BOX HILL NORTH PLANNING PROPOSAL

Aboriginal Heritage Assessment

Prepared for APP Corporation Pty Ltd

The Hills Local Government Area

Draft Report
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KELLEHER NIGHTINGALE CONSULTING PTY LTD
Archaeological and Heritage Management
ACN 120 187 671

Suite 911-912, 155 King St
SYDNEY NSW 2000
Phone 02 9232 5373
Fax 02 9232 5316

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Prepared by	Cristany Milicich; Mark Rawson; Alison Nightingale; Ben Anderson
Approved by	Dr Matthew Kelleher; Alison Nightingale

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1 Introduction

1.1 Project background

APP Corporation Pty Limited (APP) was engaged to prepare a planning proposal for rezoning lands at Box Hill North for future residential development purposes. The rezoning proposal will be submitted to The Hills Shire Council.

The land, known as Box Hill North (hereafter referred to as the study area), was approximately 390 hectares in size and located in Sydney's northwest (Figure 1). The study area was generally bounded by a portion of Boundary Road in the west, Maguires Road in the north, Janpieter Road in the east and a portion of Old Pitt Town Road in the south. Surrounding land use was mixed semi-rural development on all sides.

To inform the rezoning proposal, Kelleher Nightingale Consulting Pty Ltd (KNC) was engaged to carry out an Aboriginal heritage archaeological assessment of the land. The assessment included background research and an archaeological field survey conducted in accordance with Office of Environment and Heritage (OEH) requirements including:

Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales

Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales

1.2 Summary of findings

Four Aboriginal archaeological sites were identified in the study area:

Box Hill North 1 (BHN 1) – AHIMS 45-5-4297

Box Hill North 2 (BHN 2) – AHIMS 45-5-4298

Box Hill North 3 (BHN 3) – AHIMS 45-5-4299

Box Hill North 4 (BHN 4) – AHIMS 45-5-4300

Sites consist of a grinding groove site (BHN 1), two open artefact scatters (BHN 2 and BHN 3) and one isolated find (BHN 4).

The grinding groove site (BHN 1) is significant in terms of both its cultural and scientific values and should be conserved within the development layout. Open artefact scatter sites BHN 2 and BHN 3 should be conserved if possible, BHN 2 especially in given its spatial relationship with the grinding grooves.

The indicative layout plan developed for the planning proposal has retained BHN 1, the majority of BHN 2 and BHN 3, and the isolated artefact at BHN 4 within proposed open space zoning. If the open space zoning does not allow for conservation of artefact sites BHN 2-4, an Aboriginal heritage impact permit (AHIP) would be required.

Sites BHN 2-4 do not pose a constraint to development but will require a process of further assessment, consultation and mitigation to comply with relevant legislation and associated requirements.

Site BHN 1, grinding grooves, should be conserved.

1.3 Investigators and contributors

A list of investigators and contributors to the study is included in the table below.

Table 1. Investigators and contributors

Investigator/Contributor	Affiliation	Role
Alison Nightingale	KNC	Advisor, reporting and review
Matthew Kelleher	KNC	Advisor and review
Steve Randall	DLALC	Survey, Cultural Heritage Advisor
Mark Rawson	KNC	Survey, reporting
Cristany Milicich	KNC	Survey, reporting
Ben Anderson	KNC	Survey, GIS mapping

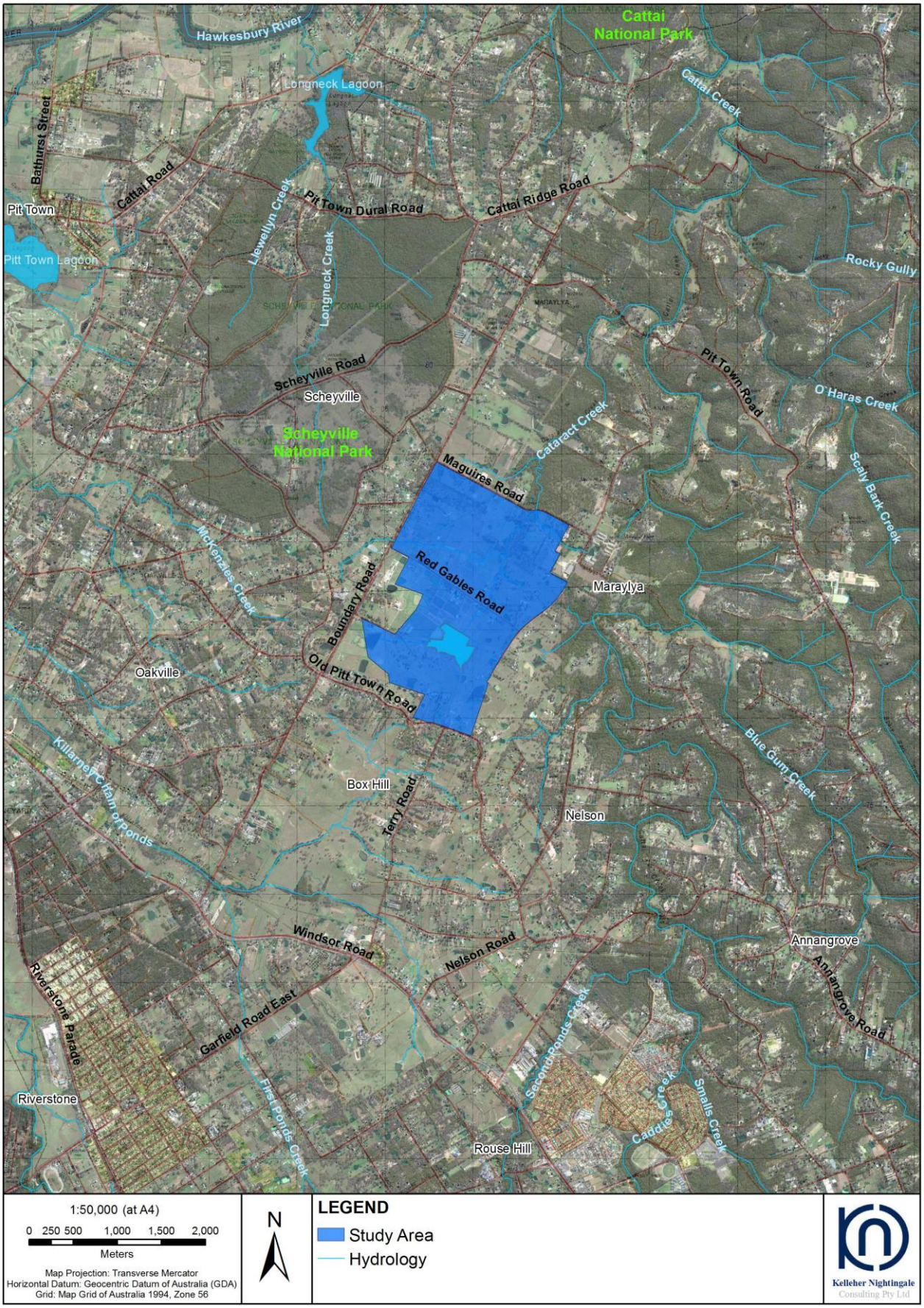

Figure 1. Study area location

2 Description of Development Proposal

The planning proposal to The Hills Shire Council seeks to rezone the land from its current zoning of RU6 – Transition (according to The Hills Local Environmental Plan 2012) to allow for future residential development and associated infrastructure and services, consistent with the development of adjacent precincts in Sydney's North West Growth Centre.

A number of studies were undertaken to assess the potential impacts of future residential development consider and inform the future development layout of the study area, including flora, fauna and biodiversity; Aboriginal archaeological heritage; contamination; water cycle management; infrastructure and services; social planning; traffic and transport; and urban design.

Based on the findings of these studies, an indicative layout plan was prepared for the rezoning of the study area (Figure 2). The proposed development layout includes a mix of:

- low/medium density residential;
- high density residential;
- large lot residential;
- environmental living;
- retail/mixed use;
- school;
- environmental conservation;
- open space;
- sports fields;
- creeks/drainage;
- transmission easement; and
- future link road.

3 Aboriginal Community Involvement

According to the Code of Practice, consultation with the Aboriginal community is not a formal requirement of the due diligence process. However, the proponent considered consultation with the local Aboriginal community at the planning stage would assist in the decision-making process. The proponent sought to undertake the due diligence assessment in consultation with the relevant Local Aboriginal Land Council to identify any sites or issues of cultural significance.

The assessment was undertaken in consultation with Deerubbin Local Aboriginal Land Council (DLALC) whose boundaries covered the study area. DLALC was contacted at the commencement of the project to discuss the planning proposal and invited to participate in site investigations. Land Council representative Steve Randall participated in the archaeological survey on Wednesday 22nd and Thursday 23rd May 2013.

DLALC provided a cultural assessment report on the study area (Appendix A). Aboriginal objects, sites and potential archaeological deposits were found within the study area. The Land Council therefore recommended further detailed investigation prior to development of the lands.

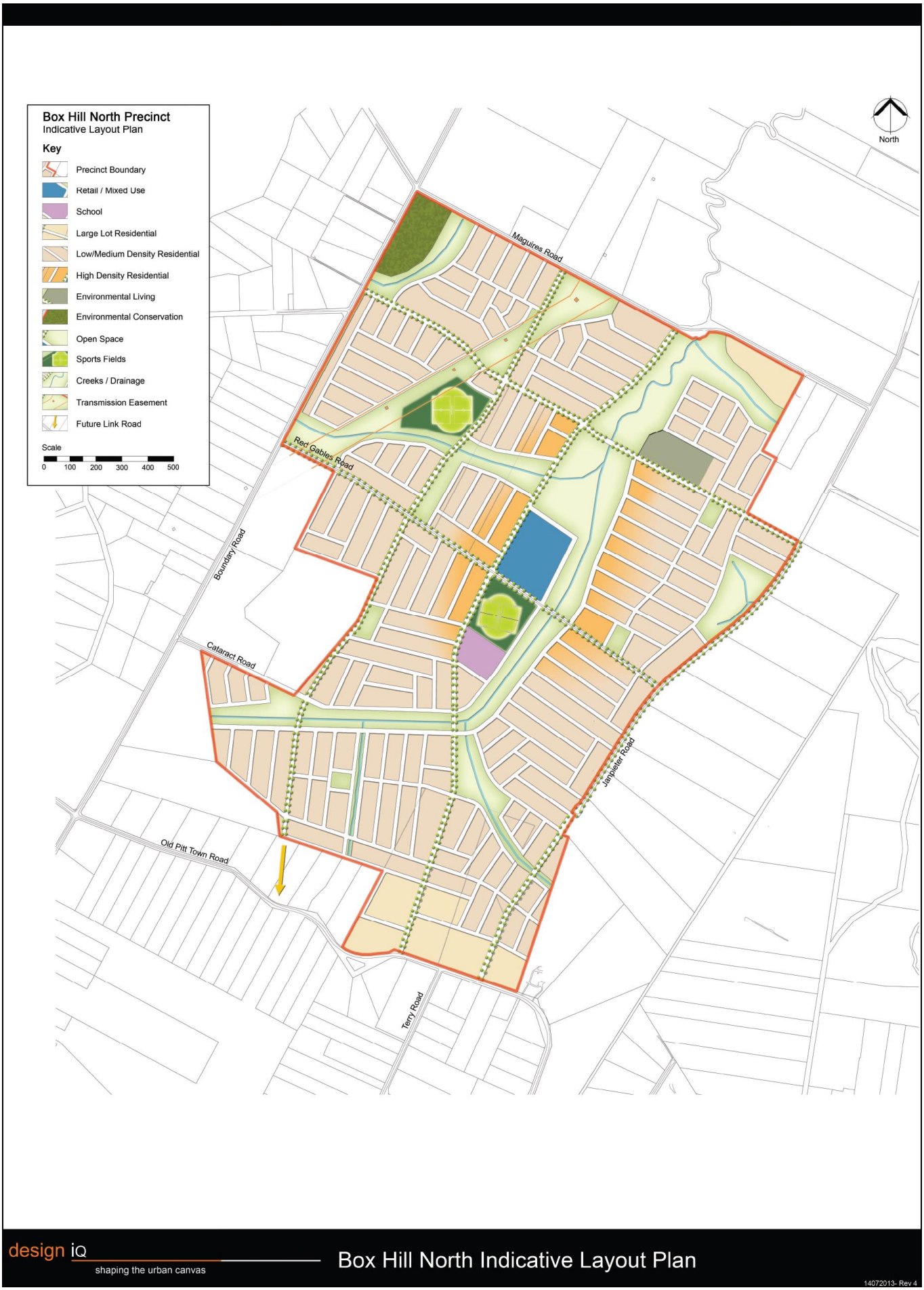

Figure 2. Box Hill North Indicative Layout Plan (source: design iQ, as provided by APP)

4 Previous Archaeological Work

4.1 Database search (AHIMS)

The Aboriginal Heritage Information Management System (AHIMS) is a database operated by the Office of Environment and Heritage (OEH) and regulated under section 90Q of the *National Parks and Wildlife Act 1974*. AHIMS contains information and records related to registered Aboriginal archaeological sites (Aboriginal objects, as defined under the Act) and declared Aboriginal places (as defined under the Act) in NSW.

