SOUTH DURAL PLANNING PROPOSAL

Aboriginal Heritage Study

Prepared for APP Corporation Pty Limited

Hornsby Shire Local Government Area

August 2016

Ref. 1524

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Document Information

Project Name	South Dural Planning Proposal: Aboriginal Heritage Study
Project Number	1524
Status	Final
Version	2.0
Client Name	APP Corporation Pty Limited
Recipient	Peter Alevizos, Assistant Project Manager
Issue Date	1 August 2016
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Approved by	Dr Matthew Kelleher

Executive Summary

APP Corporation Pty Limited is preparing a planning proposal for rezoning lands at South Dural, NSW, within the Hornsby Shire Local Government Area. The initial planning proposal was submitted to the Hornsby Shire Council and subsequently to the NSW Planning & Infrastructure Gateway Review Panel in December 2013. Gateway determination was that the planning proposal should proceed subject to conditions. One of these conditions required additional assessment of heritage issues including preparation of a heritage study.

APP Corporation Pty Limited engaged Kelleher Nightingale Consulting Pty Ltd to complete an Aboriginal heritage study of the South Dural study area to meet Gateway conditions and inform future planning for the development of the area. The study has been undertaken with reference to the Office of Environment and Heritage (OEH) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.

No Aboriginal archaeological sites or objects were identified within the study area. Four areas of moderate archaeological potential were identified based on landform and assessment of likely integrity (i.e. low visible disturbance). According to the indicative structure plan, all areas of archaeological potential are located within a conservation area and are not impacted by the proposed rezoning.

Outside of the identified areas of moderate potential, the remainder of the study area inspected as part of the Aboriginal heritage study, displayed low archaeological potential due to steeply sloping topography and a combination of erosion, flood energy, agricultural activity and contemporary disturbance of the land.

It is recommended that the identified areas of moderate archaeological potential and lands not physically inspected as part of the Aboriginal heritage study are subject to visual inspection if subsequent development planning indicates they may be impacted by the proposed activity. More detailed recommendations may be formulated at that time, if required, based on the results of the inspection and the confirmation of whether they contain Aboriginal archaeological sites.

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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 South Dural, NSW, within the Hornsby Shire Local Government Area (LGA).

The subject land (hereafter referred to as the 'study area') is located within the suburbs of Castle Hill, Dural and Glenhaven (Figure 1). The study area is bound by the Old Northern Road to the north, south and west, New Line Road to the north east and Hastings Road to the south east. The area of proposed rezoning encompasses approximately 240 hectares and consists of 135 allotments. Existing land uses include large lot rural/residential development, a water reservoir, caravan park, seniors living development, landscape supplies, child care centre and a hotel/motel.

The land is currently zoned part RU2 (Rural Landscape), part E3 (Environmental Management) and part SP2 (Infrastructure - Road) under the Hornsby Local Environmental Plan (LEP) 2013. Rezoning would seek to allow for mixed density residential development of the majority of the study area, as well as some commercial, educational and open space uses and provision of associated infrastructure. An indicative yield of 2500 to 3000 dwellings is proposed. An indicative structure plan has been prepared for the proposal and is shown in Figure 2.

The initial planning proposal was submitted to the Hornsby Shire Council and subsequently to the NSW Planning & Infrastructure (NSW P&I) Gateway Review Panel in December 2013. Gateway determination was that the planning proposal should proceed subject to conditions. One of these conditions required additional assessment of heritage issues including preparation of a heritage study.

APP engaged Kelleher Nightingale Consulting Pty Ltd (KNC) to complete an Aboriginal heritage study of the South Dural study area to meet Gateway conditions and inform future planning for the development of the area.

The Aboriginal heritage study included background research, desktop assessment and an archaeological field survey. The study has been undertaken with reference to Office of Environment and Heritage (OEH) requirements and guidelines, including:

- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH 2010a)
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (OEH 2010b)

1.2 Summary of findings

Background research, desktop assessment and archaeological field survey did not identify any Aboriginal objects (artefacts) or Aboriginal archaeological sites within the study area. No significant Aboriginal cultural features were identified within the study area by the Deerubbin Local Aboriginal Land Council (Appendix A). Four areas of moderate Aboriginal archaeological potential were identified bordering Georges Creek. In general, the study area displayed low archaeological potential due to combinations of archaeologically unfavourable topography, sloping ground, flooding, erosion, agricultural activity and contemporary disturbance of the land.

It is recommended that the identified areas of moderate potential and lands not physically inspected as part of the Aboriginal heritage study are subject to visual inspection to determine the presence/absence of Aboriginal archaeological sites if subsequent development planning indicates they may be impacted by the proposed activity. More detailed recommendations may be formulated, if required, at that time.

1.3 Investigators and contributors

The study has been undertaken by the people in the following table.

Table 1. Investigators/Contributors

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

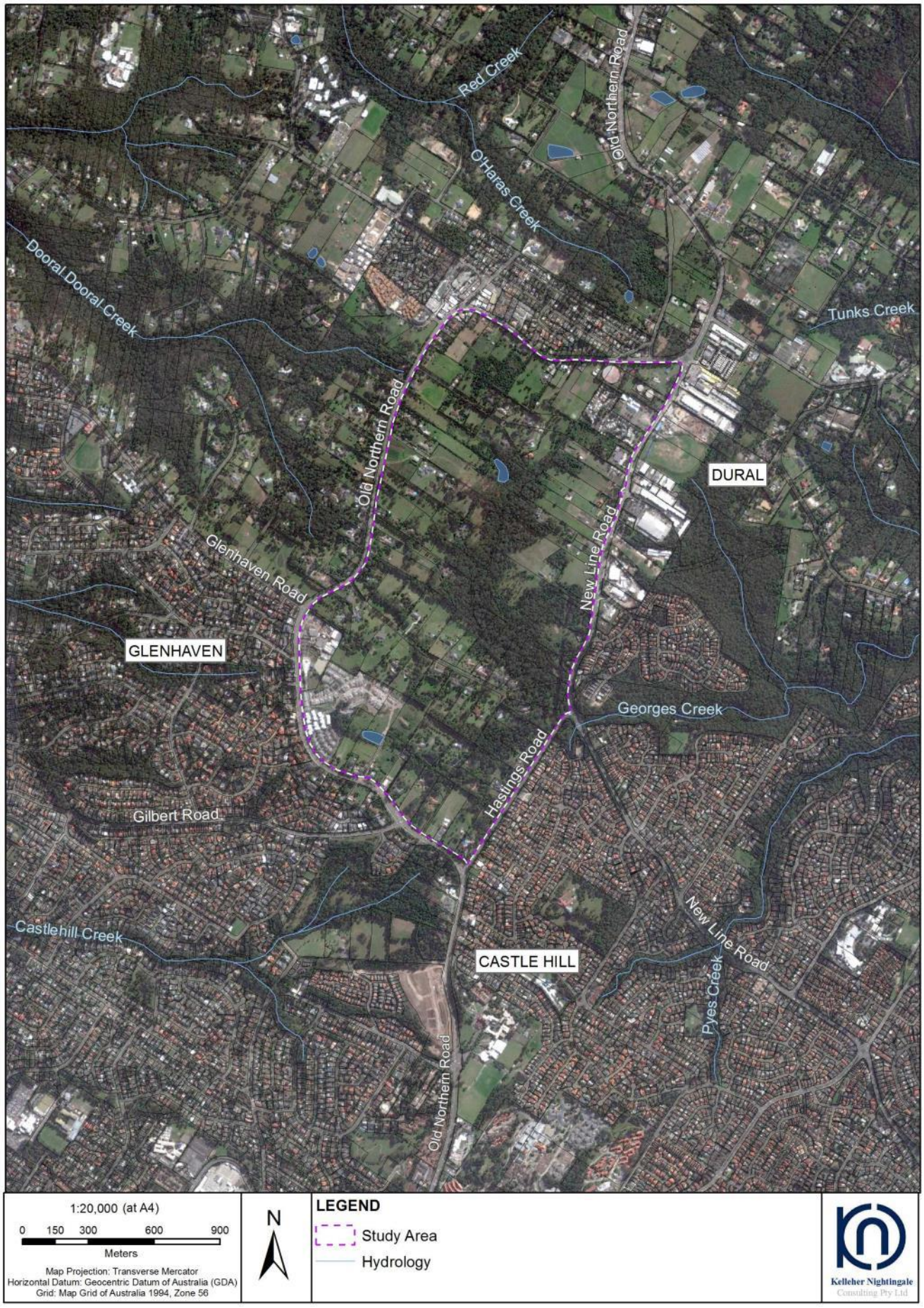

Figure 1. Study area location

Figure 2. South Dural Indicative Structure Plan

2 Aboriginal stakeholder consultation

The Aboriginal heritage study 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 heritage study and was invited to participate in site investigations. Land Council representative Steve Randall participated in the archaeological survey.

