asset Geotechnical 2014, 20 Shepherd Street, Liverpool

20 Shepherd Street is located within the northeast extent of the study area. The geotechnical survey involved drilling of five boreholes (Figure 13) to a target depth of approximately 3 metres into the rock. Drilling was carried out by auger drilling then washbore drilling to refusal at bedrock (Asset Geotechnical 2014:2).

The results of the geotechnical survey indicate that a dense layer of fill covers the entire area; between 1.6 metres to 6.9 metres in depth (Table 2). The fill material is made up of a mixture clay, sand and gravel.

Natural alluvial sand and clay is present below the fill layer. It is unknown if the alluvial deposits were cut prior to fill deposits being introduced to the area. The bore holes reveal a bedrock of shale material starting at depths between 9.7 metres and 13 metres.

Asset Geotechnical 2015, 28 Shepherd Street, Liverpool

28 Shepherd Street is located within the central portion of the study area. The geotechnical survey involved drilling of six boreholes (Figure 13). Drilling was carried out by a track mounted drilling rig, with auger drilling and a TC bit on refusal at bedrock (Asset Geotechnical 2015:2).

The results of the geotechnical survey indicate that a dense layer of fill covers the entire area; between 1.6 metres to 3.5 metres in depth (Table 3). The fill material is made up of a mixture clay, sand and gravel.

Natural alluvial or slope wash sand and clay is present below the fill layer. It is unknown if the alluvial deposits were cut prior to fill deposits being introduced to the area. The bore holes reveal a bedrock of shale material starting at depths between 7.3 metres and 9.5 metres.

Table 2: 20 Shepherd Street – summary of geotech results

Bore Hole ID	Depth (m)	Description
BH1	0.0 – 0.2	**Asphalt**
	0.2 – 0.6	**Fill:** Sandy gravel
	0.6 – 1.4	**Fill:** Clayey sand. Trace of sandstone and ballast fragments
	1.4 – 2.4	**Fill:** Sand
	2.4 – 3.5	**Fill:** Sandy clay
	3.5 – 8.3	**Alluvial:** Sand
	8.3 – 10.2	**Alluvial:** Sandy clay
	10.2 – 14.75	**Bedrock:** Shale
BH2	0.0 – 0.2	**Asphalt**
	0.2 – 0.6	**Fill:** Sandy gravel, trace of ballast material
	0.6 – 0.8	**Fill**: Sandy clay
	0.8 – 3.8	**Fill:** Clay, trace of gravel and sand
	3.8 – 5.3	**Alluvial:** Sandy silty clay
	5.3 – 8.3	**Alluvial:** Sand
	8.3 – 12	**Alluvial:** Sandy clay
	12 – 16.75	**Bedrock:** Shale
BH3	0 – 0.1	**Asphalt**
	0.1 – 0.5	**Fill:** Sandy gravelly clay
	0.5 – 1.0	**Fill:** Sand
	1.0 – 2.6	**Fill:** Sandy clay, inclusions of terracotta fragments
	2.6 – 6.8	**Alluvial:** Clay
	6.8 – 9.7	**Alluvial:** Clayey sand
	9.7 – 12.83	**Bedrock:** Shale
BH4	0 – 0.4	**Fill:** Clayey sandy gravel
	0.4 – 1.7	**Fill:** Sandy gravelly clay
	1.7 – 2.0	**Fill:** Clayey sand
	2.0 – 4.2	**Fill:** Clayey sand, possible coal tar contamination
	4.2 – 5.7	**Fill:** Clayey sand
	5.7 – 6.9	**Fill:** Clay, trace of sand
	6.9 – 11.0	**Alluvial:** Sand
	11.0 – 13.0	**Alluvial:** Sandy clay, with wood fragments
	13.0 – 16.08	**Bedrock:** Shale
BH5	0 – 0.1	**Asphalt**
	0.1 – 0.3	**Fill:** Clayey gravelly sand
	0.3 – 1.0	**Fill:** Gravelly sandy clay
	1.0 – 1.6	**Fill:** Clayey sand, with ash deposits
	1.6 – 3.3	**Alluvial:** Sand
	3.3 – 5.5	**Alluvial:** Sandy clay
	5.5 – 9.5	**Alluvial:** Clayey sand
	9.5 – 11.4	**Alluvial:** Sandy clay
	11.4 – 14.32	**Bedrock:** Shale