A search of AHIMS was conducted on 2 May 2013 to identify registered (known) Aboriginal sites or declared Aboriginal places within or adjacent to the study area (AHIMS Client Service ID: 99579). Search results are attached as Appendix B.

The AHIMS Web Service database search was conducted within the following coordinates (GDA, Zone 56):

Eastings: 0302000 to 0310000
Northings: 6272900 to 6280900
Buffer: 0 metres (search coordinates included a substantial buffer around the study area)

The AHIMS search results showed:

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

The distribution of recorded Aboriginal sites within the AHIMS search area is shown in Figure 3, with site context and features ('site types') listed in Table 2.

Table 2. Frequency of site types from OEH AHIMS database search

Site Context	Site Features	Number	*%*
Open Site	Artefact	49	*51.0*
	Artefact; Potential Archaeological Deposit	4	*4.2*
	Potential Archaeological Deposit	21	*21.9*
	Art (pigment or engraved)	2*	*2.1*
	Grinding Groove	2	*2.1*
Closed Site	Artefact	7	*7.3*
	Artefact; Art (pigment or engraved)	5	*5.2*
	Artefact; Grinding Groove	2	*2.1*
	Art (pigment or engraved)	4	*4.2*
	Total	**96**	***100***

*Site 45-5-0219 (Open site with art) is not an archaeological site

4.2 Discussion of AHIMS search results

As well as determining if there are any registered (known) sites within a given area, an AHIMS search also helps to characterise local archaeology by illustrating the distribution of sites within the local landscape. Results from the AHIMS database search divide archaeological sites into two contexts – open, meaning existing in an open landscape context, and closed, meaning associated with a rock shelter.

AHIMS results indicated the predominance of open sites with artefacts (i.e. open camp sites or artefact scatters) around the study area. In 4.2% of cases, these open campsites were also associated with areas of Potential Archaeological Deposit (PAD). 21 separate PADs without surface manifestations of artefacts have also been recorded. Other open sites in the search area included grinding grooves (n=2, 2.1%) and two instances of open art sites. One of these, site 45-5-0219, was not an archaeological site but modern 'art' painted to serve as a backdrop for a film project. It was registered on AHIMS to avoid confusion with an actual archaeological site.

Sites in closed contexts dominate east of the study area, associated with the incised Hawkesbury sandstone ridges and the rock shelters formed therein. Of the closed (shelter) sites, the most common site features were artefacts (7.3%), followed by sites containing both artefacts and either pigmented or engraved art (5.2%). There were also shelter sites with art alone (4.2%) and sites with both artefacts and grinding grooves (2.1%).

The diversity of site types and features indicated in the AHIMS search results illustrate the rich archaeological resource around the study area, with many and varied manifestations of past Aboriginal people's presence and use of the environment.

No previously recorded sites in the AHIMS database were located within the boundaries of the study area.

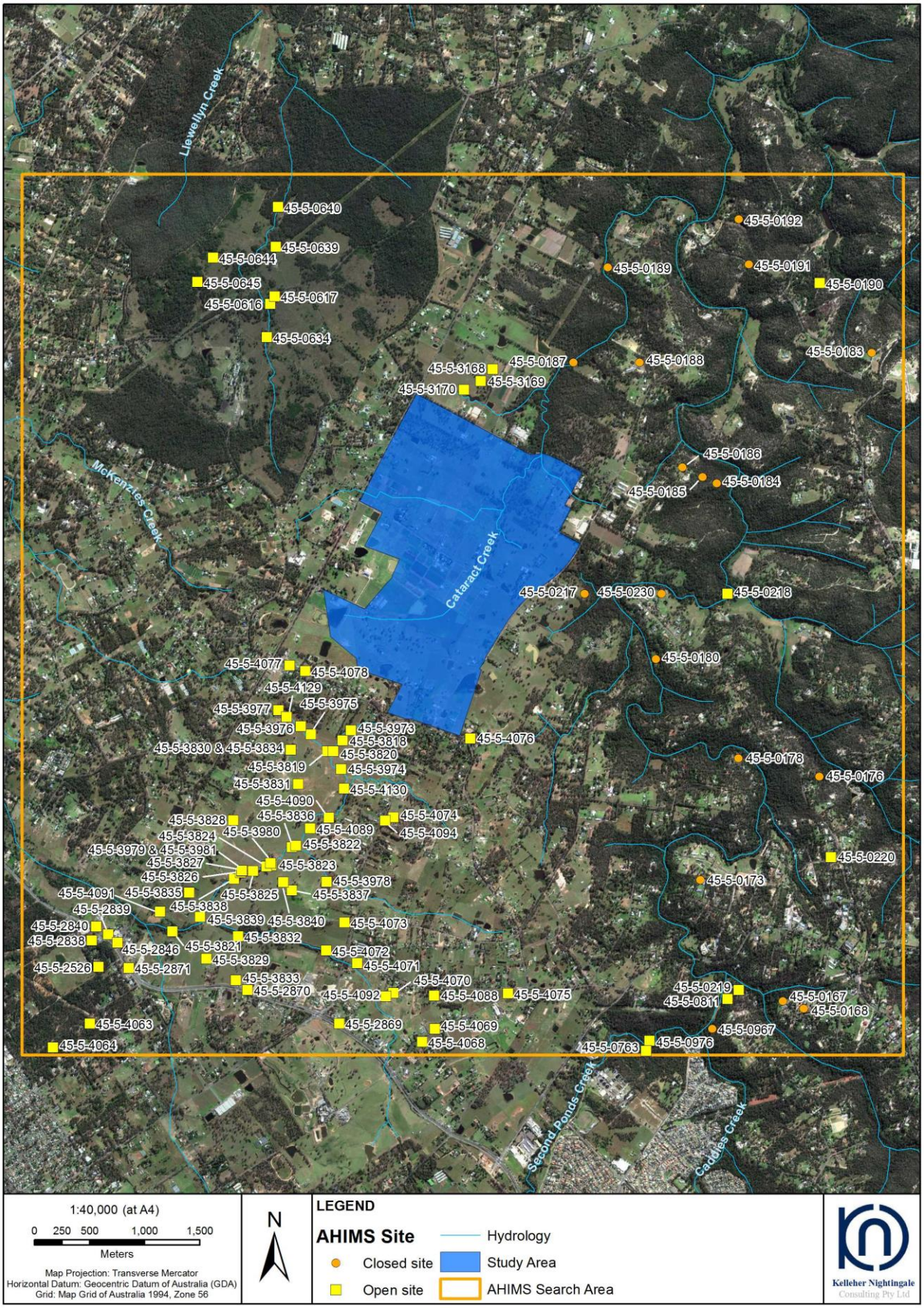

Figure 3. Recorded sites surrounding the study area

4.3 Previous archaeological investigations and recorded sites

Several archaeological investigations have been conducted in the vicinity of the study area. A summary of the pertinent studies is presented in this section.

One of the earliest studies pertaining to the study area was undertaken during planning for a potential second airport (Haglund 1978). The study area stretched from Annangrove Road in the south to Longneck Lagoon in the north and covered the area between Oakville and Pitt Town in the west and Cattai and Blue Gum Creeks in the east, completely encompassing the current area of investigation. Haglund conducted a series of interviews with landowners to ascertain if any Aboriginal objects were known to occur in the study area, with no success. On the basis of these negative responses, foot survey was concentrated in the Cattai Creek drainage area, where sites were known to occur.

The accompanying survey map to Haglund's report indicated the current study area was not subject to systematic pedestrian survey. A number of rock shelters were recorded east of the current study area, amongst the sandstone gullies incised by the Cattai and Blue Gum Creek drainage systems. Several shelters contained Aboriginal art (45-5-0167, 45-5-0219, 45-5-0192, and 45-5-0193). It was determined that the 'art' at site 45-5-0219 was not Aboriginal in origin however the site was registered on AHIMS to avoid any future confusion. One other recorded shelter with art (45-5-0188) also contained art of non-Aboriginal origin; however one hand stencil was believed to be genuine. In addition this shelter contained clearly identifiable artefactual deposit. Other shelters with deposit included 45-5-0217, 45-5-0230, 45-5-0184, and 45-5-0187. Grinding grooves on exposed sandstone outcrops adjacent to the creeks were also recorded (45-5-0218 and 45-5-0212). Haglund (1978:9) stressed that the "whole area needs checking more carefully", especially considering that dense vegetation along the creeklines could easily conceal the presence of archaeological sites.

Investigation in a similar environmental context around 5km east of the study area drew similar conclusions (Dallas 1988), where a small study area inspected ahead of proposed rezoning yielded four archaeological sites, including two open artefact scatters of predominantly chert and silcrete, and two shelters with archaeological deposit and art. The open camp sites had been substantially disturbed and were assessed as having no potential for any further deposit. The shelter sites were not in areas likely to be subject to development, so the recommendation was made to provide interpretive signage at one and maintain screening vegetation on the other. The identified archaeological sites were not expected to preclude rezoning and eventual development of the area.

A portion of Scheyville National Park to the northwest of the current study area was subject to an archaeological study in 1990 (Dallas and Navin 1990). Background research and field survey identified 16 sites, comprising four previously recorded isolated finds and twelve open camp sites. Open camp sites recorded were dominated by silcrete, chert and quartzite artefacts. Where sites were identified near creeks and drainage lines, it was noted that dam construction had affected the sites by changing the morphology of the creeks upstream. Disturbance at the majority of the recorded sites was classed as high, with various historical land use practices and flooding/erosion processes destroying their integrity. Three sites of higher artefact density in less disturbed contexts were considered worthy of preservation as they had potential for undisturbed deposit. Sites appeared to increase in number and density closer to Longneck Lagoon, in the north of the study area, and were considered significant as they could provide information on past Aboriginal people's potentially focused use of the lagoon environment.

Immediately north of the current study area, a heritage assessment was carried out for a proposed sportsground on a corner portion of land bounded by Maguires Road and Boundary Road (ERM 2005). Two isolated finds and one open campsite were recorded within the property. Isolated find Boundary Road Reserve 1 (AHIMS 45-5-3168) was located on a gentle slope approximately 450 metres east of Boundary Road and consisted of a broken silcrete flake. Boundary Road Reserve 2 (AHIMS 45-5-3169) was located on a flat area approximately five metres south of a small creekline on the corner of Boundary Road and consisted of an indurated mudstone flaked piece. Open camp site Boundary Road Reserve 3 (AHIMS 45-5-3170) consisted of two silcrete artefacts, one flake and one core. This open campsite was located on the top of a very gentle rise approximately 250 metres east of Boundary Road. It was recommended that Boundary Road Reserve 1 be retained within woodland. If development impact was unavoidable, an Aboriginal heritage impact permit was recommended. For Boundary Road Reserve 2 and 3, test excavation was recommended under the thick grass cover down the rise and slope and along the creekline, to ascertain the true extent and nature of the sites.

A series of upgrades to Windsor Road, south of the study area also prompted a number of archaeological assessments. Therin (2002) examined the Windsor Road corridor between Boundary Road and Henry Road and identified four open artefact scatters (WBH 1, WBH 2, WBH 3 and WBH 9) and one area of PAD (WBH PAD). Later assessment of the stretch of Windsor Road between Boundary Road and Mile End Road (Therin 2003) identified a further five archaeological sites (WMB 1-5), including two isolated finds and three artefact scatters, the largest of which covered an area of approximately 4000m^2. Four areas of PAD were also identified. One of these PADs, WMB Area 1, was subsequently excavated (Therin 2004). WMB Area 1 was located on a low creek terrace above Second Ponds Creek, approximately

6km southeast of the current study area. Dispersed test excavation recovered 336 artefacts, with an open area excavation of 160m^2 following identification of an area of high artefact density. 1017 artefacts were recovered from the open area. An oxidisable carbon ration (OCR) date of 1260 ±36 years before present (BP) was obtained from the open area, with approximately 80% of the artefacts occurring above the dated layer, indicating that most occupation at the site occurred after this time.