DLALC provided a cultural assessment report on the study area (Appendix A). No Aboriginal objects, sites or potential archaeological deposits were found within the study area. The Land Council recommended further detailed investigation of identified areas of potential prior to development of the lands, especially in the parts of the study area where the survey team did not have access.

3 Archaeological context

3.1 Database search (AHIMS) and known information sources

3.1.1. AHIMS web services

The Aboriginal Heritage Information Management System (AHIMS) is a database operated by OEH, 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.

The search of AHIMS was conducted on 11 February 2016 (Client Service ID: 211114) to identify registered (known) Aboriginal sites or declared Aboriginal places within or adjacent to the study area.

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

Eastings: 0315150 - 0318000
Northings: 6266950 - 6270600
Buffer: 0m (search coordinates included an extensive buffer around the study area)

The AHIMS search results showed:

9	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 these coordinates is shown on Figure 3. The frequencies of site features (site 'types') within the AHIMS database search area are listed in Table 2.

Table 2. Frequency of site features from AHIMS database search

Site Context	Site Features	Frequency	*(%)*
Open Site	Artefact	3	*33.3*
	Artefact; Potential Archaeological Deposit (PAD)	1	*11.1*
	Grinding Groove	1	*11.1*
	Grinding Groove; Water Hole	1	*11.1*
Closed Site	Art (Pigment or Engraved)	2	*22.2*
	Artefact	1	*11.1*
Total		*9*	*100*

3.1.2. Other heritage registers and databases

Other sources of information including heritage registers and lists were also searched for known Aboriginal heritage in the vicinity of the study area. These included:

- Hornsby Local Environmental Plan 2013
- The Hills Local Environmental Plan 2012
- State Heritage Register and State Heritage Inventory
- Commonwealth Heritage List
- National Heritage List
- Register of the National Estate
- Australian Heritage Places Inventory and
- Historic Heritage Information Management System (HHIMS).

No Aboriginal archaeological sites were recorded on these databases within the study area and no other items of Aboriginal heritage significance were identified during the register search.

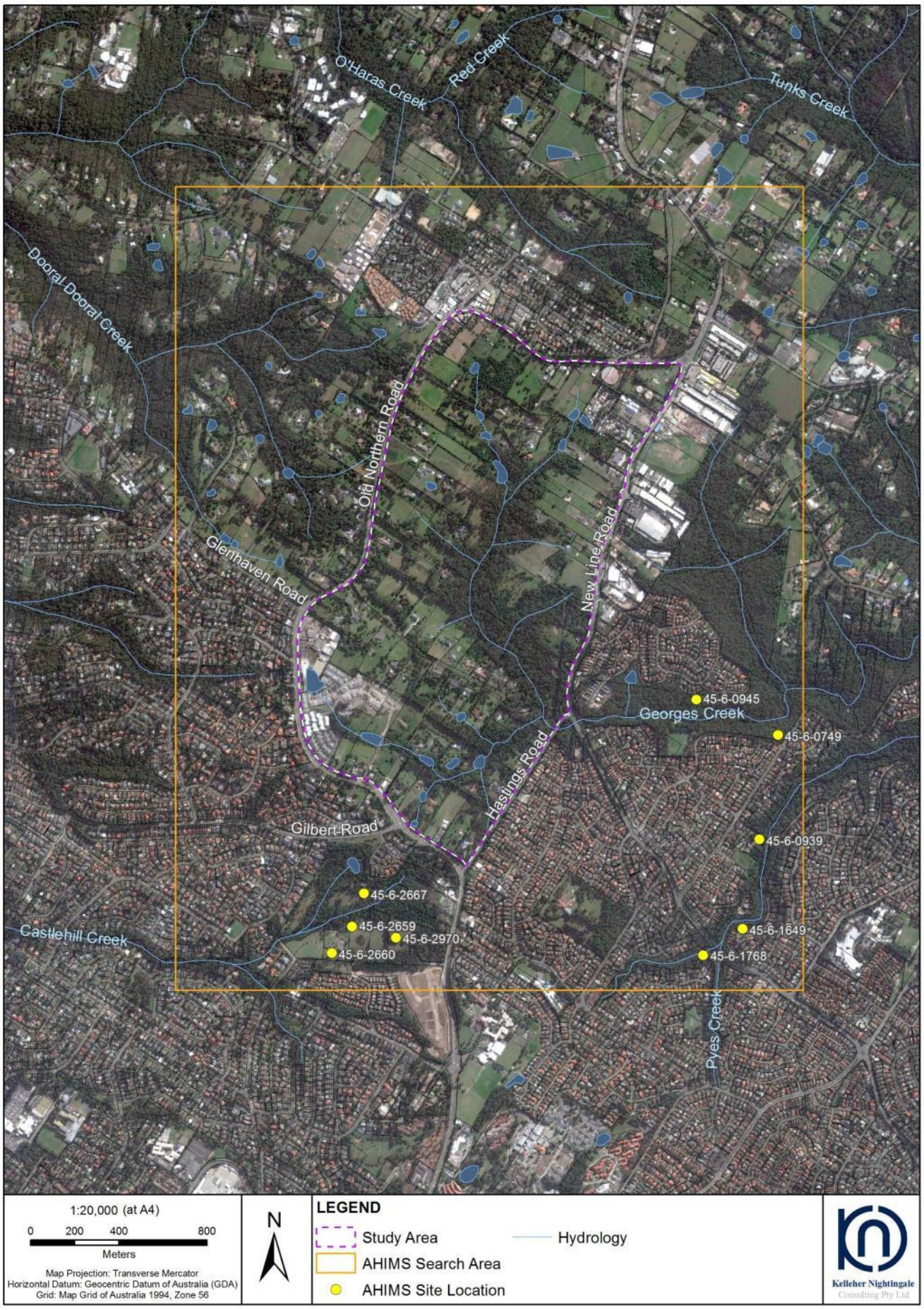

Figure 3. Registered Aboriginal sites near study area (AHIMS search results)

3.2 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, one of which was associated with an area considered to have high potential for subsurface archaeological deposit (Potential Archaeological Deposit or 'PAD'). Open context grinding groove sites have also been recorded in association with the drainage lines which descend the elevated Hornsby Plateau. Grinding groove sites are related to Aboriginal people's manufacture and shaping of ground stone tools such as axes and hatchets and commonly occur on suitable abrasive rock exposures such as Hawkesbury sandstone. One of these sites was also associated with a waterhole/well deliberately shaped to hold water to assist with the shaping process.

Closed context sites included two rockshelters with art and one rockshelter containing artefacts. All three closed context sites are located to the south east of the study area associated with the incised Hawkesbury sandstone ridges and the rockshelters formed therein.

All nine of the previously recorded sites within the AHIMS search area are located to the south and south east of the study area, in closer proximity to more urbanised areas. The scarcity of recorded sites within the AHIMS search coordinates is likely more reflective of survey effort than the actual distribution of Aboriginal archaeological features across the landscape. Heritage assessments are more likely to have been undertaken (and hence more sites identified) in areas where development and infrastructure projects have taken place.

Despite the low number of recorded sites, the diversity of site types and features indicated in the AHIMS search results illustrate the rich archaeological resource around the study area, with many 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.

3.2.1. Previously recorded Aboriginal archaeological sites

A description of known sites in the vicinity of the study area based on information held within the AHIMS database is provided below.

Open Context Sites

To the south of the study area, a series of open context sites have been recorded within the Castle Hill Heritage Park.

Site 45-6-2659 (CHHP IF1) was an isolated find of a single silcrete angular fragment identified on a revegetated lower slope approximately 40 metres from Castle Hill Creek. The site was located on a disturbed former 4WD track running through the eastern part of the park. It was recommended that the artefact be relocated and collected ahead of any park redevelopment works that may affect the site location.

