MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
SSD-10410

Aboriginal Cultural Heritage Assessment

Prepared for Design Collaborative Pty Ltd
on behalf of Deerubbin Local Aboriginal Land Council

The Hills Shire Local Government Area

June 2021

Ref. 2009

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Document Information

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Executive Summary

Deerubbin Local Aboriginal Land Council ('Deerubbin LALC') is proposing to construct and operate a friable sandstone extraction industry off Wisemans Ferry Road at Maroota, NSW ('the project'). The project is located across approximately 180ha at Lot 7005 DP 1055724, Lot 202 DP 752025 and Lot 213 DP 752025 within The Hills Shire Local Government Area. The project envisions the use of some 50 hectares of the subject site for the extraction, processing and delivery of up to 500,000 tonnes of sand per annum to meet the increasing demands of the Sydney construction and building market.

The project has been designated as State Significant Development and is subject to approval under the *Environmental Planning and Assessment Act 1979*. Planning Secretary's Environmental Assessment Requirements (SEARs) for the proposal were issued by the Department of Planning, Industry and Environment (DPIE) on 18 February 2020 and included requirements for the assessment of Aboriginal cultural heritage as part of the Environmental Impact Statement (EIS).

Kelleher Nightingale Consulting Pty Ltd was engaged by Deerubbin LALC to prepare an Aboriginal cultural heritage assessment report (CHAR) for the project to assist in the preparation of the EIS by Design Collaborative. The CHAR has been prepared in accordance with the SEARs, Heritage NSW [formerly Office of Environment and Heritage] *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales, Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* and *Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW.*

Aboriginal archaeological assessment identified 24 Aboriginal archaeological sites comprising Aboriginal objects and one potential archaeological deposit (PAD) within the study area. The sites comprised 16 rock shelter sites displaying a mixture of art, artefacts and/or Potential Archaeological Deposit (PAD), four open context artefact sites (three artefact scatters and one isolated find), three grinding groove sites, and one modified (scarred) tree. Six 'potential habitation shelters' were also identified, which do not feature Aboriginal objects or constitute archaeological sites but form part of the overall Aboriginal heritage landscape. An area of PAD was also identified along the main ridge spur crest and is considered likely to contain limited subsurface archaeological deposit. Archaeological significance of the identified Aboriginal archaeological sites was defined by the information exhibited by each site. Sites displayed a mixture of low, moderate and high significance and the identified PAD was considered to display moderate potential.

The specific area to be impacted by the extractive activities is the main ridge spur which runs northwest from Wisemans Ferry Road into the centre of the study area. This would be the focus of quarrying activity. Additional impacts are expected from associated infrastructure, some cut/fill earthworks adjacent to the quarried area, and establishment of water storage including a new dam immediately west of the extraction area. The majority of the study area is not expected to be impacted by the proposed extraction and associated activities and will be retained as native bushland. Early identification and assessment of Aboriginal heritage sites and areas of archaeological potential has allowed for more informed management of impacts and avoidance of sites and archaeologically sensitive areas. In general, the extractive proposal is associated with the main ridge spur which is not a focus of Aboriginal archaeology within the study area: sites are more common on the slopes and in the creek gullies, associated with outcropping sandstone.

Deerubbin LALC is committed to industry-leading protection and preservation of Aboriginal heritage. The project represents a strong positive conservation outcome, with identified archaeological sites within the study area to be avoided by the proposal. This includes ensuring no impact to highly significant rock shelter sites within the study area. Where recorded sites are located near the project boundary, a 35 metre radius buffer zone will be applied between the site locations and the proposed impact area, to ensure complete avoidance and no inadvertent impact. Ongoing regular monitoring of the sites within the property during the lifetime of the project will ensure these remain protected and unaffected by the proposal. Following completion of the extraction operations, a portion of the landform will be reconstructed and rehabilitated, ensuring the landscape connection between sites is maintained for future generations.

Impact assessment identified that the PAD area located along the main ridge spur would be directly impacted by the proposal and is unavoidable due to the PAD's location atop the proposed extraction resource. The PAD does not contain confirmed Aboriginal objects but displays moderate potential for subsurface deposit. Appropriate mitigation for impact to the PAD would comprise an excavation program to record any associated archaeological material.