South of the study area, archaeological investigations had mostly been undertaken in association with planning and proposed development of precincts within the North West Growth Centre, including Box Hill, Box Hill Industrial and North Kellyville. Other major investigations have taken place in the Rouse Hill Development Area.

Archaeological survey and assessment was undertaken ahead of the urban release of the Box Hill Precinct immediately south of the current study area (Austral Archaeology 2009). Archaeological survey of a 224ha parcel of land identified twelve archaeological sites (BH1 – BH12). These consisted of open artefact scatters of varying sizes and seven isolated finds. The predominant raw material was silcrete (n=23, or 82%), followed by a smaller frequency of undifferentiated mudstone/FGS (n=5, or 18%). Artefacts consisted of complete flakes and other flaked debitage. Most of the sites identified as open artefact scatters contained only two or three artefacts in association. The exception to this was site BH1 & BH PAD 1 (45-5-3818), which contained nine artefacts eroding out of a creek channel and in several patchy exposures. The site also had an associated area that was designated as a PAD based on its landscape context, distance to water and presence of BH1 artefacts and other raw material. An additional eleven areas of PAD were also described in their survey area, based on similar factors. The majority of PADs were located on the flats and lower slopes in close proximity to creeklines of the Killarney Chain of Ponds.

Ground surface visibility was noted to be low, and the authors stressed the sparse and low density sites recorded were not an accurate reflection of the true archaeological resource present in the area (Austral 2009:52), especially considering that the majority of the area had been subject to only low levels of disturbance and had the potential to retain intact subsurface archaeology. Accordingly, subsurface test excavations were recommended for any identified areas of PAD impacted by future development, in particular, those assessed as having moderate to high significance (associated with sites BH1, BH9, and BH10). The significance of the majority of the open artefact scatters and isolated finds was considered to be low, with no further assessment recommended.

An Aboriginal heritage assessment in the same general area was carried out as part of the planning process for water-related services in the North West Growth Centre (AHMS 2010). The Box Hill and Box Hill Industrial Precincts were part of the area subject to archaeological investigation. Field survey identified open artefact scatters, isolated finds and a number of areas of PAD, fifteen of which were present in the AHIMS search area for the current project. At least two of the identified PADs (1030-6 and 1031-6) corresponded with BH PAD 7 and BH PAD 8 identified by Austral in 2009. The most common raw material described was silcrete, chiefly flakes and flaked fragments. Sites and PADs located in relatively undisturbed contexts on the flat areas and lower slopes associated with creeklines were considered to have greater potential for subsurface deposit.

The Box Hill and Box Hill Industrial Precincts were subject to further assessment in 2011 (AECOM 2011). This assessment included field survey of both precincts, which identified 11 additional archaeological sites, including nine open artefact scatters and two isolated finds. Two of these artefact scatters incorporated sites described by Austral (2009). Twenty four of the twenty seven previously recorded sites and PADs were relocated, with three of the sites recorded by Therin (WMB 2, WMB 3, and WMB 4; Therin 2003) having been destroyed as a result of upgrades to Windsor Road. Previously recorded sites BH 1 (artefact scatter, 45-5-3818), BH 2 (isolated find, 45-5-3819) and BH 3 (isolated find, 45-5-3820) were found to have undergone further erosion, which increased the visibility of the ground surface. This resulted in a significant increase in the number of artefacts observed at these sites, from 9 at BH 1 to 51, and from 1 each at BH 2 and BH 3 to 71 and 36, respectively. The newly identified sites consisted of open artefact scatters and isolated finds of silcrete and mudstone, including cores, complete flakes, flaked fragments and broken flakes. Newly identified artefacts at the previously recorded sites included retouched flakes and a Bondi Point. Significant quantities of non-artefactual silcrete were also observed along the creekbanks of the Killarney Chain of Ponds and it was suggested this was a natural occurrence of the material.

The majority of identified sites were found in the western half of the AECOM study area, in association with extant or former creeklines. In regards to landform, all sites were recorded on the flats or lower slopes associated with the drainage system, with no sites recorded higher up the slopes or on ridgelines or crests. The authors noted that this apparent site patterning was likely a product of differential ground visibility in these environments, with fluvial erosion around the creeklines contributing to the identification of artefacts in these locations. It was suggested recorded site locations were surface manifestations of a more-or-less continuous subsurface archaeological landscape in the study area which would vary in scale and density based on environmental factors such as landform and distance to water. Three of the identified sites were considered to have moderate scientific significance, with the remainder of the sites (n=18 in total, including Austral 2009 sites) exhibiting 'some' significance. Archaeological sensitivity mapping was also carried out for the precinct, with areas of high, moderate and low potential for intact subsurface deposit determined based on estimates of disturbance and other landscape variables known to have archaeological relevance in the wider region (AECOM 2011:64). It was recommended identified areas of PAD and zones of high archaeological sensitivity

warranted archaeological test excavation prior to any development impacts, in order to establish their 'archaeological reality'. Zones of moderate archaeological sensitivity would require an Aboriginal archaeological due diligence assessment in line with the OEH guidelines. It was recommended identified archaeological sites be conserved where feasible. If development impacts were likely to occur, an AHIP would be required.

Archaeological investigation of the wider region has been extensive, particularly at Rouse Hill to the south, where a series of excavations have been carried out in the Rouse Hill Development Area (RHDA). Early surveys undertaken as part of the Rouse Hill Infrastructure Project (RHIP) Stage 1 identified 27 archaeological sites and 14 areas of PAD, and involved limited test excavation of some sites (McDonald and Rich 1993). Open artefact scatters were the most frequent site type observed. Stage 2 of the project involved salvage excavation of six of the PADs identified during Stage 1 (JMCHM 2001), in areas where surface manifestations of archaeology were either rare or totally absent. The excavation included three open areas of approximately 100m^2, dispersed testing and several smaller open areas. In total, 482m^2 was excavated across the six archaeological landscapes, recovering over 33,000 lithics. Differences in site use were demonstrated, with specialised activities occurring at one of three sites determined to be short term residential camps. There was some evidence for stratification at site RH/CC2, with differences in raw material use and artefact type between the lower and upper deposits suggesting that the site had hosted occupation potentially much earlier than commonly encountered on the Cumberland Plain. All sites showed evidence for a wide variety of activities taking place in the area. The excavation also demonstrated that areas with no surface manifestations could be archaeologically rich and significant.

Additional salvage excavation took place for Stage 3 of the RHIP (JMCHM 2005). Eight archaeological landscapes in the Second Ponds Creek Valley were subject to excavation, yielding around 80,000 artefacts from around 1310m^2. The predominant raw material used for artefact manufacture was silcrete, with a notable assemblage component of silicified tuff and also quartz. A variety of landforms were sampled, with excavations at higher elevations more distant from permanent water generally displaying lower artefact densities and evidence for more short term and sporadic landscape use. Results from this excavation program indicated that the bulk of occupation took place in the Middle Bondaian (c.1000 to 4000 BP), with the presence of certain diagnostic artefacts such as elouera indicating occupation continued into the more recent past (c.1500 BP to contact). Results also indicated significant variation in both the scale and nature of procurement strategies employed by past Aboriginal people in the Second Ponds Valley.

Excavation also took place at a further four areas on gentle slopes and terraces in proximity to Caddies Creek (JMCHM 2007). Two of these (RH/CD7 and RH/CD5) were located in proximity to sandstone outcrops displaying previously recorded axe grinding grooves. A total of 545m^2 was excavated across the four areas, including dispersed testing and subsequent open area excavations. More than 18,000 artefacts were recovered from the excavation programme. As with other excavations in the Rouse Hill area, silcrete was the most commonly recovered material type. Analysis of the variation between silcrete assemblages in each site suggested that RH/CD7 was used differently than the other areas investigated. Stratigraphic variation in the silicified tuff assemblage at this site was also evident, with the presumably older deposits displaying attributes characteristic of Pre-Bondaian occupation (potentially > 8000 BP), similar to those observed at RH/CC2. Results indicated that gentle mid and lower slopes within 200m of the creek, with northerly and north easterly aspects, were the preferred landscape settings for Aboriginal occupation. Overall, the results from all of the Rouse Hill investigations have overwhelming demonstrated the rich settlement history of the region and have contributed significantly to our understanding of Aboriginal people's use and occupation of this part of the Cumberland Plain, particularly within the sandstone/shale interface zone.

4.4 Implications for the study area

Previous archaeological investigations in proximity to the study area have covered landscapes similar to those that exist in Box Hill North. Archaeological potential has been identified on lower slopes and terraces associated with creeks and excavations of areas such as this that occur within a similar sandstone/shale interface zone have yielded substantial archaeological deposits, indicating these areas are capable of retaining significant archaeology.

Excavations such as those conducted at Rouse Hill have added significantly to our understanding of past Aboriginal people's use of these landscapes. Where development impacts to sites have been unavoidable, salvage excavations help to mitigate the loss of information that would otherwise occur and contribute valuable information that aids our understanding of local archaeological landscapes.

Based on the outcomes of previous local archaeological assessments, it was considered likely the current study area contained archaeological sites. The presence of archaeological sites does not necessarily preclude development, provided appropriate management or mitigation is undertaken. A holistic approach to Aboriginal heritage during the planning and development process can help to ensure satisfactory heritage outcomes.

5 Landscape Context

The study area is located on the northern margin of the Cumberland Plain, a physiographic region of the western Sydney Basin characterised by low lying, gently undulating low hills and plains atop the Wianamatta Group of Triassic Period sedimentary shales. The study area occupies a transitional zone, with the Hornsby Plateau immediately east of the study area boundary.

Geology within the study area was comprised of four chief units (Figure 4). The majority of the study area is situated on Ashfield Shale of the Middle Triassic Period, consisting of dark-grey to black sideritic claystone and siltstone which grades upward into a fine sandstone-siltstone laminate (Clark and Jones 1991). Present in the northeast of the study area are two occurrences of older Hawkesbury Sandstone. The Hornsby plateau on the eastern margin of the study area is composed of this lithology, being a medium-coarse grained quartz sandstone with minor lenses of laminate and shale. Along the elevated southern margins of the study area is a small amount of Bringelly Shale from the Middle-Late Triassic, consisting of shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff (Clark and Jones 1991). Between this and the predominant Ashfield Shale is a small band of Minchinbury Sandstone, an intermediary lithology representing an original strandline boundary between the shallow-water sub-aqueous sediments of the Ashfield Shale, and the more recent alluvial plain sediments of the Bringelly Shale.

Topography within the study area is characterised by rolling hills with broad crests and gently undulating slopes and flats, sloping up in the southern portion of the study area towards the ridge-top occupied by Old Pitt Town Road along the southern boundary. Drainage depressions mark the creeklines of the small tributaries of Cataract Creek, flowing north from the study area towards the Hawkesbury River, which at its closest passes approximately 5.5km from the northwesternmost part of the study area. The incised sandstone plateau to the east is marked by various tributaries and branches of Second Ponds, Caddies, and Cattai Creeks. Numerous large dams are present within the study area, suggesting it would have been well-watered in the past. Landforms identified in the study area are shown on Figure 6.

Soils in the study area are chiefly of the Blacktown soil landscape, with a small incursion of the Hawkesbury colluvial soil landscape in the east of the study area (Figure 5). Residual soils of the Blacktown soil landscape, developed *in situ* from the underlying Ashfield Shale, are present on the broad rounded crests and ridges and gently inclined slopes found in the majority of the study area. The residual Blacktown soil landscape consists of shallow to moderately deep hard setting red, brown and yellow podzolic soils. Soil fertility and soil drainage are low. Erosional susceptibility of this soil landscape is relatively low, but is increased where surface vegetation is not maintained (Bannerman, Hazleton and Tille 1990). Archaeologically, these soils may retain intact archaeological deposit where disturbance levels are low but these are likely to retain only horizontal integrity.

The colluvial Hawkesbury soil landscape is associated with the rugged, rolling, and very steep hills and slopes of the Hawkesbury sandstone on the Hornsby Plateau immediately east of the study area. Rock outcropping approaches 50%. Narrow ridges and crests are deeply incised with narrow valleys, and have steep sideslopes with rocky benches, broken scarps, and boulders (Bannerman, Hazleton and Tille 1990). This soil landscape is subject to rock falls, mass soil movement, shallow soils, and severe erosion hazards. Where archaeological deposit exists outside of the rock shelters that dominate this landscape, little is likely to survive *in situ*. Whether the archaeological deposit within rock shelters displays stratigraphic and spatial integrity is generally determined by factors other than soils (e.g. proximity to creeks and potential flood scouring, roof falls/collapses preserving deposit etc.).