Site 45-6-2660 (CHHP IF2) was another isolated find recorded within the park, located on a lower slope approximately 50 metres from an ephemeral tributary of Castle Hill Creek. A single chert flake was identified on the edge of an unsealed access road. It was recommended that the artefact be relocated and collected ahead of any park redevelopment works that may affect the site location.

Site 45-6-2667 (CHHP) was an open artefact scatter and associated area of PAD recorded in a mid slope context on a minor spur line separating Castle Hill Creek from a small tributary. The site was located approximately 200 metres north of the other isolated find recorded within the park. The registration of an area of PAD suggests that assessment of soil integrity was high, with low levels of disturbance around the site and a high likelihood of subsurface deposit.

Site 45-6-2970 (CHIF 1) was recorded in a private lot bordering the park during a heritage assessment ahead of a proposed subdivision. The site consisted of an isolated find of a silcrete flake in a disturbed context. The artefact was located on a mid slope approximately 500 metres from Castle Hill Creek on the edge of an unformed vehicle track. Site context was disturbed by erosion. It was recommended that an AHIP be sought from OEH to relocate the artefact to a proposed reserve area within the property boundaries should the subdivision and development of the lot go ahead.

Site 45-6-1768 (Cherrybrook) was an open context axe grinding groove site identified on a sandstone platform in the bed of a tributary of Pyes Creek. The site was located approximately 100 metres upstream of the tributary's confluence with Pyes Creek and comprised four grinding grooves on a large (10 metres x 6.5 metres), flat sandstone outcrop within the creek bed. Part of the rock platform was obscured by moss growth and the grooves were weathered and stained black due to pollution within the creek.

A second open context grinding groove site has been recorded along Georges Creek. Site 45-6-0945 (Rogans Hill; Glenhaven) comprised 29 axe grinding grooves and a carved water channel that were identified on a sandstone platform within the Georges Creek creekbed. The site was located approximately 300 yards east of the intersection of Hastings Road and New Line Road, just above the junction with Pyes Creek. The site card for 45-5-0945 has been incorrectly accessioned to the AHIMS database as site 45-6-0939 (a closed context rockshelter site).

Closed Context Sites

Closed context sites have been recorded to the south east of the study area, primarily located within the steep valleys bordering the drainage systems of Pyes Creek and Georges Creek.

Site 45-6-0939 (Rogans Hill) is listed as a closed context rockshelter site featuring art (pigment or engraved). The listed site coordinates on AHIMS place the site on an east facing slope at the end of Joyce Place and overlooking Pyes Creek. The site card held by AHIMS for this site actually contains information relating to site 45-5-0945 (open context axe grinding groove site).

Site 45-6-0749 (Cherrybrook 5) was a large sandstone overhang with art that was located within the Dural Nature Reserve. The site was situated on a steep slope approximately 40 metres west of Jenner Road and 60 metres south east of Georges Creek. The site contained a single unidentifiable outlined and infilled black motif that had been drawn in charcoal. Site condition was good with no evidence for modern visitation or European disturbance.

Site 45-6-1649 (Pyes Creek 1 (Cherry brook)) was a large sandstone shelter complex with two areas of overhang, approximately 15 metres from the eastern side of Pyes Creek. The larger overhang measured 10 metres long x 3 metres deep x 3 metres high (at dripline) and the smaller measured 5 metres long x 2 metres deep x 3 metres high (at dripline). A total of 72 surface artefacts were recorded along the driplines of the overhangs. Deposit within the shelters was loose sandy brown loam and appeared to be at least 15 centimetres deep. The site was considered to be in good condition, with little evidence of disturbance. No art was identified on the shelter walls but these were thickly covered by lichen.

This site was originally identified during an archaeological survey of the Cherrybrook Development Estate in 1984 (McDonald 1984) which covered approximately two square kilometres. Within the survey area, a total on nine Aboriginal archaeological sites were identified. These included six closed context rockshelter sites with PAD, one rockshelter with art and one rockshelter with archaeological deposit (site 45-6-1649). One open context grinding groove site was also identified, consisting of six grinding grooves situated around a deep rock pool on a minor tributary of Pyes Creek. It was recommended that the identified sites be considered as part of the development process and avoided where possible. Test excavation of two rockshelters with PAD was recommended, and further investigation was suggested for site 45-6-1649 should harm from the proposed works be unavoidable.

The site was subsequently excavated in 1985, ahead of proposed impact from the construction of a wastewater pipeline along Pyes Creek (McDonald 1985). A total of 4.5m^2 was excavated at the site, split between a 6 x 0.5 metre trench, four 0.5 x 0.5 metre test pits and a 1 x 0.5 metre square. Excavation was conducted in five centimetre spits, with spit depths altered to accommodate stratigraphic levels where encountered.

Spatial analysis of artefact distribution suggested that knapping activity had occurred primarily around the dripline of the shelter. In terms of the vertical sequence, artefacts were concentrated between Spit 2 and Spit 4 and in the top stratigraphic units (Units I and II), suggesting that the most intensive use of the site occurred within a relatively short time frame. Quartz was the dominant raw material, accounting for 67.6% of all artefacts. Silcrete was the second most common, accounting for 24.1% of artefacts. Other artefactual raw materials included mudstone, quartzite and petrified wood. The bipolar knapping technique was predominant at the site and based on technological characteristics of the assemblage the possible age range of the site was determined to be between 2,500 and 3,000 years ago.

4 Landscape context

The study area is located on the southern fringes of the Hornsby Plateau, the high plateau located at the north east margin of Sydney's Cumberland Plain. Underlying geology of the study area includes Hawkesbury Sandstone, a medium to coarse grained quartz sandstone with very minor shale and laminate lenses (Herbert 1983). Hawkesbury Sandstone comprises a Triassic sedimentary deposit over the older sediments of the Narrabeen Group. The study area is located in a transitional zone between the Hawkesbury Sandstone and the Wianamatta Group shales, which dominate the geology of the Cumberland Plain to the west. Ashfield Shale comprises black to dark grey shale and laminate and underlies the majority of the study area, forming the more elevated ridge crests, spurs and slopes surrounding the sandstone based drainage basin and valley surrounding Georges Creek.

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. Similar raw materials are offered by the Cranebrook and Agnes Bank formations along the Hawkesbury/Nepean River.

The majority of the study area is located atop erosional soils of the Glenorie soil landscape (Figure 4). Glenorie soils commonly occur on the undulating to rolling low hills common to the Wiannamatta Group shales. Local relief varies from 50 – 80 metres, with slope gradients generally between 5-20% on narrow ridges, hill crests and valleys. Glenorie soils consist of topography-dependent shallow to moderately deep red, brown and yellow podzolic soils, with a high erosion hazard (Chapman & Murphy 1989). Gully erosion along roads/tracks is common, as is moderate sheet erosion in overgrazed paddocks. Evidence of prior erosion is often commonplace, with eroded topsoil deposited against fencelines on the moderate slopes. The Glenorie soil landscape is generally not conducive to the survival of Aboriginal objects in situ, but archaeological potential is increased where suitable topography has remained intact and erosion rates are low.

Residual Lucas Heights soils are present along the lower reaches of the Georges Creek valley near where it exits the study area. Lucas Heights soils generally occur on the gently undulating crests and ridges on plateau surfaces, where sandstone and shale/laminites are interbedded (Chapman & Murphy 1989) but may also be present along the less-incised upper reaches of the drainage systems of the Hornsby Plateau. Soils consist of moderately deep hardsetting yellow podzolics and soloths, with yellow earths occurring on outer crest edges. Rock outcropping is absent although soils may be stony. Soils are generally stable but display moderate susceptibility to erosion. Given their location within the study area along a watercourse, these soils may also have been affected by flood episodes and associated erosion/deposition of sediments.

Landforms within the study area consist of undulating slopes and crests, with low ridgeline spurs generally tending east-west off the main ridgeline occupied by the Old Northern Road along the western study area boundary. The northern, western and southern parts of the study area are more elevated, while the relatively narrow drainage valley of Georges Creek occupies the central and south eastern parts of the study area. The drainage valley includes creekbank, narrow creekflat and moderate to steep lower slope landforms. Georges Creek is a semi-permanent watercourse which drains the eastern slopes of the main ridge crest and runs east to join Pyes Creek approximately 2 kilometres east of the study area, eventually joining the Hawkesbury River system near Berowra Waters, approximately 12 kilometres to the north east. A number of on-line dams have been constructed along the watercourse in the northern and southern parts of the study area, affecting the hydrological and drainage characteristics of the drainage valley and surrounding slopes.