An Aboriginal heritage management policy has been developed based on the findings of the CHAR and includes procedures for unexpected heritage items such as Aboriginal objects, procedures for handling human remains, procedures for proposed changes to the Approved Project, and ongoing regular monitoring of the sites. This policy should guide the ongoing management of Aboriginal cultural heritage while the project is operational. Project approval is required from DPIE before impacting the PAD identified within the proposed impact area. Impact to Aboriginal objects/sites/PADs may only be undertaken in accordance with conditions of project approval.

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1 Introduction

1.1 Proponent and consultants

Deerubbin Local Aboriginal Land Council ('Deerubbin LALC') is proposing to construct and operate a friable sandstone extraction industry off Wisemans Ferry Road at Maroota, NSW ('the project'). The project is located across approximately 180ha at Lot 7005 DP 1055724, Lot 202 DP 752025 and Lot 213 DP 752025 within The Hills Shire Local Government Area (LGA). The project envisions the use of some 50 hectares of the subject site for the extraction, processing and delivery of up to 500,000 tonnes of sand per annum to meet the increasing demands of the Sydney construction and building market.

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1.2 Location and scope of activity

The project is located across the three parcels of land described above, which together constitute the 'study area' of this report (Figures 1 and 2). Maroota is located approximately 50 kilometres north west of the Sydney CBD and 8.3 kilometres south of Wisemans Ferry on the Hawkesbury River. Old Northern Road and Wisemans Ferry Road provide main road links from the study area to the Sydney metropolitan area.

The proposed activity is the extraction and processing of Hawkesbury and Maroota Sandstone into a fine-medium graded sand. Crushed sandstone, fine graded sand and a fine aggregate may also be produced as a by-product of the primary process. The project will involve the implementation of an extraction and rehabilitation plan simultaneously so that the study area will be suitable for other uses in the future.

The proposal includes:

- the establishment of a processing plant and associated works such as a weighbridge, machinery sheds, office etc;
- the clearing of vegetation to expose working surfaces;
- the construction of haul roads, both temporary and permanent;
- the removal and storage of overburden;
- the extraction of Hawkesbury Sandstone within approved depths and setbacks;
- the haulage and delivery of extracted material to the processing plant;
- the establishment and operation of clean water supplies to the processing plant;
- the establishment and operation of a tailings disposal system;
- the stockpiling of processed sand;
- the loading and transport of processed sand for delivery to the metropolitan area via either the Old Northern Road or Wisemans Ferry Road;
- the construction of landforms within the extracted area in accordance with an approved rehabilitation plan, using the stored overburden; and
- the importation of clean material for the construction of landforms within the extracted area in accordance with approvals and an approved rehabilitation plan, and the revegetation of the constructed landforms.

1.3 Project requirements

This CHAR addresses the Aboriginal heritage requirements identified in the project SEARs. The objectives of the CHAR combine Aboriginal community consultation with an archaeological investigation in accordance with:

- Secretary's environmental assessment requirements;
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (OEH 2010a);
- *Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011), and;
- *Aboriginal cultural heritage consultation requirements for proponents 2010* (OEH 2010b).

Aboriginal cultural heritage assessment for the project was designed to meet the SEARs. This included:

- Assessment of impacts to Aboriginal heritage (both cultural and archaeological significance);
- Consultation with Aboriginal communities to assess impacts and determine cultural significance.

Specific requirements of the SEARs relating to Aboriginal heritage and Aboriginal community consultation are outlined in Table 1 below.

Table 1. SEARs

Planning Secretary's Environmental Assessment Requirements	Where addressed in this document
Heritage – including: -an assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage;	Impact assessment (Section 10) Consultation (Section 2)