Sources of lithic raw materials suitable for artefact manufacture occur close to the study area. Chert and quartz may have been obtained from the Hawkesbury sandstone formations beneath and adjacent to the study area. The Tertiary alluvial deposits known as the Rickabys Creek Gravels are widely distributed across the western Cumberland Plain, offering a raw material source of quartzite, quartz, granite, chert, silicified tuff, silcrete, and others. This formation is known to occur along the margins of South Creek (approximately 7km west of the study area), with similar raw materials offered by the Cranebrook and Agnes Bank formations along the Hawkesbury/Nepean. Exposures of the Rickabys Creek gravels have also been recorded around the banks of Longneck Lagoon northwest of the study area (Smith 1988:40). The silcrete outcroppings of the St Marys Formation at Plumpton Ridge (c.11km south west of the study area) are also known to have been used as a raw material source by past Aboriginal peoples. The presence of raw silcrete cobbles has also been noted along the Killarney Chain of Ponds immediately south of the study area (Austral 2009; AECOM 2011) and cobbles are known to occur in the Berkshire Park soils associated with watercourses to the west.

Vegetation is limited in the study area, with the majority of the landscape having been cleared of vegetation. Original vegetation would have included tree species typical of the Cumberland Plain woodland group, with various eucalypt species, spotted gum and occasional ironbarks. Alluvial woodland with a denser understorey would have been present along the creek margins. Introduced pasture grasses, scrub, and regrowth natives currently cover the study area, with some large trees of the species described above occurring close to Cataract Creek. A number of large dams have been constructed throughout the area.

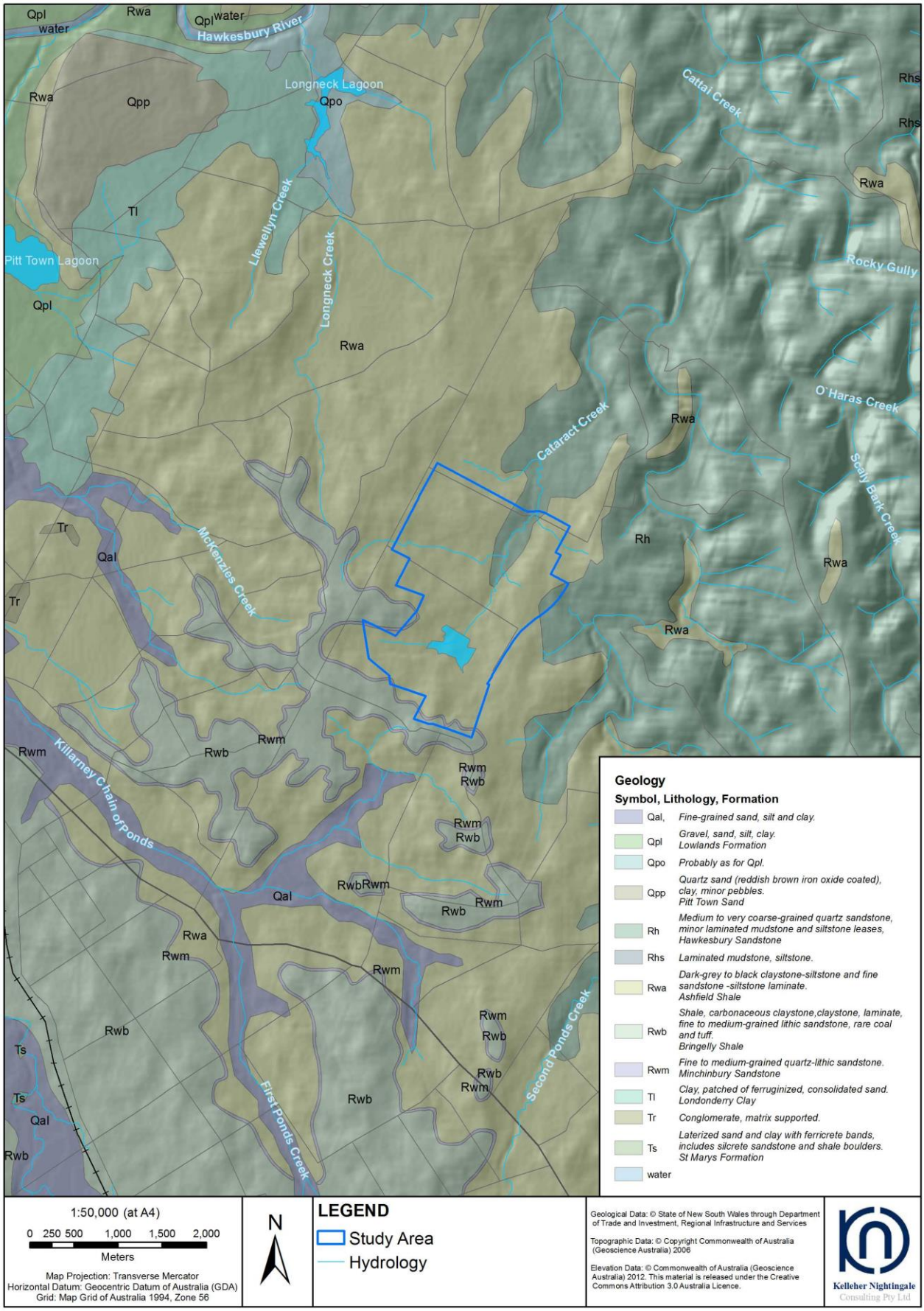

Figure 4. Geology of the study area

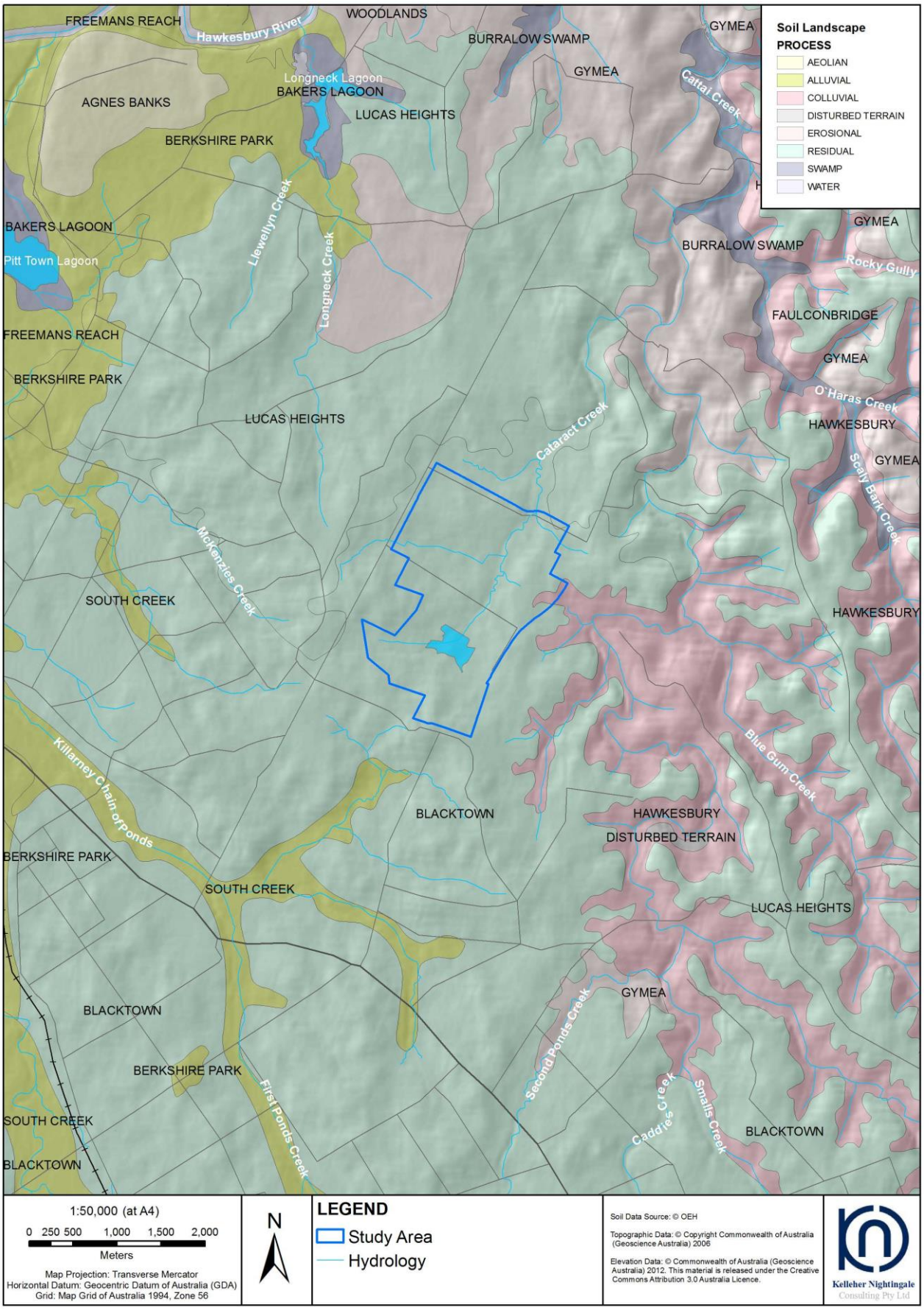

Figure 5. Soil landscapes of the study area

6 Regional Character

Previous archaeological field surveys and excavations across the northern Cumberland Plain have provided data on artefact distribution, site typology and lithic raw material use that aid in assessing the archaeological character of the wider region.

Artefacts generally occur as open camp sites or surface scatters and as isolated finds on the underlying Bringelly/Ashfield shale geologies. Open sites predominate as the underlying geology of the region is not conducive to the formation of rock shelters. Previous studies have demonstrated the relationship between artefact densities and proximity to water sources and landform. Relatively elevated landforms along the margins of creeks, especially those offering permanent water, would have been favourable for occupation by Aboriginal people. This is reflected in the archaeological record by higher artefact densities recorded at these sites, potentially reflecting repeated or more intensive use of these locations.

Where the Hawkesbury sandstone geology exists, archaeological sites generally occur as rockshelters with art and/or archaeological deposit. Grinding grooves occur on sandstone outcrops located near water. In areas where the shale/sandstone geologies meet, archaeological sites types are varied and often include examples of all of the above. Shale/sandstone transitional zones would have offered a wide variety of resources for past Aboriginal people and would likely have been heavily utilised. The prevalence of silcrete, silicified tuff and quartz in local assemblages is reflective of regional geologies, with silcrete and silicified tuff present in the Rickabys Creek gravels, available at several locations northwest of the study area. Silcrete may also have been present along the Killarney Chain of Ponds to the south. Quartz and chert are available from the Hawkesbury sandstone to the north and east of the study area.

This resource rich area would have had much to offer past Aboriginal people and archaeological investigations have revealed a rich settlement history in the region. Lower slopes and raised terraces in close proximity to water sources were favoured for occupation, with increases in site complexity linked to both repeated occupations and a wide variety of activities taking place. Where historical disturbances are minimal, these contexts have been demonstrated to retain significant archaeology with the possibility of intact vertical stratigraphy of the deposit. Stratification of open sites is generally rare and results from excavations of such sites are valuable.

Regional archaeology has been variably impacted by historical and current land use practices as well as by natural processes. Preservation of archaeological sites in open contexts is difficult because of the adverse effects of erosion, floods and disturbance from various human activities. Conversely, ground surface visibility is often increased by these processes, leading to increased identification of artefacts in these areas. Previous studies have underscored the relationship between particular landforms and ground disturbance as key factors in the location of archaeological sites.

7 Predictions

The information outlined in previous sections allows several predictions to be made about the nature of the archaeology that may be expected in the study area.

- Archaeological sites are likely to consist of open artefact scatters and/or isolated finds on the gentle rolling hills associated with the Ashfield shale landscape.
- It can be expected that silcrete will be the most commonly encountered artefact raw material, with significant occurrences of silicified tuff, quartz and occasional chert.
- Clearance of original vegetation lessens the likelihood of identifying culturally modified trees, but old growth trees may be present in the study area and have the potential to display scars of Aboriginal origin.
- Grinding grooves may exist on the sandstone outcroppings that occur in the north and east of the study area.
- Archaeological sites are more likely to be identified in areas that have been subject to less intensive disturbance.
- Identification of archaeological sites is likely to be affected by differential visibility of the ground surface, but successful assessment of areas of PAD can be made based on landform and other environmental factors such as aspect and distance to water.

8 Method and Survey Coverage

8.1 Sampling Strategy

The aim of the archaeological survey was to conduct a general inspection of the study area and identify any Aboriginal archaeological sites. The study area was to be subject to a pedestrian survey. Due to the size of the study area, a full coverage survey was not practicable at this stage. Additionally, access to several properties was not available but inspection from the boundary of neighbouring properties allowed a general assessment of landform and archaeological potential to be carried out in those locations.