Land use in the area is predominantly rural residential and semi-rural in nature, with some areas of commercial and light industrial development along the Old Northern Road and New Line Road. The more elevated parts of the study area along the ridge spurs have been cleared of the majority of original vegetation. Pasture grasses exist in paddocks and landscaped gardens and laws are present around residential buildings. Along Georges Creek, some larger regrowth trees and possible old growth trees remain along the bank margins and steeper lower slopes.

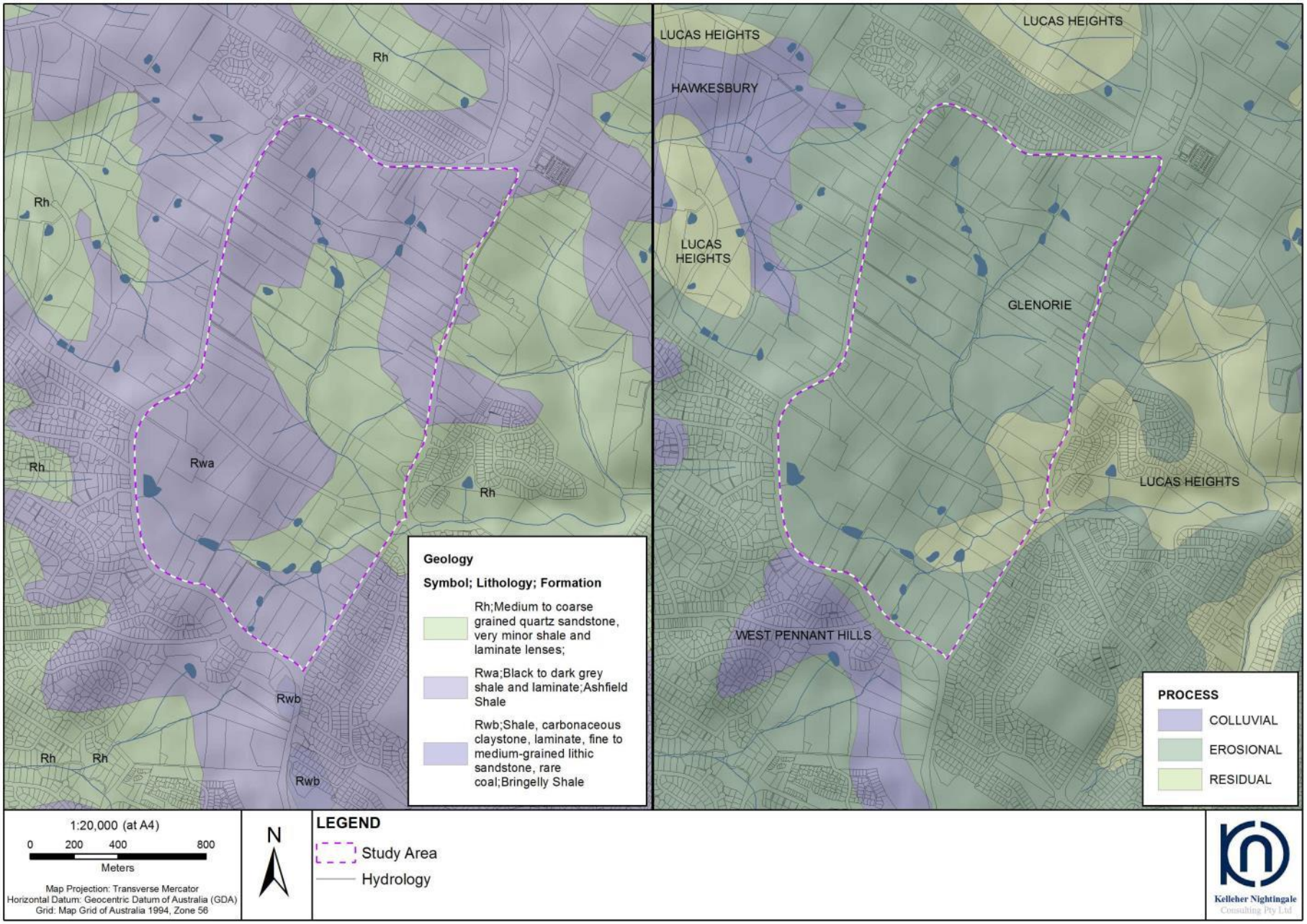

Figure 4. Geology and soil landscapes of the study area

5 Regional character and site predictions

Given that the study area is located in a transitional zone between the Cumberland Plain and the Hornsby Plateau, the archaeology of the region tends to display characteristics of both regions.

Atop the Wiannamatta shales of the Cumberland Plain, Aboriginal archaeological sites 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 Plain 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, chert and quartz in local assemblages is reflective of regional geologies, with silcrete present in the Rickabys Creek gravels, available at several locations north and west of the study area and widely distributed across the Cumberland Plain. Quartz and chert are available from the Hawkesbury sandstone to the east of the study area.

This resource rich area would have had much to offer past Aboriginal people and while survey effort in the immediate vicinity of the study area has to date been low, archaeological investigations further afield 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. Elevated locations on hilltops and ridge crests tend to display a different archaeological signature, chiefly a sparser artefact distribution and less evidence for 'everyday' or utilitarian activities, suggesting that these areas were often used differently. Where historical disturbances are minimal, these contexts have been demonstrated to retain significant archaeology. Within the closed context of rockshelter sites, art and archaeological deposit also survive where disturbance is low. Excavated rockshelter sites in the vicinity of the study area (e.g. site 45-6-1649) also demonstrate that significant archaeological deposit remains at sites where historical and environmental disturbance levels are low.

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. Rockshelter sites and grinding grooves on exposed sandstone platforms are relatively obtrusive site types which tend to be readily identifiable.

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 rolling hills associated with the Ashfield shale landscape.
- It can be expected that silcrete will be the most commonly encountered artefact raw material in open context sites, with 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 (especially along Georges Creek) and have the potential to display scars of Aboriginal origin.
- Grinding grooves may exist on any outcropping sandstone platforms along the Georges Creek valley and adjoining slopes.
- Rockshelter sites may occur beneath sandstone overhangs along the Georges Creek valley and adjoining slopes. Shelter sites may contain artefacts, art and/or PAD.
- 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 or archaeological potential can be made based on landform and other environmental factors such as erosion, flood levels. Solar aspect and distance to water.

6 Sampling strategy

The aim of the archaeological survey was to conduct a pedestrian survey of the study area to record any Aboriginal archaeological sites or areas with potential to contain Aboriginal objects. 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. The study area was arbitrarily divided into six units based on landform elements and established property boundaries (Figure 5). Properties where access was available is shown in Figure 6.

Survey Unit 1 was located in the south eastern portion of the study area and contained a number of rural properties bounded by a tributary of Georges Creek to the north, Hastings Road to the east, Old Northern Road to the south and a seniors living development to the west. The survey unit was characterised by upper slopes and crests along the southern and eastern boundaries which slope down to an unnamed tributary of Georges Creek in the north. The gentle slopes within the survey unit were divided by two drainage channels which flowed into the unnamed creek.

Survey Unit 2 was located in the western portion of the study area and contained rural residential properties and the seniors living development. The survey unit was bounded by a drainage line to the north, Georges Creek to the east and Old Northern Road and an unnamed creek to the south. The survey unit contained slope, crest and drainage depression landforms and formed part of an east-west ridge spur extending along Wayfield Road from a highpoint at the intersection with Old Northern Road.

Survey Unit 3 was situated in the north western portion of the study area and contained rural properties bounded by the Old Northern Road to the north and west, commercial/light industrial properties and Georges Creek to the east and a drainage depression to the south. The survey unit contained two ridges that were separated by a series of drainage lines which flowed from the north west towards Georges Creek.

Survey Unit 4 was located in the eastern portion of the study area and contained commercial and rural properties. The survey unit was bound by Old Northern Road to the north, New Line Road to the east and Georges Creek to the south and west. The survey unit ascended steep slopes adjacent to Georges Creek in the south and west across gentle slopes to a ridge crest on the north eastern side of the study area.