Table 3: 28 Shepherd Street – summary of geotech results

Bore Hole ID	Depth (m)	Description
BH1	0.0 - 0.4 0.4 – 1.2 1.2 – 1.6 1.6 – 2.8 2.8 – 4.6 4.6 – 9.5 9.5 – 13.59	**Fill:** Gravelly clay **Fill:** Sandy clay, with brick fragments **Fill:** sandy clay **Alluvial or slope wash:** Clay **Alluvial or slope wash:** Clay, trace of sand **Alluvial:** Clayey sand **Bedrock:** Shale
BH2	0.0 – 1.6 1.6 – 3.1 3.1 – 5.8 5.8 – 8.3 8.3 – 8.5 8.5 – 11.4	**Fill:** Gravelly clay, with brick fragments **Alluvial or slope wash:** Clay **Alluvial or slope wash:** Clay **Alluvial:** Sandy clay **Residual:** clay **Bedrock:** Shale
BH3	0.0 – 1.6 1.6 – 5.6 5.6 – 6.8 6.8 – 7.3 7.3 – 10.27	**Fill:** gravelly clay, with shale fragments **Alluvial or slope wash:** Clay **Alluvial:** Clayey sand **Residual:** Shaley clay **Bedrock:** Shale
BH4	0.0 – 3.5 3.5 – 5.8 5.8 – 8.2 8.2 – 11.2	**Fill or slope wash:** Clay **Alluvial:** Sand, with clay **Alluvial:** Clayey sand **Bedrock:** Shale
BH5	0.0 – 1.2 1.2 – 2.8 2.8 – 5.5 5.5 – 6.0 6.0 – 8.6 8.6 – 9.0	**Fill:** Gravely clay **Fill:** Sandy clay **Alluvial:** Sandy clay **Alluvial:** Sandy clay **Alluvial:** Clayey sand **Bedrock:** Shale
BH6	0.0 – 1.0 1.0 – 2.0 2.0 -4.4 4.4 – 7.35 7.35 – 8.6 8.6 – 9.0	**Fill:** Clay **Fill:** Clayey sand **Alluvial:** Clayey sand **Alluvial:** Clayey sand **Residual:** Clay **Bedrock:** Shale

Figure 13: Location of geotechnical survey

5.0 PREDICTIONS

5.1 Aboriginal Land Use

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

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

5.2 Predictive Model

The predictive model comprises a series of statements about the nature and distribution of evidence of Aboriginal land use that is expected in the study area. These statements are based on the information gathered regarding:

- landscape context and landform units
- ethno historical evidence of Aboriginal land use
- distribution of natural resources
- results of previous archaeological work in the vicinity of the study area
- predictive modelling proposed in previous investigations

Predictive statements are as follows:

- stone artefacts/artefact scatters will be the most likely Aboriginal site types
- Identification of artefact sites will be dependent on visibility and vegetation density- artefacts will more frequently be identified on eroded surfaces.
- Based on the spatial patterning of recorded Aboriginal sites and on findings from previous studies in the area, the highest numbers of sites and sites with the highest densities of artefacts are likely to be located along main waterways.
- Modified trees may be identified within the study area if suitable old growth trees remain
- Areas of PAD may be identified where suitable depth of deposit exists, in areas that feature a relative lack of disturbance and ready access to freshwater and resources.

It is probable that the only material traces of Aboriginal occupation remaining will be stone artefacts and/or modified trees. The potential for shelter sites, middens, quarries, rock engravings and axe grinding grooves is limited by the landscape context and historical land use and amount of fill in the area. Areas of PAD would be dependent on landform and levels of disturbance. Areas of PAD would not be identified across steep slopes, swampy deposit, in areas of flooding, or in areas of high disturbance.

6.0 SURVEY METHODOLOGY

6.1 Site Definition

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

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

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

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

PADs are areas where sub-surface stone artefacts and/or other cultural materials are likely to occur (OEH 2010: 38). These areas may be associated with recorded sites but are often greater in extent, taking in areas around the visible artefacts where there is a potential for further buried artefacts to exist. PADs may also be present where no visible artefacts are located. This may be the case when there is no ground surface visibility, but the area is seen to have a high likelihood of containing subsurface artefacts.