Due to the majority of the study area being covered in grass, field assessment focused on areas of surface exposure, where there was a greater chance of identifying artefactual material due to better visibility. The generally poor visibility of the remainder of the study area led to an increased focus on landform and topography.

Based on the archaeological background and landform context of the study area, several areas were targeted for close inspection. The presence of the Hawkesbury sandstone along the creek margins in the north of the study area necessitated close examination for the presence of grinding grooves. On the raised terraces and lower slopes associated with the creek, the survey team closely inspected any areas of surface exposure for artefacts. Old growth trees were also examined for evidence of cultural modification.

Assessment of archaeological potential was also carried out, focusing on a combination of factors such as landform and topography, aspect, distance to water and relation to identified Aboriginal sites. The level of soil disturbance was also assessed, as this has the potential to impact upon any subsurface archaeology that may be present.

8.2 Field Methods

Field survey of the study area was carried out between Monday 20th and Thursday 23rd May 2013 by KNC archaeologists Mark Rawson and Cristany Milicich and Deerubbin Local Aboriginal Land Council representative Steve Randall.

A desktop review of AHIMS registered Aboriginal sites found that site types in the vicinity of the study area were predominantly isolated finds and open artefact scatters, with shelters and grinding grooves in areas of Hawkesbury sandstone. For this reason, areas of high surface visibility were targeted for close inspection, including exposures such as vehicle tracks, driveways, stock tracks, sheet wash erosion scours, dam edges and creek banks. Where geological mapping identified Hawkesbury sandstone, the area was closely inspected for outcroppings. Large mature or dead trees were also inspected for the possibility of being a culturally modified tree.

The study area was divided into three survey units for ease of reference (Figure 6). Survey unit 1 comprised the land bounded by Cataract Creek in the west, Maguires Road in the north, Red Gables Road in the south and the study area boundary and a portion of Janpieter Road in the east. Survey unit 1 included the eastern side of Cataract Creek and its banks, low terraces and gentle hillslope leading up to a low ridge in the east. Over this low ridge was a portion of upper hillslope traversed by the northern portion of Janpieter Road.

Survey Unit 2 comprised the north western part of the study area, bounded by Boundary Road in the west, Maguires Road in the north, Cataract Creek in the east and Red Gables Road to the south. This survey unit contained gentle slopes leading to a moderate crest in the centre of the survey unit, then down again to Cataract Creek in the east and a remnant creek branch (now dammed) in the south. Another broad crest was present in the south eastern part of this survey unit, on Red Gables Road.

Survey unit 3 comprised the portion of the study area south of Red Gables Road, including the dammed remains of Cataract Creek, the flats south of Red Gables road, a broad crest on Janpieter Road in the east and the gentle to moderately steep slopes leading up to the ridgeline of Old Pitt Town Road in the south. This survey unit also contained a very large dam in the centre.

The study area was traversed by pedestrian survey in a series of transects. High resolution colour aerial photographs, topographic maps and geological maps were used for reference in the field. Site locations were plotted using handheld GPS units, mapped and photographed, including landform context and site contents. Site recording forms were completed for each site, listing details of artefacts observed, site extent and field sketches. Notes were taken during the survey of landform, exposures, nearest water, vegetation, current land use, previous ground disturbance and areas of potential for intact subsurface archaeological deposit.

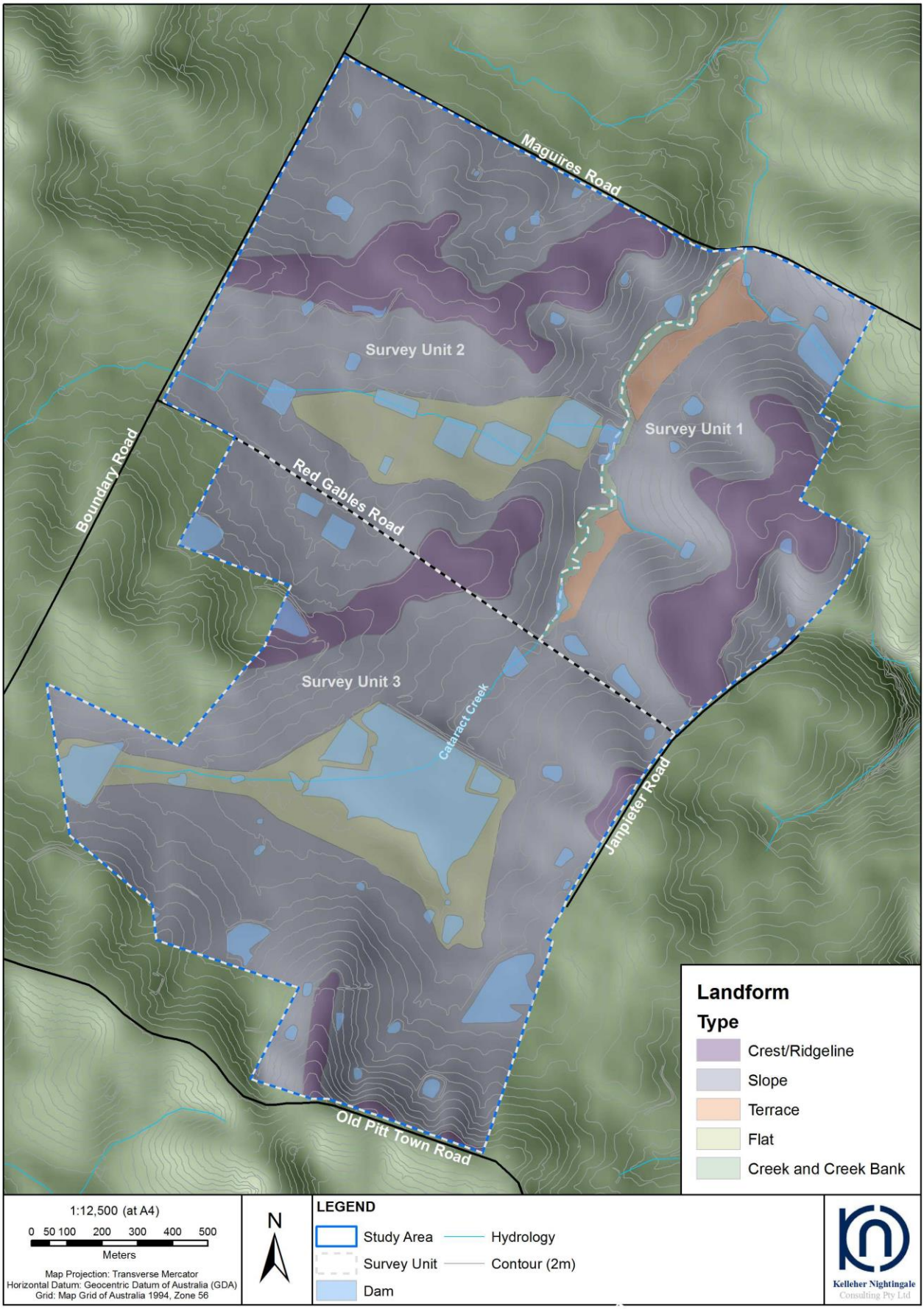

Figure 6. Landforms and survey units of the study area

8.3 Survey coverage

Survey commenced in the north east corner of the study area, where Cataract Creek crossed Maguires Road into survey unit 1. The survey team proceeded south along the creekline, examining sandstone outcroppings on the banks and immediately above the creek. A crossing was made into the east portion of survey unit one approximately 200m south of Maguires Road. Visibility along the western portion of the creek was low, with vegetation and regrowth trees. Large ironbarks were present on the creek terraces extending to the east. Visibility on the east bank was low to moderate, with erosion scours and a portion of a stock track offering good exposure.

The terraces and gentle slopes rising to the east offered poor visibility and were covered with low pasture grasses and occasional brush. Small dams had been constructed along the creekline and the walls of these were inspected for artefacts. Ground disturbance in survey unit 1 was assessed to be generally low, mostly limited to vegetation clearance higher up the slopes and general use as grazing pasture. Dam construction had impacted the ground along portions of the creekline. House and driveway construction has also taken place along the higher ground and broad crest in the east. Further south in survey unit 1 were occasional exposures by dam walls and adjacent to the creek, especially where stock crossings were formed. Mown grass and pasture extended east to Janpieter Road, with some possible sandstone exposures noted around a dam at 5 Janpieter Road. These were not inspected during the survey due to access restrictions.

Survey unit 2 was approached from the northwest of the study area, off Maguires Road. The survey team walked south up the gentle slopes leading to a broad crest in the central portion of the survey unit. Vegetation in the northern part of survey unit 2 was low grasses and mixed young regrowth vegetation and brush. Visibility was low, limited to exposures around dams, along unsealed driveways and at the base of the occasional larger regrowth trees.

The southwestern portion of survey unit 2 had been subject to high disturbance due to prior and current use for market gardening and was surrounded by paddocks with tall grass and very uneven ground. East of this was a series of dams constructed along the western branch of Cataract Creek. The majority of the area between this chain of dams and Red Gables Road appeared moderately disturbed, with heaped earth and piles of fill, and the construction of a high (>5m) berm running south from the chain of dams. The gentle crest in the southeastern portion of survey unit 2 appeared relatively undisturbed and offered a good outlook down to the confluence of the creek branches. Occasional exposures along stock tracks and dam margins were closely inspected, as was a grove of large trees on the slopes just east of the central crest. Overall, visibility was low in survey unit 2, with large paddocks of very long grass offering zero visibility.

Survey unit three was approached from the west, from Cataract Road. The central portion of survey unit 3 was disturbed, with a large block of land between Red Gables Road and the very large dam having been subject to intensive market gardening. East of the market gardens, the gentle slopes had been cleared and subject to mixed activities including excavation and planting of a Christmas tree plantation, house construction, and occasional dumping of fill materials visible on the ground surface. Survey concentrated on the area south of the large dam as this area appeared less disturbed, and contained landform elements considered more likely to retain archaeological potential.

A series of exposures were inspected along the line of dams built over Cataract Creek. Visibility was limited to stock tracks, erosion scours, and unformed vehicle tracks in paddocks and along fence lines. Only scattered trees were present, including some large ironbarks south of the large dam, with the remainder of the area covered with pasture grasses, limiting visibility. Visibility was better (circa 70%) along the flats on the margin of the large dam, however water weed and ground creepers obscured large parts of this landscape. The moderate to steep slopes leading up to the ridgeline of Old Pitt Town Road were covered with lush pasture grasses, offering zero visibility.

Overall, ground surface visibility was severely limited in the majority of the study area, due to grass cover. Exposures identified on aerial photographs were located and inspected in the field. Other exposures were present along dam margins and stock/vehicle tracks. While all landform units were inspected during the survey, due to the large size of the study area, attention was focussed on areas containing landforms that have been identified as archaeologically sensitive in other regional studies, namely the lower hillslopes and terraces above the drainage lines of Cataract Creek. Areas with ground surface visibility were closely inspected regardless of their landform context.

Access restrictions also affected survey coverage, with several properties not accessible during the current investigation. Additionally, the presence of stock curtailed the survey team's ability to enter or cross some paddocks. Nevertheless, landform assessment was carried out for these areas from viewpoints in adjoining properties, allowing a general assessment of their potential. Visibility was very limited across the majority of the study area due to grass cover. Survey coverage and effectiveness is presented in Tables 3 and 4.

Table 3. Survey coverage

Survey Unit	Landform	Survey Unit Area (sq m)	Visibility %	Exposure %	Effective Coverage Area	Effective Coverage %
1	Crest / Ridgeline	182,350	5	0	0	0
1	Slope	484,400	10	10	4844	1
1	Terrace	61,800	20	20	2472	4
1	Creek and creekbank	29,500	10	10	295	1
2	Crest / Ridgeline	272,350	10	5	1361.75	0.5
2	Slope	907,000	10	10	9070	1
2	Flat	174,200	15	20	5226	3
2	Creek and creekbank	14,600	5	5	36.5	0.25
3	Crest / Ridgeline	105,600	0	0	0	0
3	Slope	1,354,000	5	5	3385	0.25
3	Flat	323,800	40	30	38856	12

The survey coverage table above demonstrates the limitations imposed on the effectiveness of the survey by very poor visibility of the ground surface. The majority of the area was heavily grassed, with exposures limited to occasional stock tracks, dam walls and at the base of some large trees. The flats in survey unit 3 provided the best ground surface visibility due to the stock tracks created along the drainage line and the margins of the very large dam. The crests and ridgeline in survey units 1 and 3 were heavily grassed, or maintained around houses and buildings, and offered almost zero visibility of the ground surface. Access restrictions prevented closer examination of the ridge spur in the south of survey unit 3, effectively limiting the coverage of this landform.