Based on the archaeological background, landscape context and regional character, it was anticipated that overall surface visibility would be low except in areas of sandstone outcropping. The presence of the Hawkesbury sandstone along the creek valley in the centre of the study area necessitated close examination for the presence of shelters with art and/or deposit, engravings and grinding grooves.

On the adjacent slopes and crests, field assessment focused on areas of surface exposures, 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. 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, topography, gradient, erosion, flood level, solar 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.

7 Field methods

The survey units were traversed by pedestrian survey in a series of transects. The survey team consisted of Matthew Kelleher (KNC), Mark Rawson (KNC) and Steve Randall (DLALC). Survey was undertaken over four days between 23-24 February 2016, 18 April 2016 and 24 April 2016.

The survey team were equipped with high resolution aerial photography and topographic maps showing the study area boundary. A non-differential GPS receiver was used for spatial recordings. All GPS recordings were made using the Geocentric Datum of Australia (GDA) coordinate system. Detailed notes on the condition of each survey unit were compiled by the survey team including an assessment of surface visibility, vegetation coverage, modern disturbance and current land use.

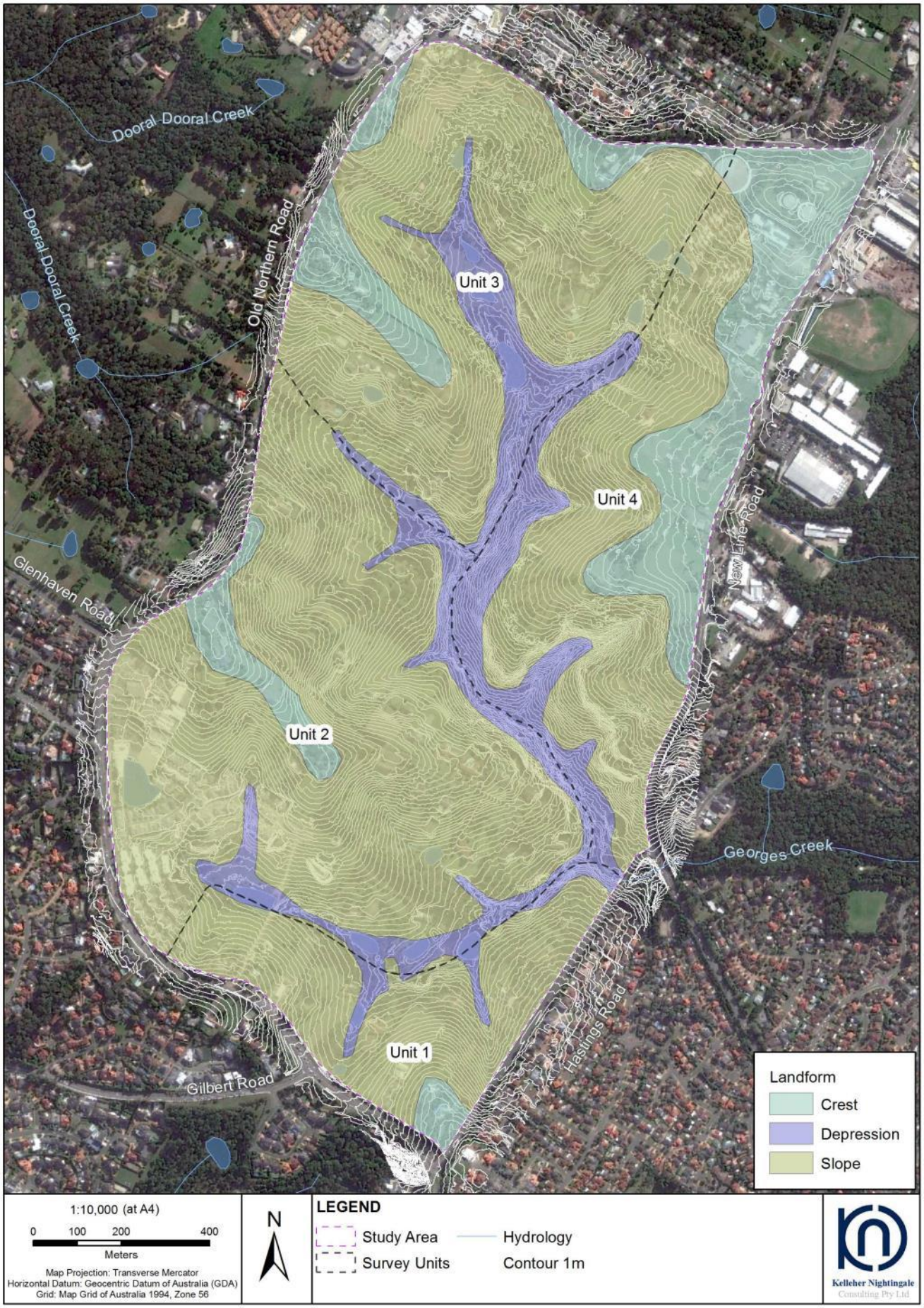

Figure 5. Survey units and landforms of the study area

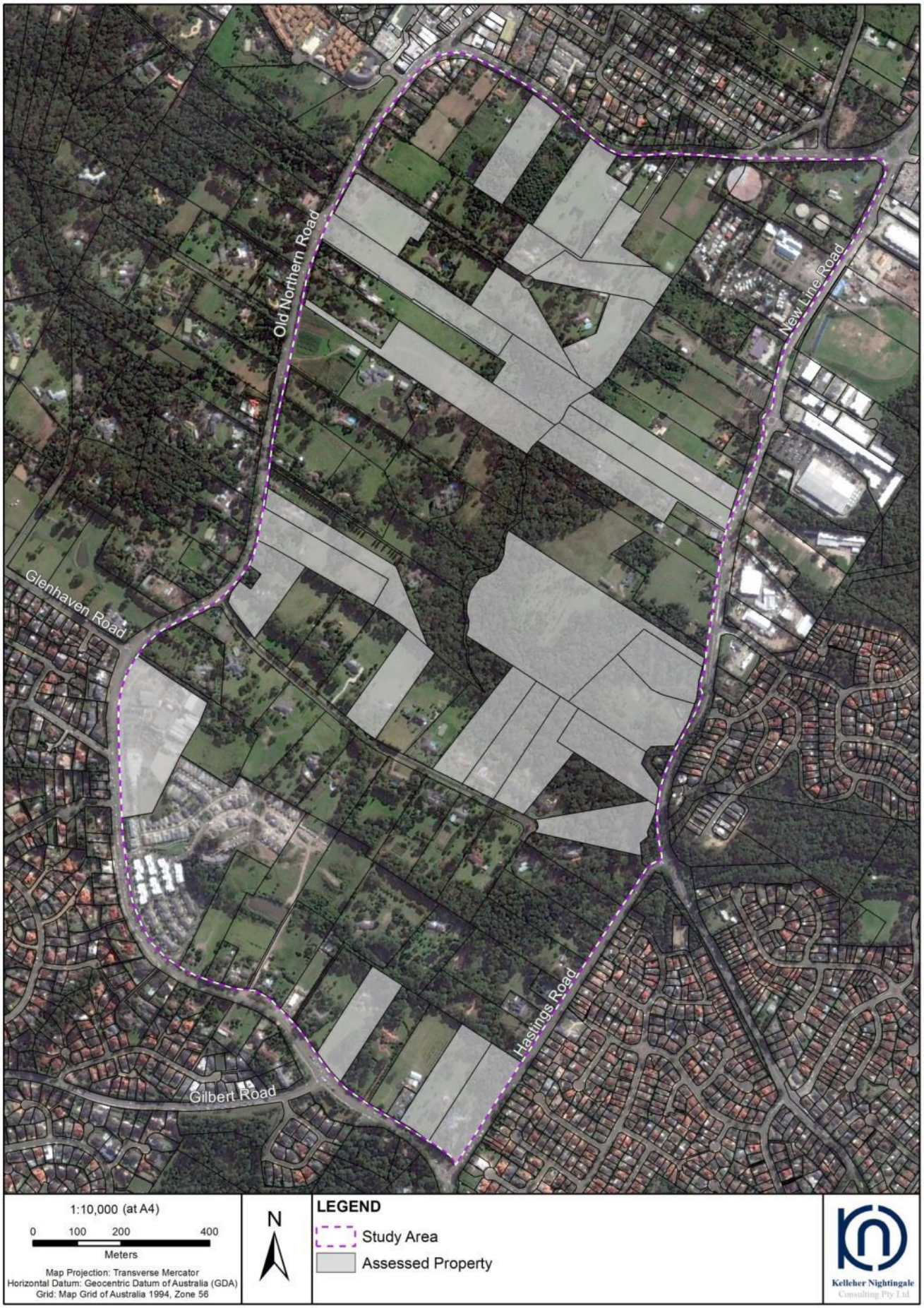

Figure 6. Properties accessed during visual inspection

8 Survey results

8.1 Field notes

8.1.1. Survey Unit 1

This survey unit sloped down from Hastings Road and Old Northern Road to the north and west towards Georges Creek. The survey unit contained low density semirural properties and a commercial structure on the corner of Hastings Road and Old Northern Road. The hill crest and slopes had been extensively disturbed by construction, driveways and landscaping (Plate 1). The crest and slopes were partially cleared with scattered regrowth eucalypts and maintained lawns.