6.2 Survey Methodology

The sample survey of the study area was conducted on 21 August 2015 by Alexander Timms and Kim White (Artefact Heritage). Donna Whillock from TLALC also attended the survey. Full coverage of the study area was not possible due to the density of development and vegetation throughout the study area. Concrete and asphalt surfaces cover a great deal of the study area and undeveloped areas along the river were densely vegetated. As such, there was little visibility throughout the study area. However, site survey was useful in clarifying landform features and confirming information acquired through archival research.

A sample survey of the study area is acceptable under the Code of Practice with justification. There were two main reasons for conducting a sample survey, including density of vegetation and development. Buildings and hard surfaces obscured the ground surface across substantial portions of the study area.

The survey was undertaken in accordance with the Code of Practice. A handheld Global Positioning System (GPS) was used to track the path of the surveyors and to record site coordinates. An aerial map of the study area was also carried by members of the survey team in the field. All accessible sections of the study area were covered on foot and examined for traces of Aboriginal occupation.

A photographic record was kept of all sections of the study area that were accessible. Photographs were taken to record landform units within the study area, vegetation, levels of disturbance, and areas of archaeological potential. Scales were used for photographs where appropriate.

Figure 14: Survey units

7.0 SURVEY RESULTS

7.1 Effective Survey Coverage

A sample survey of the study area was undertaken, which targeted exposed areas. Sample survey was necessary as the density of vegetation along the riverside obscured visibility and prevented access. Also, much of the area has been built up and is covered in concrete surfaces or structures. The survey coverage and landforms are summarised in Table 4 and Table 5.

Table 4: Survey coverage

Survey Unit	Landform	Survey unit area (m2)	Visibility (%)	Exposure (%)	Effective Survey Coverage (m2)	Effective Coverage (%)
1	Flat, river terrace	16270	20%	10%	325	2
2	Flat, river terrace	7790	30%	40%	935	12
3	Flat, Low crest, slope, river terrace	24042	30%	40%	2885	12

Table 5: Landform Summary

Landform	Landform area (m2)	Area effectively surveyed	% of landform effectively surveyed	Number of sites
Flat	28610	8583	30%	0
Slope	17973	5392	30%	0
River terrace	1240	124	10%	0
Low crest	280	28	10%	0

7.2 Survey Observations

The study area has been cleared of most of the original vegetation and extensive modification of the natural landforms has occurred. Therefore, the study area has been divided into three survey units based on property boundaries. The results of each survey unit is discussed below.

7.2.1 Survey Unit 1

Survey unit 1 is located in the north portion of the study area. Survey unit 1 includes 20 and 26 Shepherd Street and the adjoining river frontage land (Figure 14).

The old mill building and associated concrete/bitumen yard cover a majority of survey unit 1. The old mill building is located on the southwest corner of survey unit 1, fronting Shepherd Street (Photo 1 and Photo 2). The building on the corner of Shepherd and Atkinson Streets seen on the aerial image (Figure 14) has since been demolished (Photo 3). Some minor landscaping has been undertaken along the north side of the old mill building (Photo 4). 26 Shepherd Street is covered in hardstand, primarily utilised as a vehicle storage area (Photo 6). The entire area is located on a modified flat landform. Large amounts of fill would have been introduced to the area to create a flat construction pad for the mill building and car yard (Photo 1 to Photo 6).

On the eastern edge of the survey unit, the terrain drops sharply down to the river terrace. This area is densely vegetated with woody weeds and vines (Photo 7) such as Lantana, Green Cestrum (Green Poison berry), Morning Glory and Balloon Vine (ACS 2015a:5). Due to the terrain and vegetation cover, much of this portion of survey unit 1 was inaccessible. A part of the northern extent of the river edge was able to be surveyed, as the slope had been terraced out to create garden beds by locals (Photo 8 and Photo 9). However, visibility was still poor, as the area is disused and weeds have been allowed to grow. Within the areas of ground surface exposure, mixed grey brown clayey silt was evident.