Table 4. Landform summary

Landform	Landform Area (sq m)	Area Effectively Surveyed	% of landform effectively surveyed	Number of sites	Number of artefacts or features
Crest / Ridgeline	560,300	1361.75	0.24	0	0
Slope	2,745,400	17299	0.63	1	13
Terrace	61,800	2472	4	1	22
Flat	498,000	44082	8.85	2	26
Creek and creekbank	44,100	331.5	0.75	0	0

9 Results

Field inspection identified four Aboriginal archaeological site locations. These comprise a grinding groove site, two open artefact scatters and one isolated find. Sites were given the identifier "Box Hill North" or BHN 1 to 4. A summary of sites identified is presented in Table 5 and locations shown on Figure 7.

Table 5. Summary of identified sites

Site ID	Feature	Survey Unit	Landform
BHN 1	Grinding grooves	2	Slope
BHN 2	Open scatter	1	Terrace
BHN 3	Open Scatter	3	Flat
BHN 4	Isolated artefact	3	Flat

9.1 BHN 1 (45-5-4297)

BHN 1 comprised two sandstone bench outcrops with grinding grooves located west of Cataract Creek, near the northern boundary of the study area. The two stone slabs were located at a distance of approximately 10m from the creek on the lower slope immediately above the steep banks and approximately 24m south of the wooden fence marking the northern property boundary of Lot 4 DP 135304 on Maguires Road. The grinding grooves were observed on two of a series of exposed sandstone benches that run south along the top of the steep creekbanks for a distance of approximately 40m.

The two slabs were located approximately five metres apart. The northernmost slab was roughly rectangular. It measured approximately 1m wide (east-west) in the north and 1.5m wide in the south, with a length of approximately 2m from north to south. This slab had two distinct groupings of grinding grooves. The first group consisted of five clearly defined grooves free of organic matter. The second group consisted of four less clearly defined grooves with a partial sandy soil infill.

The southernmost slab was partially buried, with the western margin of the slab not discernible and covered in leaf litter, soil and grass. A third group consisting of four narrow grinding grooves was identified on the southern half of the exposed slab. Two grooves had well defined edges. The southernmost sandstone slab measured approximately 1.2m wide (east-west) and 4.2m long (north-south). Abutting the eastern margin was the trunk of a tall bloodwood tree.

Table 6. Grinding grooves at BHN 1

Group	Groove ID number	Length (cm)	Width (cm)	Orientation	Notes
1	1	26	8	East - West	Well-defined shape
1	2	30	9	East - West	Well-defined shape
1	3	30	6.5	East - West	Well-defined shape
1	4	26	7	East - West	Well-defined shape
1	5	29	12	East - West	Well-defined shape
2	6	30	?	East - West	Width not discernible due to soil infill
2	7	32	?	East - West	Width not discernible due to soil infill
2	8	29	4	East - West	
2	9	28	5	East - West	
3	10	10	2	North - South	Southern edge not discernible
3	11	30	2	North - South	
3	12	40	2	North - South	
3	13	20	2	North - South	Southern edge not discernible

Figure 7. Aboriginal sites in the study area

Plate 1. BHN 1 grinding grooves group 1 (L) and group 2 (R)

Plate 2. BHN1 grinding grooves, group 3

Plate 1. BHN 1 seen from eastern side of Cataract Creek Photo looking north-east up slope

Plate 2. BHN 1 looking south east across Cataract Creek. Group 1 and Group 2 grooves visible on slab in foreground

9.2 BHN 2 (45-5-4298)

Site BHN 2 comprised an open artefact scatter of at least 22 artefacts on the eastern side of Cataract Creek, approximately 175m south of Maguires Road and 100m southwest of the grinding grooves identified at BHN 1. Artefacts were identified on a large exposure located on the creekbank and margins of a level terrace extending to the west. The terrace has been cleared for grazing and has a cover of pasture grasses with scattered tall grey gums, occasional ironbarks and *Angophora*.

The exposure measured approximately 15m (east-west) by 10m (north-south), and consisted of gully erosion and a stock track leading down to a creek crossing to the west. Visibility on the exposure was good, at up to 70%, on a sediment background of yellow orange fine silty to fine sandy loam. Leaf litter was scattered across the surface of the exposure and there were occasional clumps of pasture grass. On the terrace edges to the southeast, the eroding edge of the pale grey A2 soil horizon above the orange red clay subsoil was visible in profile. The A unit appeared c.25cm deep.

Twenty two artefacts, all silcrete, were observed on the surface of the exposure in an area measuring approximately 5m (north-south) by 6m (east-west). It was estimated the extent of the site beyond the visible scatter is at least 100m x 100m. The level terraces extending to the east of the exposure were considered to have good potential for intact deposit. Disturbance was minimal and limited to vegetation clearance and use as grazing pasture.

Plate 3. Site BHN 2, looking west Cataract Creek visible in midground

Plate 4. Site BHN 2, looking north across level creek terraces

Table 7. Sample of artefacts at BHN 2

Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Notes
Distal Fragment	Silcrete	32	43	16	Red, <30% cortex, feather termination, glossy, edge fracture/usewear?
Proximal Fragment	Silcrete	12	11	2	Red, glossy, zero cortex, crushed platform
Backed artefact	Silcrete	22	9	6	Red, slight gloss, Bondi point
Flake	Silcrete	36	25	8	Yellow-pink, slight gloss, plain platform, feather termination
Medial Fragment	Silcrete	20	18	6	Yellow, zero cortex
Angular Fragment (heat shattered)	Silcrete	40	32	16	Red, slight gloss, 40-60% cortex, both flaked and heat shatter surfaces
Angular Fragment (heat shattered)	Silcrete	24	18	5	Red/pink, glossy, zero cortex, dorsal flake scars and ventral crenate fracture surfaces
Angular Fragment (heat shattered)	Silcrete	14	19	9	Red, slight gloss, zero cortex
Angular Fragment (heat shattered)	Silcrete	16	14	3	Pink, slight gloss, crenate fracture ventral surface, zero cortex
Angular Fragment (heat shattered)	Silcrete	22	11	10	Pink, slight gloss, zero cortex
Proximal Fragment	Silcrete	9	12	3	Pink, zero cortex, focal platform
Angular Fragment (heat shattered)	Silcrete	15	11	2	Yellow-red, potlid scarring

Angular Fragment (heat shattered)	Silcrete	18	10	3	Red, slight gloss, zero cortex, potlid scarring
Medial Fragment	Silcrete	5	8	2	Yellow red, slight gloss, zero cortex
Angular Fragment	Silcrete	12	8	4	Yellow pink, slight gloss, zero cortex
Distal Fragment	Silcrete	18	10	4	Pink, slight gloss, zero cortex, step termination
Angular Fragment (heat shattered)	Silcrete	11	11	2	Red, slight gloss, potlid scarring, zero cortex
Distal Fragment	Silcrete	8	6	2	Pink, slight gloss, zero cortex, feather termination
Proximal Fragment	Silcrete	9	10	2	Pink, slight gloss, zero cortex, crushed platform
Angular Fragment (heat shattered)	Silcrete	12	6	3	Pink, slight gloss, zero cortex, crenate fracture ventral surface
Proximal Fragment	Silcrete	17	15	6	Red, glossy, scarred platform, central ridge, zero cortex
Proximal Fragment	Silcrete	16	15	4	Pink, slight gloss, plain platform

Plate 5. Sample of artefacts recorded at BHN 2 Bondi Point in centre

Plate 6. Site BHN 2, looking south

Plate 7. Soil profile at southern exposure margin of BHN 2

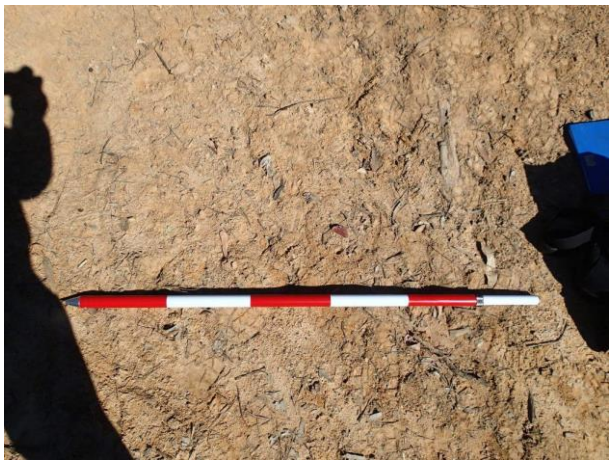

Plate 8. Silcrete artefact and exposure at BHN 2

9.3 BHN 3 (45-5-4299)

Site BHN 3 was an open artefact scatter of over 25 artefacts located along the margins of a large exposure approximately 100m south of Cataract Road and immediately west of the driveway leading to the house at Lot 16 DP 255616. The exposure occurs on the margins of a large sheet erosion located on the lower hill slopes and creekbanks in the drainage line flats of Cataract Creek. There was a shallow dammed pool at the western edge of the exposure, and a shallow pool to the east abutting the driveway. In between was an expansive eroded patch of approximately 100m by 70m with pockets of shallow surface water.

Artefacts were located adjacent to the shallow, sheet eroded northern margins of the exposure, on the edge of the shallow pool to the west and eroding out of the entire length (c.70m) of the steeper bank to the south. One artefact was observed eroding out of the bank. At least three distinct clusters were observed, with scattered single occurrences noted in between. Artefact raw material was predominantly silcrete, with some silicified tuff and quartz also noted. Two unmodified silcrete cobbles were also noted, potentially a natural occurrence of this material. Visibility on the exposure varied between 50-70%, with patchy grasses, small pond weeds, cattle trampling, and water cover reducing it to close to zero in small areas.

North of the exposure was a cleared paddock with gentle lower slopes leading up to Cataract Road and the hilltop to the north. To the south and south west was a level expanse of ground approximately 100m across before the beginning of the slopes leading up to the ridgeline where Old Pitt Town Road is located. These areas had zero visibility due to low pasture grass cover. It was considered that potential for intact subsurface deposit on both sides of the exposure was good, with the depth of the A horizon soils visible in the eroding margins of the exposure and estimated at c.20cm. Subsoil was an orange brown fine silty clay loam. A sample of artefacts recorded at BHN 3 is presented below.

Table 8. Sample of artefacts at BHN 3

Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Notes
Distal Fragment	Silcrete	16	21	3	Red, slight gloss, zero cortex, feather termination
Distal Fragment	Silcrete	15	8	5	Red, glossy, zero cortex, ridge straightening flake fragment
Bipolar Core	Silcrete	25	28	13	Red, glossy, <30% cortex, opposing platforms, scar length =25mm
Heat Shatter	Silcrete	25	23	10	Pink, dull, crenate fractures, zero cortex, potlid scarring
Medial Fragment	Silcrete	17	15	4	Purple, zero cortex
Proximal Fragment	Silcrete	8	9	3	Orange, plain platform, zero cortex
Heat Shatter	Silcrete	21	8	2	Pink, zero cortex, potlid scarring
Angular Fragment	Silicified Tuff	8	4	2	Brown, zero cortex, crenate fracture

Plate 9. Sample of artefacts observed at BHN 3

Plate 10. Location of artefact in bank at BHN 3, looking south

Plate 11. Range pole marks location of artefacts at BHN 3. Photo looking northwest up slope

Plate 12. Eroding bank along southern edge of exposure at site BHN 3

Plate 13. Further sample of artefacts from BHN 3

Plate 14. Unmodified silcrete cobble at BHN 3

Plate 15. Rangepole marks location of artefacts at BHN 3. Photo looking south across exposure.

Plate 16. Location of artefacts at BHN 3. Photo looking southwest across exposure.

9.4 BHN 4 (45-5-4300)

Site BHN 4 was an isolated silcrete artefact, found on the southern edge of a very large dam south of Red Gables Road. The artefact was observed in an exposure measuring approximately 50m x 2m, with visibility of approximately 70%, limited in places by pond weeds and occasional grass. Landform at the site was flat to gentle lower hillslope, sloping north down to the shores of the large dam.

This large dam is part of a chain of dams constructed along what would have originally been the drainage line of Cataract Creek, which has since been relatively heavily modified into the series of dams. Originally the area where this artefact was found would have been located south of the creekline.

The artefact was located approximately 11m north of the fence line marking the northern boundary of the property at 11 Janpieter Road. Paddocks to the east, west and south of the site are currently used as pasture and were covered with short grasses with zero visibility. Occasional large ironbarks were present to the south and southwest. A level expanse of ground and the gentle lower hillslopes leading up to the ridgeline of Old Pitt Town Road was considered to retain high potential for intact subsurface archaeology.