The slope landforms within Survey Unit 1 were divided by two drainage channels which flowed into the unnamed creek on the northern boundary of the unit (Plate 2). The northern portion of the survey unit comprised lower slopes and the creek bank of an unnamed tributary of Georges Creek. Visibility in areas adjacent to the unnamed creek were low with dense vegetation and regrowth trees.

Plate 1. Survey Unit 1 view to east of landscaped garden

Plate 2. Survey Unit 1 view to north west towards junction of drainage channel and unnamed creek

8.1.2. Survey Unit 2

This survey unit was dominated by the spur crest that extended along Wayfield Road from the intersection of Old Northern Road to the eastern extent of the road. The surveyed area comprised low density semirural properties that had been partially cleared with maintained lawns and scattered regrowth eucalypts, Ironbark and Turpentine trees (Plate 3). The crest and slope landforms within the survey unit had been extensively disturbed by construction, installation utilities, driveways and landscaping (Plate 4).

Plate 3. Survey Unit 2 view to south of landscaped slope adjacent to bushland and Georges Creek

Plate 4. Survey Unit 2 view to south of disturbance from structures and landscaping

The lower slopes and banks of Georges Creek and the unnamed tributary comprised dense vegetation of exotic weeds, vines and eucalypts with areas of sandstone exposures and minor overhangs (Plate 5). The creeks contained sandstone bedding. Sandstone exposures were inspected for grinding grooves and engravings. Overhangs were inspected for art and archaeological deposit but all identified overhangs were small and unsuitable for use as shelters. Visibility was generally low on the sandstone outcropping with dense leaf litter and moss on most surfaces (Plate 6).

Plate 5. Survey Unit 2, view to north of dense vegetation towards Georges Creek

Plate 6. Survey Unit 2, view to west of sandstone bedding within Georges Creek

8.1.3. Survey Unit 3

This survey unit contained two ridges that were separated by a series of minor drainage lines which flowed from the north west towards Georges Creek. The surveyed area comprised low density semirural and commercial properties on crest and slope landforms. These areas had been extensively disturbed from landscaping, past agricultural use and the construction of structures, utilities and driveways. Visibility was generally low with dense vegetation cover comprising maintained lawns, pine trees and scattered native trees. Surface exposures including areas within vehicle tracks and beneath trees were inspected for Aboriginal artefacts; however, none were identified.

Plate 7. Survey Unit 3 view to west of cleared slope with thickly vegetated tributary of Georges Creek left

Plate 8. Survey Unit 3 view to east across cleared ridge top showing planted pines and track exposure

The lower slopes, minor creekline tributaries and banks of Georges Creek displayed variable levels of visibility with vegetation comprising tall forest eucalypts with an understorey of low grasses or dense exotic weeds (Plate 9). Sandstone exposures on the slopes and within creek beds were examined; however, they were small and often bedded at angles (Plate 10). Visibility on the sandstone exposures was limited by moss, leaf litter, and aquatic weeds.

Plate 9. Survey Unit 3 view to north of vegetation adjacent to Georges Creek

Plate 10. Survey Unit 3 sandstone exposures within Georges Creek

8.1.4. Survey Unit 4

Survey Unit 4 encompassed the western slopes and crest of the north south ridgeline that ran along the eastern boundary of the study area. The crest and slope landforms in the surveyed area comprised low density semirural properties and demolished structures with overgrown areas of dense exotic weeds (Plates 11 and 12). These areas had been extensively disturbed from landscaping, past agricultural use and the construction of structures, utilities and driveways.

Plate 11. Survey Unit 4 view to north west of cleared area with planted pines

Plate 12. Survey Unit 3 view to north of vacant property with exotic weeds and planted pines

Adjacent to Georges Creek, the slopes became steeper with dry sclerophyll forest vegetation and occasional small benched sandstone outcrops and sandstone boulders (Plate 13). Visibility was generally low due to dense leaf litter. The sandstone benches and boulders were examined; however, they were not suitable for shelter formation or rock art (Plate 14).

Plate 13. Survey Unit 4 view to north east of steep slope adjacent to Georges Creek

Plate 14. Survey Unit 3 sandstone boulders

8.2 Survey coverage analysis

Overall exposure across the survey area was low, primarily limited to vehicle tracks, erosion scours and cleared areas of high disturbance surrounding modern disturbance. Landuse practices dictated vegetation and visibility. Vegetation within areas of semirural and commercial landuse on the crest, upper and lower slope landforms generally consisted of short dense grass and scattered trees. Lower slopes, minor creeklines and areas adjacent to Georges Creek was relatively unaffected by modern landuse and vegetation varied between remnant forest or dense exotic weeds and mixed trees. Details of survey coverage and landform coverage are outlined in Tables 3 and 4.

Table 3. Survey unit coverage calculations

Survey Unit	Landform	Survey Unit area (m^2)	Exposure %	Visibility %	Effective Coverage Area (m^2)	Effective Coverage Area (%)
1	Crest	4,354	10	50	217.7	5
	Depression	9,588	15	20	287.64	3
	Slope	18,273	10	70	1279.11	7
2	Crest	4,354	15	50	326.55	7.5
	Depression	9,588	30	25	719.10	7.5
	Slope	18,273	10	70	1279.11	7
3	Crest	4,354	15	60	391.86	9
	Depression	9,588	25	30	719.10	7.5
	Slope	18,273	15	65	1781.62	9.75
4	Crest	4,354	20	60	522.48	12
	Depression	9,588	25	25	599.25	6.25
	Slope	18,273	20	70	2558.22	14

Table 4. Landform coverage calculations

Landform	Landform Area (m^2)	Area Effectively Surveyed (m^2)	Area Effectively Surveyed (%)
Crest	225,697	1458.59	33.5
Depression	290,662	2325.09	24.25
Slope	1,780,267	6898.06	37.75

Survey coverage analysis indicates that the slope landforms were the most effectively surveyed in terms of landform coverage. This is attributable to more frequent exposures and higher visibility due to disturbance and erosion. Crest landforms had comparable level of exposure and visibility due to disturbance around structures and modern landuse practices. Depression landforms were the least effectively surveyed due to vegetation and leaf litter.

Sandstone exposures were frequent, reflecting the underlying geology and topography of the study area. Survey coverage of sandstone exposures was good, generally limited only by leaf litter and encroaching vegetation at platform margins. Where sandstone was exposed in the creek, moss limited visibility. Exposures were generally readily visible despite thick surrounding bush land in some cases.