Within the drop in terrain adjacent the mill yard, stepped vertical walls displayed silt and clay deposits will brick and rubble inclusions (Photo 10). Based on the geotechnical investigation and visual evidence, it is clear that the area has been built up significantly with introduced fill deposits.

Photo 1: Survey Unit 1 – Shepherd Street frontage, northeast aspect

Photo 2: Survey Unit 1 – south side of old mill, west aspect

Photo 3: Survey Unit 1 – demolished structure, north aspect

Photo 4: Survey Unit 1 – minor landscaping, west aspect

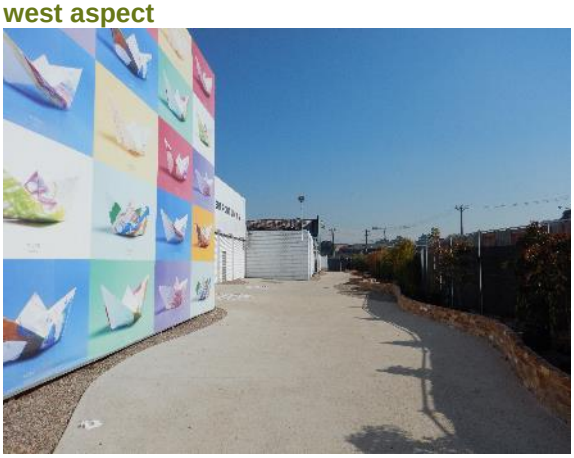


Photo 5: Survey Unit 1 – rear yard of mill building, south aspect

Photo 6: Survey Unit 1 – 26 Shepherd Street, southeast aspect

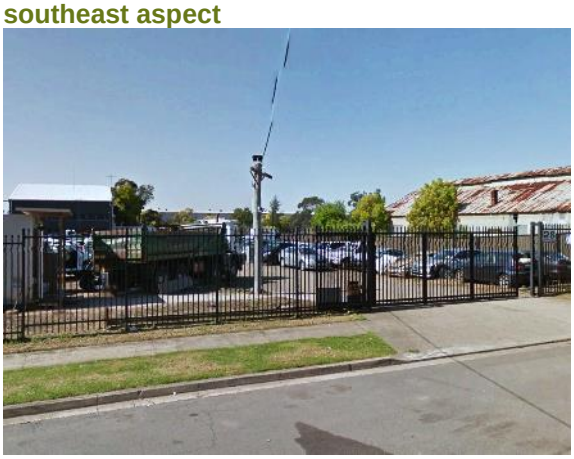


Photo 7: Survey Unit 1 – densely vegetated water front, north aspect

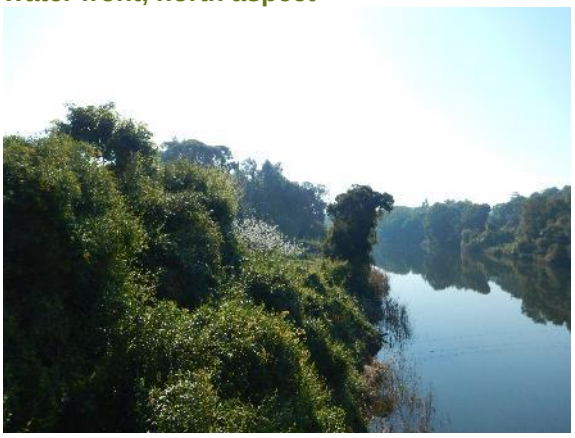


Photo 8: Survey Unit 1 –accessible area at end of Atkinson St, east aspect

Photo 9: Survey Unit 1 – terraced garden area, northwest aspect

Photo 10: Survey Unit 1 – steep drop in terrain at rear of mill, west aspect

7.2.2 Survey Unit 2

Survey unit 2 is located in the central portion of the study area. Survey unit 2 includes 28 Shepherd Street and the adjoining river frontage land (Figure 14).

The area is accessed from a driveway off Shepherd Street (Photo 11), which slopes down into 28 Shepherd Street, which is a flat site. The area contains a toilet block Photo 12 and large steel framed shed (Photo 13 and Photo 14). The structures are framed by open areas of weed and grass which offered minimal ground visibility (Photo 15 and Photo 16).