Table 9. Artefact at BHN 4

Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Notes
Distal Fragment	Silcrete	20	10	2	Red-orange, zero cortex, feather termination

Plate 17. Rangepole at location of BHN 4. Photo looking southeast

Plate 18. Artefact at site BHN 4

9.5 Archaeological Potential in the Study Area

During the archaeological survey, an assessment of archaeological potential was conducted within the study area. The characterisation of archaeological potential was based on several factors known to influence both the location and preservation of archaeological sites in landscapes such as those present in the study area. These factors included landform context, aspect, distance to water, integrity of the ground surface / assessment of disturbance and location relative to identified archaeological sites. The study area was divided into zones of high, moderate and low archaeological potential. Figure 8 shows the classification of the study area into these zones.

North of Red Gables Road were two areas of high potential, occupying two differing landform contexts. North of the confluence of the two branches of Cataract Creek, archaeological potential was high on the flat terraces and gentle lower slopes adjacent to the creekline to both the east and the west. Groves of large trees still exist and disturbance was been limited to vegetation clearance sometime in the past and use as grazing pasture. Terrace and lower slope landforms in proximity to creeks have been identified as archaeologically sensitive in a number of both local and regional archaeological investigations (see sections 4.3 and 4.4). In addition, these areas are in close proximity to the sandstone outcrops at the north of the study area and would have been favourable locations for campsites while this resource was being utilised. Between the creek confluence and Red Gables Road the eastern banks and lower hillslopes also offer high archaeological potential, with raised, flat areas adjacent to the creek margins generally having been subject to low disturbance. Observations of the banks and occasional sheet erosion patches suggested this area retained a reasonably good depth of soil. The steeper slopes and construction of a number of small dams as well as a house and stables had moderated the archaeological potential of the west bank, south of the confluence.

The broad, flat crest to the north of Red Gables Road in the centre of the study area also offers high archaeological potential. The north easterly aspect offers good views down to the creek confluence and areas with outcropping sandstone. Although it had been subject to vegetation clearance and possible market gardening in the past, the landform appeared stable with no indication of significant subsurface disturbance. Crest and ridge landforms, where stable, offer a unique archaeological perspective, in that they were often used differently than the more utilitarian areas near creeks.

The corner property at the north side of the intersection of Red Gables Road and Boundary Road has been subject to intensive market gardening activities and is considered to retain low archaeological potential due to modification of the ground surface.

South of Red Gables Road was a large area considered to have low archaeological potential. Intensive market gardening and construction of a very large dam have created a highly modified landscape. The crest in the east of this area, immediately west of Janpieter Road, had been disturbed by building construction, levelling, dumping of fill and establishment of a conifer plantation. South of the large dam was an area considered to retain high potential, based on its landform and proximity to identified site BHN 4. The flat paddocks and lower slopes immediately abutting the southern margin of the dam have been subject to vegetation clearance but some large trees remain and the ground surface appeared relatively undisturbed. Before the construction of the dam this area would have been located close to the line of Cataract Creek and offered a favourable north easterly aspect, sheltered from the wind by the steep slopes and elevated ridgeline to the south.

The flats and gentle slopes surrounding the recorded location of BHN 3 were also considered to display high archaeological potential. As discussed above, gentle lower slopes and flats in proximity to watercourses have been identified as archaeologically sensitive landscapes in the local and regional area. Observation of the soil profile in the eroded banks of the exposure containing BHN 3 indicates that reasonable soil depth remains in this area. The majority of artefacts recorded at BHN 3 were present along the southern margin of the exposure, having eroded out of the bank cut in to the lower slopes. These slopes and the flat area to the north appear to have suffered only minor disturbance, in the form of vegetation clearance and use as grazing pasture. Potential for further intact subsurface archaeological deposit was high.

The remainder of the study area exhibited moderate archaeological potential. The archaeologically sensitive landforms it contains have generally been modified to the extent that they are less likely to retain intact archaeological deposit than those classed as high potential. The presence of archaeological sites is probable, but these could not be identified during survey because of poor ground surface visibility. The survivability of archaeological sites in areas of moderate potential is dependent on landform stability, slope gradient and various disturbance processes. Areas of moderate sensitivity also included those that were not able to be accessed on foot during the survey, but based on background research have moderate potential to contain Aboriginal archaeological sites.

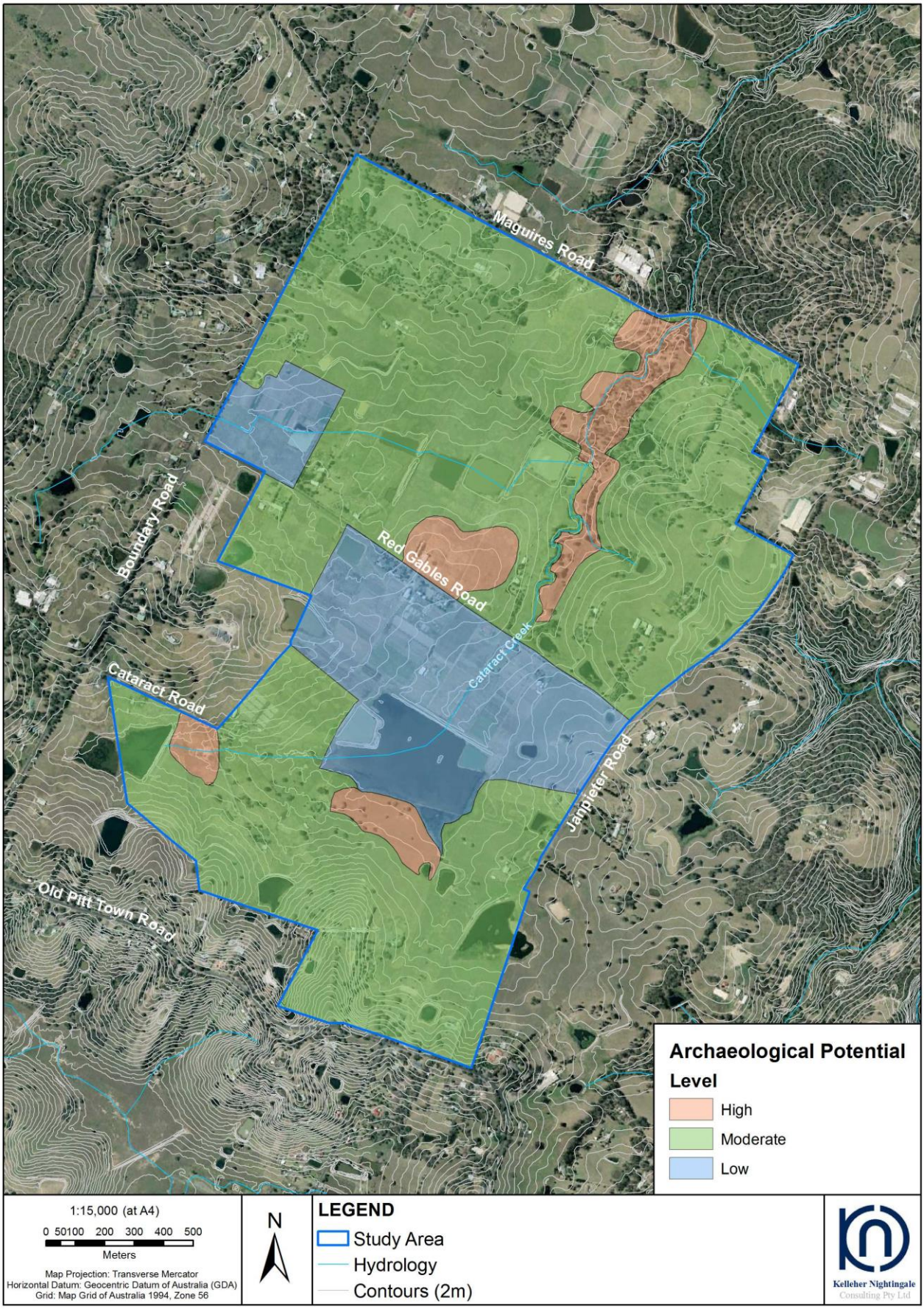

Figure 8. Assessment of archaeological potential in the study area

10 Discussion

Field survey of the study area identified four Aboriginal archaeological sites: one grinding groove site, two open artefact scatters and one isolated find. These findings were consistent with Aboriginal heritage known for the wider area. Three of the identified sites were defined by an association with the flat terraces and gentle lower slopes bordering waterways, characteristic of the topography of the study area. The presence of a grinding groove site on the Hawkesbury sandstone outcropping in the north of the study area is characteristic of the underlying geology of this part of the study area.

Areas of high potential for intact subsurface archaeology exist in association with the particular landforms known to be archaeologically sensitive in the local and regional area – gentle lower slopes, terraces and flats bordering waterways. These areas, where the deposit is stable and relatively unmodified by disturbance, retain high archaeological potential. Moderate potential exists on less archaeologically sensitive landforms, or where the ground surface has been subject to low-moderate disturbance. Low archaeological potential is contained in areas that have been subject to significant disturbance and the creation of highly modified landscapes due to intensive farming and dam construction.

Low visibility of the ground surface hampered the identification of archaeological sites and it is likely that the area contains more than were identified during the field survey. Closer inspection of areas that were not accessed during the survey, in particular the sandstone visible in the east of the study area at 5 Janpieter Road, and the ridgeline in the south along Old Pitt Town Road, would aid in a more precise assessment of the archaeological value of these landscapes.

11 Scientific Values and Significance Assessment

11.1 Assessment criteria

One of the primary steps in the process of cultural heritage management is the assessment of significance. Not all sites are equally significant and not all are worthy of equal consideration and management (Sullivan and Bowdler 1984; Pearson and Sullivan 1995: 7). The determination of significance can be a difficult process as the social and scientific context within which these decisions are made is subject to change (Sullivan and Bowdler 1984). This does not lessen the value of the heritage approach, but enriches both the process and the long term outcomes for future generations as the nature of what is conserved and why, also changes over time.

The assessment of significance is a key step in the process of impact assessment for a proposed activity as the significance or value of an object, site or place will be reflected in resultant recommendations for conservation, management or mitigation.

The *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (OEH 2010) requires significance assessment according to criteria established in the *Australia ICOMOS Burra Charter, 1999* (Australia ICOMOS 1999). The *Burra Charter* and its accompanying guidelines are considered best practice standard for cultural heritage management, specifically conservation, in Australia.

Guidelines to the *Burra Charter* set out four criteria for the assessment of cultural significance:

- Aesthetic value - relates to the sense of the beauty of a place, object, site or item;
- Historic value - relates to the association of a place, object, site or item with historical events, people, activities or periods;
- Scientific value - scientific (or research) value relates to the importance of the data available for a place, object, site or item, based on its rarity, quality or representativeness, as well as on the degree to which the place (object, site or item) may contribute further substantial information; and
- Social value - relates to the qualities for which a place, object, site or item has become a focus of spiritual, political, national or other cultural sentiment to a group of people. In accordance with the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*, the social or cultural value of a place (object, site or item) may be related to spiritual, traditional, historical or contemporary associations. “Social or cultural value can only be identified though consultation with Aboriginal people” (OEH 2011:8).

The assessment of these values are brought together to form a comprehensive assessment of significance.

11.2 Statement of significance

Archaeological value of the study was linked to consideration of site type and an assessment of the intactness of subsurface deposit.

One identified archaeological site is of high significance:

High significance archaeological site/object

- BHN 1

Three locations exhibit at least moderate subsurface deposit suitable to curate Aboriginal objects

Moderate significance archaeology sites/objects

- BHN 2
- BHN 3
- BHN 4

12 Impact Assessment

An indicative layout has been prepared for the study area, which includes the majority of the land being developed. Based on this indicative layout, an impact assessment can be made for the identified archaeological sites in Box Hill North (Figure 9).

Two identified Aboriginal archaeological sites are contained within the proposed Open Space corridor bordering Cataract Creek and tributary:

- BHN 1 (grinding grooves)
- BHN 4 (isolated find)

Two Aboriginal archaeological sites will be partially impacted by proposed development:

- BHN 2 (open artefact scatter)
- BHN 3 (open artefact scatter)

The majority of site BHN 2 would be contained within the Open Space corridor bordering Cataract Creek. The portion of the site that extends onto the terraces and lower slopes east of the corridor will be impacted by development. Site BHN 3 was similarly partially located in an Open Space area and development lands.

13 Legislative Considerations

The *National Parks and Wildlife Act 1974* is the primary statutory control for the protection and regulation of Aboriginal heritage in New South Wales.