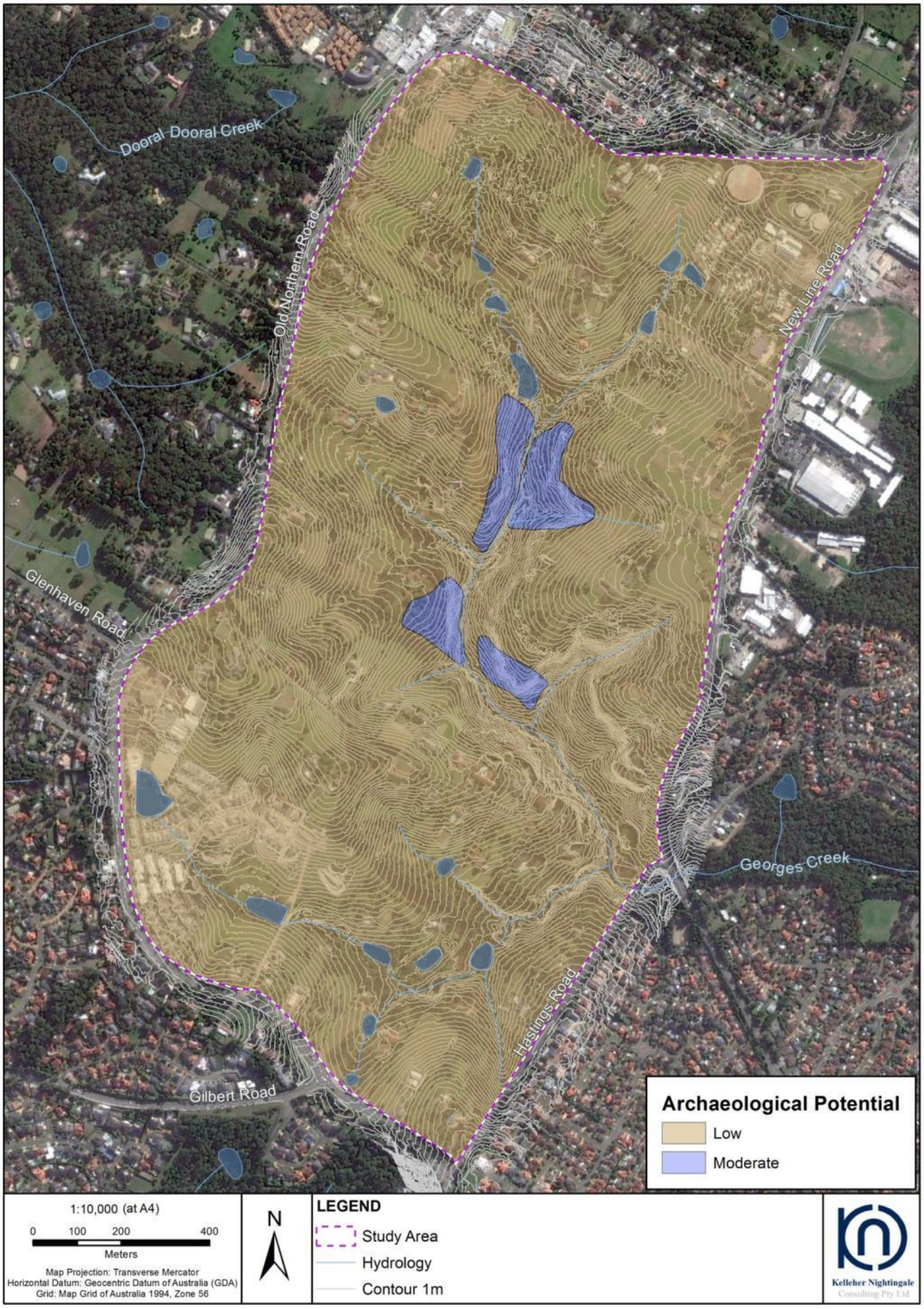

Figure 7. Assessed archaeological potential within the study area

8.3 Summary of results and discussion

No Aboriginal objects or archaeological sites were identified within the study area. No significant Aboriginal cultural features were identified within the study area by the Deerubbin Local Aboriginal Land Council (Appendix A).

An assessment of archaeological potential within the study area was conducted during the archaeological survey. The characterisation of archaeological potential was based on several factors known to influence both the location and preservation of archaeological sites within the study area. These factors included landform context, gradient, erosion, solar aspect, distance to water and integrity of the ground surface / assessment of disturbance. The study area was divided into zones of moderate and low archaeological potential. Identified areas of moderate archaeological potential are shown in Figure 7.

The sloping nature of the study area's topography strongly influenced archaeological potential as the majority of the ground exhibited gradients too steep to enable the accumulation of archaeological objects. Archaeological potential was limited to the toe slopes near Georges Creek and along sandstone exposures.

Four areas of moderate archaeological potential were identified within the study area. The presence of archaeological material in these areas was probable, but not identified during survey due to poor ground surface visibility. The survivability of archaeological sites in areas of moderate potential is dependent on landform stability, slope gradient, suitability of sandstone outcropping and various disturbance processes. Areas of moderate archaeological potential were described for parts of the study area where pedestrian survey was not possible, but based on background research were considered likely to contain Aboriginal archaeological sites.

An area of moderate archaeological potential was identified on a gently sloping spur with a north easterly aspect overlooking the confluence of Georges Creek and a minor tributary. The area of potential was located within an area of remnant forest approximately 250m north of Wayfield Road and 300m east of Old Northern Road. The location contained sandstone outcropping which may have been utilised for rock markings and a relatively stable soil deposit which may contain subsurface archaeology.

The gentle lower slope of a ridge line with an easterly aspect and on the western side of Georges Creek was also assessed as having moderate archaeological potential. The area was located within remnant native vegetation with relatively stable deposit approximately 270m south of Franlee Road and 500m east of Old Northern Road.

On the eastern side of Georges Creek, two areas of moderate archaeological potential were identified. The first area was located within an area of dry sclerophyll forest on the lower slopes and bank of Georges Creek approximately 300m west of New Line Road and 390m north west of the intersection with Sebastian Drive. The area contained steep slopes with sandstone outcropping that may contain overhangs or rock markings while the gentler slopes displayed relatively stable deposit suitable for retaining subsurface archaeology.

The second area east of Georges Creek was identified on a steep slope with a south westerly aspect overlooking a bend in the creek approximately 430m west of New Line Road and 550m north west of the intersection with Hastings Road. The area comprised dry sclerophyll forest with sandstone outcropping that may contain overhangs or rock markings.

The remainder of the study area exhibited low archaeological potential. The archaeologically sensitive landforms it contained were generally modified to the extent that they were unlikely to retain intact archaeological deposits and sandstone outcropping was unsuitable for utilisation by past Aboriginal people.

9 Impact assessment

No Aboriginal objects (artefacts) or Aboriginal archaeological sites were identified within the study area. No significant Aboriginal cultural features were identified within the study area by the Deerubbin Local Aboriginal Land Council (Appendix A).The proposed development of the South Dural study area would not impact on any *known* Aboriginal archaeological heritage objects or sites.

An assessment of archaeological potential within the study area identified four areas of moderate potential (Figure 7). The location of these areas in relation to the indicative structure plan for the proposal is shown in Figure 8 (next page). The indicative structure plan indicates that the areas of archaeological potential are located along the riparian corridor, shown as vegetated areas that the proponent has indicated are likely to be included in a conservation zone. The remainder of these areas would be developed for residential purposes and associated infrastructure including roads and services.