On the eastern edge of the survey unit, the terrain drops sharply down to the river terrace. This area is densely vegetated with woody weeds such as Camphor Laurel, Mulberry and Privet and also shrubs such as Lantana, Blackberry, African Boxthorn, Green Cestrum and Golden Wreath Wattle. (ACS 2015b:4). Due to the terrain and vegetation cover, this portion of survey unit 2 was inaccessible (Photo 17 and Photo 18).

A due diligence assessment of 28 Shepherd Street indicated that the small strip of land fronting the river was potentially undisturbed. However geotechnical results on the edge of the river front indicated that 1.6 metres of fill is located in this area (Figure 13). It is likely that the entire property, right up to the riverfront, has been filled in to create a flat surface for construction.

Photo 11: Survey Unit 2 – entrance driveway, west aspect

Photo 12: Survey Unit 2 – toilet block, northeast aspect

Photo 13: Survey Unit 2 – large steel frame shed, east aspect

Photo 14: Survey Unit 2 – interior of steel frame shed, southeast aspect

Photo 15: Survey Unit 2 –grassed area on north side of shed, southeast aspect

Photo 16: Survey Unit 2 – grassed area on south side of shed, northwest aspect

Photo 17: Survey Unit 2 – densely vegetated river front, northeast aspect

Photo 18: Survey Unit 2 – densely vegetated river front, east aspect

7.2.3 Survey Unit 3

Survey unit 3 is located in the southern portion of the study area. Survey unit 3 includes 31, 32 and 33 Shepherd Street, a portion of Mill Park and the adjoining river frontage land (Figure 14).

The survey unit is situated on a low rise, gently sloping land and modified flat. Generally, the highest elevation is located in the central west edge of the survey unit, with the land sloping down to the north, east and south. Four industrial properties are located in the northern section of survey unit 3 (31, 32 and 33 Shepherd Street); evidence of land modification is evident around these properties due to the tiered terrain (Photo 19 and Photo 20). The entire area is covered in buildings, concrete or bitumen surfaces. Therefore, there is no ground surface visibility within the area (Photo 19 to Photo 22).

Powerhouse Road (which runs off Shepherd Street), runs along the western edge of survey area 3 and continues down along the edge of Mill Park (Photo 22 and Photo 23). The southern section of the survey area is within the northern extent of Mill Park. It is visually evident that the area has been infilled by imported deposits (Photo 24). Numerous ground exposures show the deposits to be brown silt with inclusions of modern rubbish (Photo 25). A drop in the terrain shows the extent of fill in the area (Photo 26 and Photo 27).

The eastern edge of the survey unit, adjacent the river, is densely vegetated with woody weeds shrubs and vines. This portion of survey unit 3 was inaccessible due to the density of vegetation (Photo 28).

Photo 19: Survey Unit 3 – stepped slope between 32-33 Shepherd St, southeast aspect