An "Aboriginal object" is defined under the Act as "any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains". As such, Aboriginal objects are confined to physical evidence and are commonly referred to as Aboriginal sites.

Aboriginal objects and declared Aboriginal places are protected under section 86 of the Act. It is an offence to harm or desecrate an Aboriginal object, either knowingly [section 86 (1)] or unknowingly [section 86 (2)]. Harm includes to destroy, deface, damage or move.

Under section 87 (1) it is a defence to a prosecution for an offence under section 86 (1), (2) or (4) if "(a) the harm or desecration concerned was authorised by an Aboriginal heritage impact permit, and (b) the conditions to which that Aboriginal heritage impact permit was subject were not contravened".

Section 87 (2) of the Act provides a defence against prosecution under section 86 (2) if "the defendant exercised due diligence to determine whether the act or omission constituting the alleged offence would harm an Aboriginal object and reasonably determined that no Aboriginal object would be harmed". This defence appears to specifically relate to Aboriginal objects.

Section 89A of the Act relates to the notification of sites of Aboriginal objects, under which it is an offence if the location of an Aboriginal object is not notified to the Director-General in the prescribed manner within a reasonable time.

Under section 90 (1) of the Act "the Director-General may issue an Aboriginal heritage impact permit". The regulation of Aboriginal heritage impact permits is provided in Part 6 Division 2 of the Act (sections 90 to 90R).

An Aboriginal heritage impact permit (AHIP) is required for any activity which will harm an Aboriginal object or Aboriginal place.

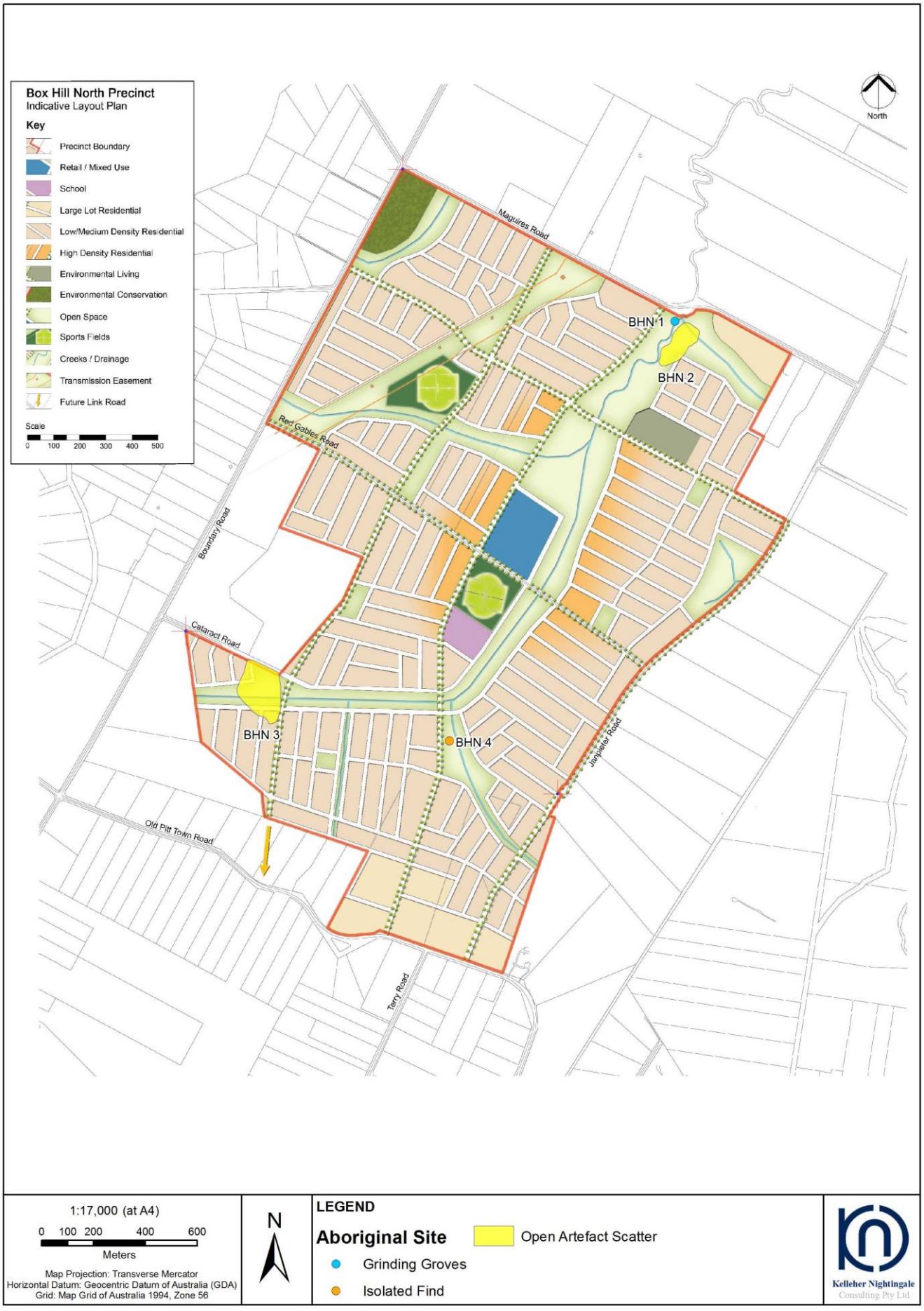

Figure 9. Development impact on Aboriginal heritage

14 Conclusions and Recommendations

Four Aboriginal archaeological sites were identified in the study area:

Box Hill North 1 (BHN 1) – AHIMS 45-5-4297

Box Hill North 2 (BHN 2) – AHIMS 45-5-4298

Box Hill North 3 (BHN 3) – AHIMS 45-5-4299

Box Hill North 4 (BHN 4) – AHIMS 45-5-4300

Sites consist of a grinding groove site (BHN 1), two open artefact scatters (BHN 2 and BHN 3) and one isolated find (BHN 4).

Sites BHN 2-4 do not pose a constraint to development but will require a process of further assessment, consultation and mitigation to comply with relevant legislation and associated requirements.

Site BHN 1, grinding grooves, should be conserved.

Rezoning will not affect identified Aboriginal items, however, an AHIP will be required for future development. The AHIP should cover the entire study area to allow impacts to identified and potential archaeological deposits on site.

The next step in obtaining an AHIP would be preparation of a Cultural Heritage Assessment Report (CHAR) and associated Aboriginal stakeholder consultation. An AHIP application can be lodged following completion of the CHAR and associated development application. Recommendation is for a bulk earthworks DA to accompany the AHIP application.

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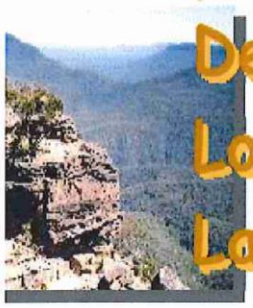
Appendix A Deerubbin Local Aboriginal Land Council Report



Deerubbin Local Aboriginal Land Council

Level 2, 9 Tindale Street
PENRITH NSW 2750

PO Box 40
Penrith BC
NSW 2751 AUSTRALIA

T: (02) 4724 5600
F: (02) 4722 9713
E: Staff@deerubbin.org.au
W: http://www.deerubbin.org.au

APP Corporation Pty Limited

Our Ref: 2340

C/- Kelleher Nightingale Consulting

Suite 911-912, 155 King Street

SYDNEY NSW 2000

17 June 2013

PROTECTION OF ABORIGINAL CULTURAL HERITAGE

Lands Bounded by Old Pittown Road, Macquires Road, Boundary Road

Box Hill

Attention: Clair Baxter, Project Manager,

A representative of Deerubbin Local Aboriginal Land Council inspected the abovementioned location in Box Hill on Wednesday, 22 and Thursday 23 May 2013. An Aboriginal cultural heritage assessment was undertaken to evaluate the likely impact the future development has on the cultural heritage of the land. Consulting archaeologists from Kelleher Nightingale carried out a scientific survey at the same time.

Our representative reports, that Potential Archaeological Deposits, Aboriginal sites and Aboriginal cultural materials (in the form of stone artefacts, for example) were found within the abovementioned locations.

Deerubbin Local Aboriginal Land Council therefore, recommends further investigation be undertaken before any development.

Yours Faithfully,

S Randall

Steven Randall

(Senior Aboriginal Cultural Heritage Officer)

c.c. Miranda Moreton – Office of Environment & Heritage

c.c. Mark Rawson – Kelleher Nightingale Consulting

Appendix B AHIMS Search Results

AHIMS Web Services (AWS)
Search Result

Your Ref Number : 1221 Box Hill North

Client Service ID : 99579

Kelleher Nightingale Consulting Pty Ltd

suite 911-912 155 King Street
Sydney New South Wales 2000

Attention: Cristany Milicich

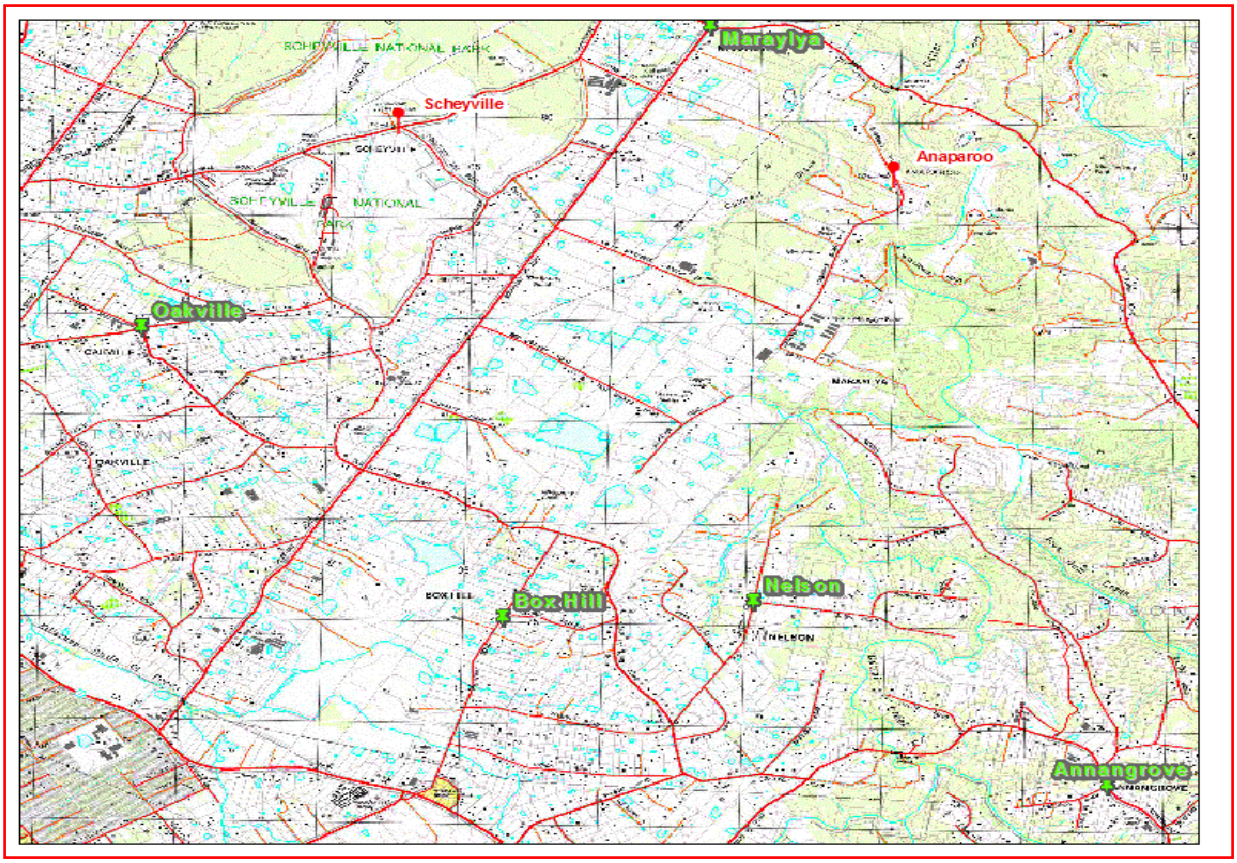
Email: cristany.milicich@knconsult.com.au

Date: 02 May 2013

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 302000 - 310000, Northings : 6272900 - 6280900 with a Buffer of 0 meters, conducted by Cristany Milicich on 02 May 2013.

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



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

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

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

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

Important information about your AHIMS search

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

PO BOX 1967 Hurstville NSW 2220
43 Bridge Street HURSTVILLE NSW 2220
Tel: (02)9585 6345 (02)9585 6471 Fax: (02)9585 6094

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