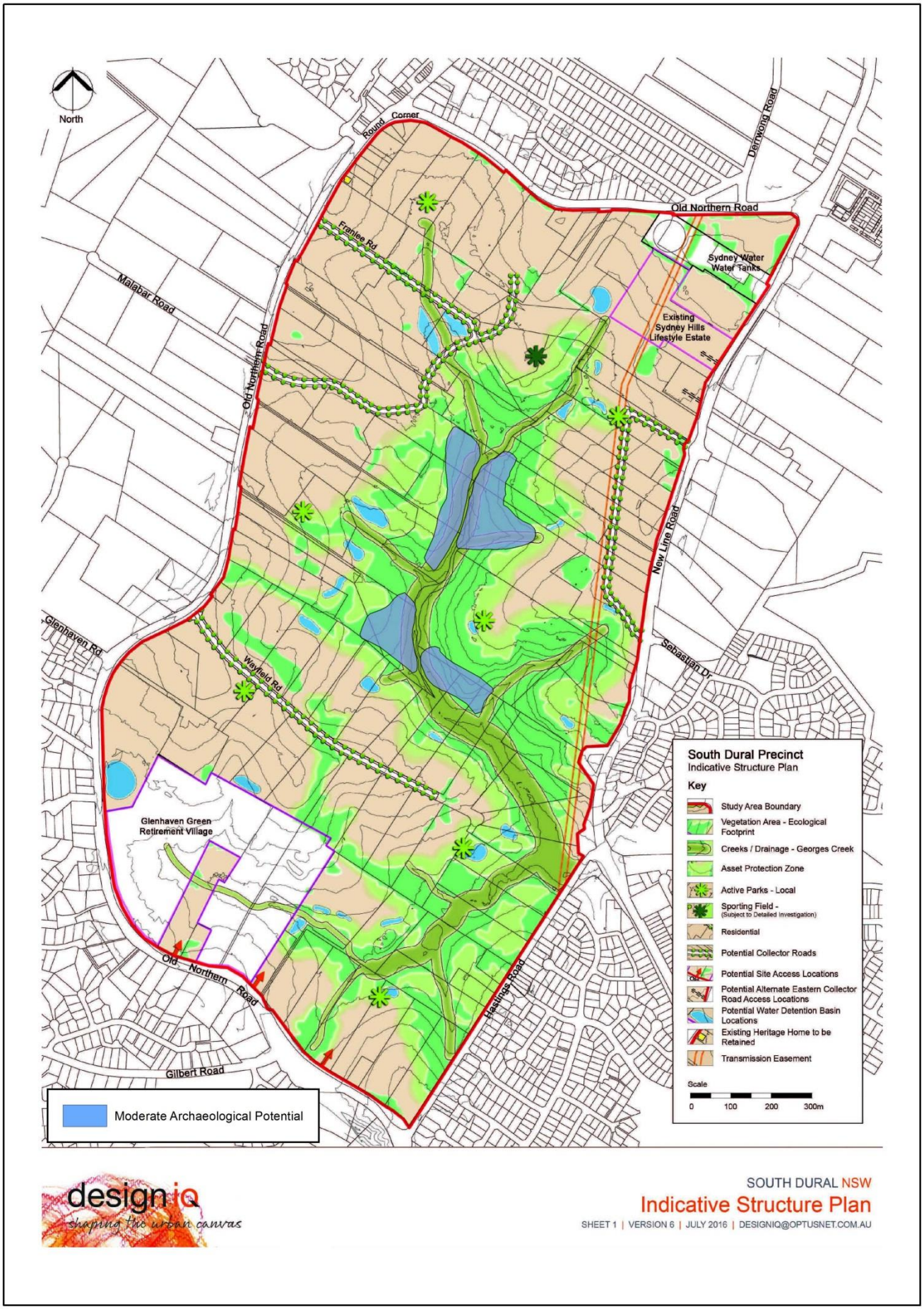

Figure 8. Indicative structure plan and areas of moderate archaeological potential

10 Significance assessment

No Aboriginal objects (artefacts) or Aboriginal archaeological sites were identified within the study area. No significant Aboriginal cultural features were identified within the study area by the Deerubbin Local Aboriginal Land Council (Appendix A).

An assessment of archaeological potential within the study area identified four areas of moderate potential.

According to the indicative structure plan, all areas of archaeological potential are located within conservation area and are not impacted by the proposed rezoning.

11 Legislative Considerations

The *National Parks and Wildlife Act 1974* is the primary statutory control dealing with Aboriginal heritage in New South Wales. Items of Aboriginal heritage (Aboriginal objects) or declared Aboriginal places are protected and regulated under the Act.

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 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)].

There are offences and penalties relating to harm to, or desecration of, an Aboriginal object or declared Aboriginal place. Harm includes to destroy, deface, damage or move. Penalties are tiered according to offences, which include:

- a person must not harm or desecrate an Aboriginal object that the person knows is an Aboriginal object;
- a person must not harm or desecrate an Aboriginal object (strict liability offence);
- a person must not harm or desecrate an Aboriginal place (strict liability offence);
- failure to notify Office of Environment and Heritage of the location of an Aboriginal object (existing offence and penalty); and
- contravention of any condition of an Aboriginal Heritage Impact Permit.

Under section 87 (1) it is a defence 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".

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, including regulations relating to consultation (section 90N).

An Aboriginal heritage impact permit (AHIP) issued under section 90 (1) of the Act is required for any activity which will harm an Aboriginal object or declared Aboriginal place.

12 Conclusions and recommendations

No Aboriginal objects (artefacts) or Aboriginal archaeological sites were identified within the study area. No significant Aboriginal cultural features were identified within the study area by the Deerubbin Local Aboriginal Land Council (Appendix A).

The sloping nature of the study area's topography strongly influenced archaeological potential as the majority of the ground exhibited gradients too steep to enable the accumulation of archaeological objects. Archaeological potential was limited to the toe slopes near Georges Creek and along sandstone exposures.

Four areas of moderate Aboriginal archaeological potential were identified bordering Georges Creek.

According to the indicative structure plan, all area of archaeological potential are located within conservation area and are not impacted by the proposed rezoning.

It is recommended that the identified areas of moderate archaeological potential and lands not physically inspected as part of the Aboriginal heritage study are subject to visual inspection if subsequent development planning indicates that they may be impacted by the proposed activity. More detailed recommendations may be formulated at that time, if required, based on the results of the inspection and the confirmation of whether they contain Aboriginal archaeological sites.

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Office of Environment and Heritage (OEH), 2010a. *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. Department of Environment, Climate Change and Water, Sydney.

OEH, 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales: Part 6 National Parks and Wildlife Act 1974.* Department of Environment, Climate Change and Water NSW, Sydney.

Appendix A Deerubbin LALC Report

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Our Ref: 2670

15 March 2016

PROTECTION OF ABORIGINAL CULTURAL HERITAGE

Proposed Developments

Properties Bounded by Old Northern Road, New Line of Road

And Wayfield Road, Dural

Attention: Mark Rawson,

A Deerubbin Local Aboriginal Land Council representative inspected accessible properties at the abovementioned location on Tuesday, 23rd and 24th February 2016. An Aboriginal cultural heritage assessment was undertaken to evaluate the likely impact the proposed development has on the cultural heritage of the land.

Although no Aboriginal cultural material (in the form of stone artefacts, for example) were found, during the walkover a number of the properties have the potential to contain subsurface Aboriginal stone artefacts. Sections of the creek that we had access to, did not reveal any grinding grooves or engravings.

Deerubbin Local Aboriginal Land Council, therefore, recommends further investigations be undertaken and also grant access to all the properties and the creek within the Old Northern Road, New line Road and Wayfield Road.

Yours Faithfully,

S Randall

Steven Randall

(Aboriginal Cultural Heritage Officer)

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

Appendix B AHIMS Search Results

Office of Environment & Heritage
NSW GOVERNMENT

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 1524
Client Service ID : 211114

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-2659	CHHP IF1	GDA	56	315950	6267240	Open site	Valid	Artefact : 1		
	Contact	Recorders	Jim Wheeler					Permits	1688	
45-6-2660	CHHP IF2	GDA	56	315860	6267120	Open site	Valid	Artefact : 1		
	Contact	Recorders	Jim Wheeler					Permits	1688	
45-6-2667	CHHP	AGD	56	315900	6267200	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Jim Wheeler					Permits	1760	
45-6-2970	CHIF1	GDA	56	316151	6267190	Open site	Valid	Artefact : 1		
	Contact	Recorders	GML Heritage Pty Ltd,Ms.Jenni Bate					Permits		
45-6-0749	Cherrybrook 5;	AGD	56	317780	6267920	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1271
	Contact	Recorders	Doctor Jo McDonald					Permits		
45-6-1768	Cherrybrook	AGD	56	317440	6266920	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	360
	Contact	Recorders	Laura-Jane Smith					Permits		
45-6-0939	Rogans Hill;	AGD	56	317696	6267446	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	ASRSYS					Permits		
45-6-0945	Rogans Hill;Glenhaven;	AGD	56	317410	6268080	Open site	Valid	Grinding Groove : -, Water Hole : -	Axe Grinding Groove,Water Hole/Well	
	Contact	Recorders	ASRSYS					Permits		
45-6-1649	Pyes Creek 1(Cherry brook)	AGD	56	317620	6267040	Closed site	Valid	Artefact : -	Shelter with Deposit	764,1039
	Contact	Recorders	Doctor Jo McDonald					Permits		

Report generated by AHIMS Web Service on 11/02/2016 for Benjamin Anderson for the following area at Datum :GDA, Zone : 56, Eastings : 315150 - 318000, Northings : 6266950 - 6270600 with a Buffer of 0 meters. Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 9

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

Page 1 of 1