Photo 20: Survey Unit 3 – stepped slope, between 31-33 Shepherd St, south aspect

Photo 21: Survey Unit 3 – rear yard of 33 Shepherd St, southwest aspect

Photo 22: Survey Unit 3 – rear of 31 Shepherd St, north aspect

Photo 23: Survey Unit 3 –Powerhouse Rd, southwest aspect

Photo 24: Survey Unit 3 - area of fill in Mill Park, southwest aspect

Photo 25: Survey Unit 3 –example of exposure in Mill Park, north aspect

Photo 26: Survey Unit 3 – area of fill in Mill Park, north aspect

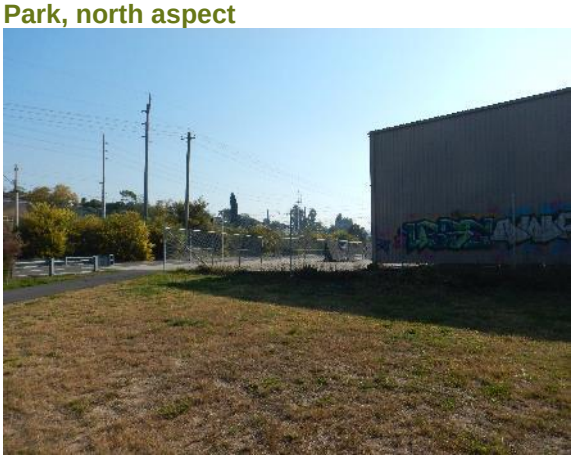
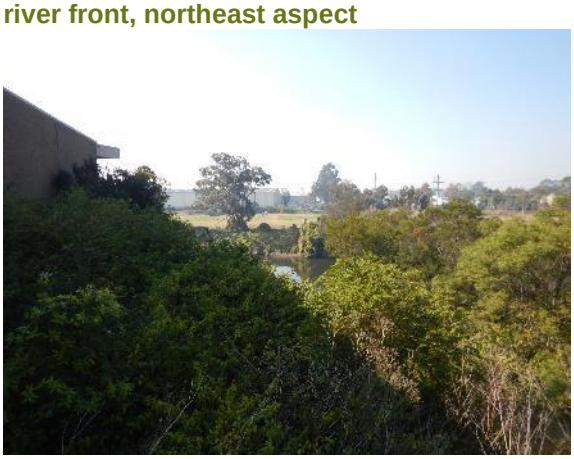


Photo 27: Survey Unit 3 –drop in terrain showing extent of fill, northwest aspect

Photo 28: Survey Unit 3 – densely vegetated river front, northeast aspect



8.0 ANALYSIS AND DISCUSSION

8.1 Disturbance Levels

Historical research suggests that the entire area has been subject to significant ground disturbance through decades of agricultural and industrial use. An early parish map of the area indicated that the terrain in the area was a gentle slope down to Georges River (Figure 5). During the industrial occupation of the study area, the land surface has been built up and flattened, creating a sharp drop down to the Georges River.

The geotechnical surveys conducted within the study area show that over the history of the site, between 1.6 metres and 6.9 metres of fill have been introduced. The depth of fill was confirmed during visual inspection of the exposed banks on the northeast portion of survey unit 1 (section 7.2.1). The only part of the study area that has not been subject to geotechnical investigation is survey area 3. However, during the archaeological survey, it was identified that a significant amount of fill has been added to the area (section 7.2.3).

It is therefore clear that the entire study area has been significantly disturbed through historical land use.

8.2 TLALC Heritage Report

Tharawal Local Aboriginal Land Council (TLALC) provided a report regarding the fieldwork and the potential for archaeological material within the proposed area of works. The report concluded that nothing of Aboriginal cultural significance was located during the survey and development may proceed without the need for further archaeological assessment. A copy of TLALC report is attached in Appendix 1.

8.3 Analysis of Archaeological Potential

Archaeological data gathered in the locality suggests that artefacts would be found across the landscape in varying densities, with higher densities expected in close proximity to water sources. While the geology of the study area does not typically hold high archaeological sensitivity; investigations by Navin Officer (2014) and AHMS (2015) to the south of the study area has identified a significant amount of artefactual material on a similar landform. The proximity to the main trunk of Georges River, which was a major resource to Aboriginal people in the region, increases the potential of archaeological material.

The main limitations to the survivability of archaeological material in the study area includes the extent of excavation and levelling activities associated with the historical industrial facilities onsite. The geotechnical investigation has identified varying depths of fill over the study area (between 1.6 metres and 6.9 metres), covering natural alluvial soils of sand and silty sand that are likely to have been truncated during land modification. The high degree of disturbance was confirmed during the survey. Due to amount of disturbance the study area is assigned a low archaeological potential.

9.0 SIGNIFICANCE ASSESSMENT

9.1 Assessment Criteria

Archaeological significance refers to the archaeological or scientific importance of a landscape, site 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 practised? Is it in danger of being lost or of exceptional interest?
- Education potential: does the subject area contain teaching sites or sites that might have teaching potential?

No cultural values or significance were identified by TLALC during the archaeological survey (Appendix 1).

9.2 Archaeological Significance Assessment

Archaeological significance of the study area has been determined based on both the findings of the historical research and observations made during field survey as well as the landscape and archaeological context of the study area.

Previous studies have indicated that land bordering Georges River have a potential for high archaeological significance; however, the study area has undergone significant ground disturbance which greatly reduces significance. The study area is located within an area that has been assessed as having low representative and rarity values for Aboriginal archaeological material and / or sites. Aboriginal objects may be present in areas of low archaeological significance, but are likely to be in disturbed contexts. The study area is assessed as having low levels of both scientific and research potential and as demonstrating overall low archaeological significance.

9.3 Impact Assessment

Coronation Property proposes to develop a residential precinct at Shepherd Street, Liverpool. A full summary of the proposal is presented in Section 1.3 and the preliminary master plan is shown in Figure 1.

Construction works will impact upon the ground surface, including excavation to varying levels. These sub-surface impacts will be associated with vegetation clearance, levelling the ground surface, as well as construction of foundations/basements for proposed structures. Ancillary works will include revegetation works and pedestrian boardwalk construction within the riparian corridor of Georges River. The proposed development will not impact upon any recorded Aboriginal objects. The proposed works will not impact upon any areas of moderate or high archaeological potential.

10.0 MANAGEMENT AND MITIGATION MEASURES

10.1 Guiding Principles

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

The nature of the mitigation measures recommended is based on the assessed significance of the site or sites. The final recommendations would also be informed by cultural significance, which will be discussed within the TLALC report.

10.2 Mitigation Measures

The current assessment has established that the study area demonstrates low archaeological potential and low archaeological significance. The assessment confirmed that no previously recorded Aboriginal sites and/or places and no areas of archaeological potential are located within the boundaries of the study area.

No further Aboriginal archaeological investigation is required for the study area.

If Aboriginal objects are uncovered once works commence, work in the vicinity of the find must cease and an archaeologist, the OEH, and the TLALC must be informed. It is an offence under the *National Parks and Wildlife Act 1974* (as amended 2010) to disturb or destroy an Aboriginal object without appropriate approvals. If human remains are found, work must cease, the site must be secured and the NSW Police and OEH notified. An Aboriginal Heritage Impact Permit (AHIP) would be required before works recommence. Further archaeological investigations may also be required.

11.0 CONCLUSION AND RECOMMENDATIONS

The following recommendations were based on consideration of:

- Statutory requirements under the *National Parks and Wildlife Act* 1974
- The results of the background research, site survey and assessment
- The interests of Aboriginal stakeholder groups
- The likely impacts of the proposed development

It was found that:

- No Aboriginal sites and/or places were located within the study area.
- The study area has been subject to significant ground disturbance
- The study area was assessed as demonstrating low archaeological potential.

It is therefore recommended that:

- The proposed 'Shepherd Street Precinct' development is able to proceed without the need for further archaeological and/or Aboriginal heritage assessment.
- If the project design should change or if areas not surveyed are added to the scope of proposed works, further archaeological assessment would be required.
- If Aboriginal objects are uncovered during works an archaeologist, the TLALC and OEH must be notified. Further investigation and approvals may be required.
- If human remains are identified during archaeological test excavation or during any stage of the proposed works, work should cease, the site should be secured and the NSW Police and the OEH should be notified. Further investigation and approvals may be required.
- A final copy of this report (with updated study area and proposed design) should be forwarded to TLALC for their records.

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13.0 APPENDICES

13.1 Appendix 1: Tharawal Local Aboriginal Land Council Report

THARAWAL LOCAL ABORIGINAL LAND COUNCIL
220 West Parade, Couridjah NSW 2571

Friday 2nd October 2015

Alex Timms
Artefact
Level 4, Building B, 35 Saunders Street
Pyrmont NSW 2009

RE: Shepherd Street, Liverpool NSW

Dear Alex,

Thank you for your invitation on this survey undertaken on Friday 21st August 2015. Nothing of Aboriginal Cultural Significance was located within this survey.

Tharawal LALC agrees with the Recommendations in the DRAFT report.

- The proposed 'Shepherd Street precinct' development is able to proceed without the need for further archaeological and/or Aboriginal heritage assessment.
- If the project design should change or if areas not surveyed are added to the scope of proposed works, further archaeological assessment would be required.
- If Aboriginal objects are uncovered during works and archaeologist, the TLALC and OEH must be notified. Further investigation and approvals may be required.
- If human remains are identified during archaeological test excavation or during any stage of the proposed works, work should cease, the site should be secured and the NSW Police, Tharawal LALC and OEH should be notified. Further investigation and approvals may be required

Yours Sincerely,

Abbi Whillock
Cultural Heritage Officer
Tharawal Local Aboriginal Land Council
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