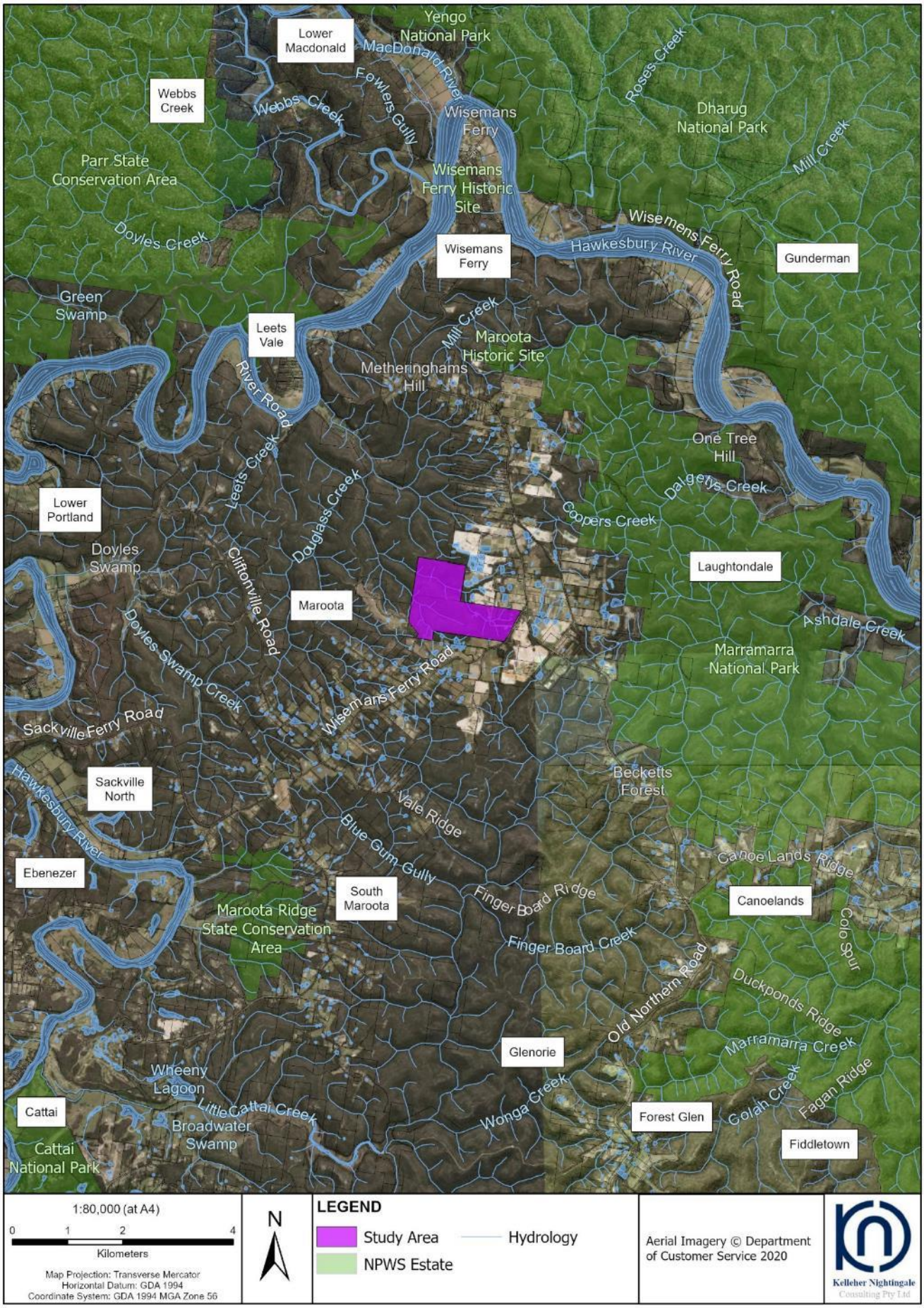

Figure 1. Location of the study area

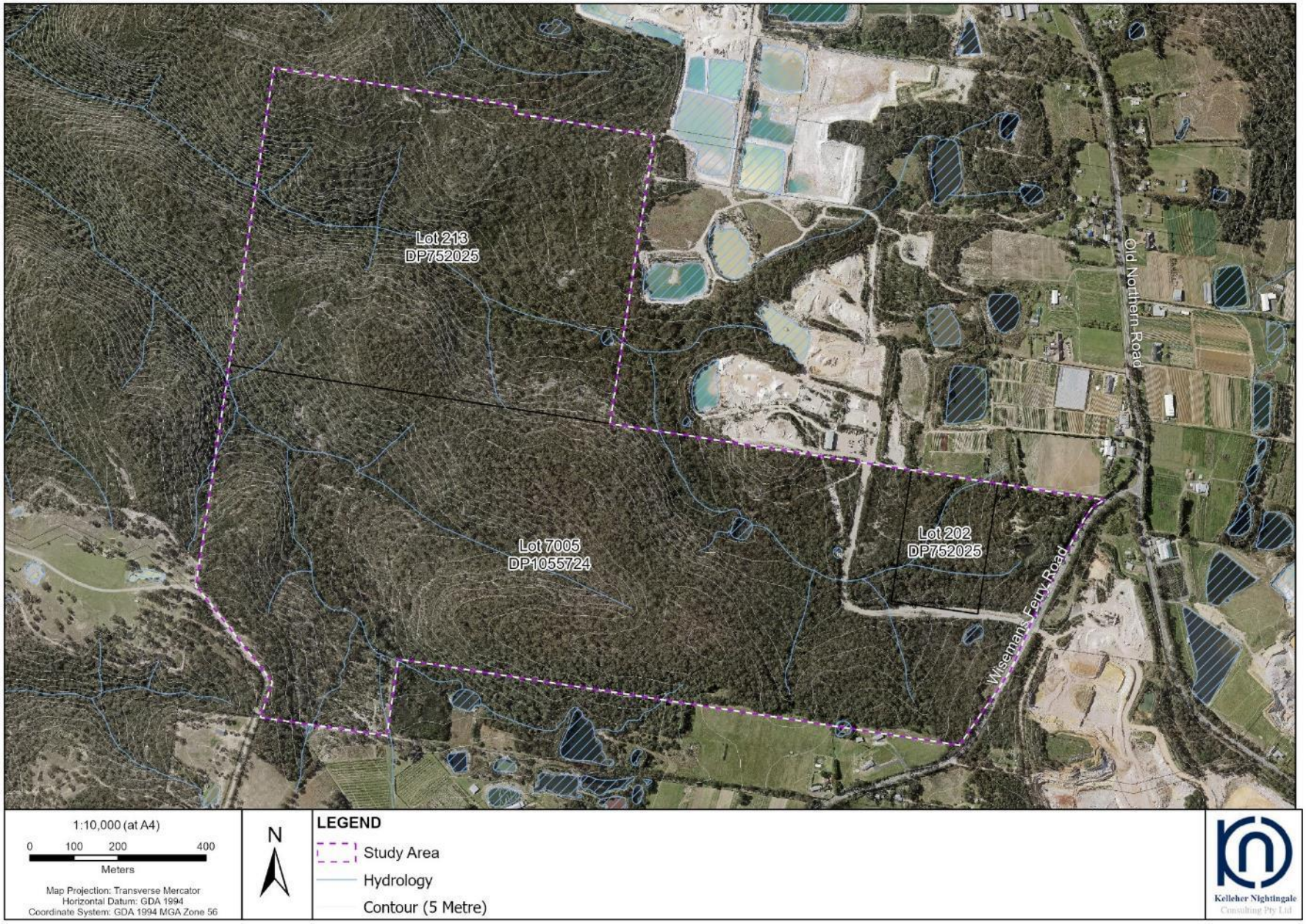

Figure 2. Detail of the study area

2 Aboriginal Community Consultation

2.1 Community consultation process

The aim of consultation is to integrate cultural and archaeological knowledge and ensure registered Aboriginal stakeholders have information to make decisions on Aboriginal cultural heritage. For the preparation of this CHAR and to inform the EIS and meet the requirements of the SEARs for the Maroota Friable Sandstone Extraction project, consultation with Aboriginal people has been undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (OEH 2010b) and the requirements of Clause 60 of the *National Parks and Wildlife Regulation 2019*. The formal consultation process has included:

- Notification of Aboriginal persons, including register of native title determinations search and government agency notification letters;
- advertising for registered stakeholders in local media *Hawkesbury Gazette* (Appendix B);
- notification of closing date for registration (16/09/2020);
- record of registration of interest (notification of Heritage NSW and LALC);
- provision of project information (28/08/2020 and 21/09/2020);
- provision of assessment methodology for review (28 day review period ending on 19/10/2020);
- invitation to advise on Aboriginal cultural value of the study area;
- provision of draft CHAR for review (28 day review period ending on 24/05/2021); and
- ongoing consultation with the local Aboriginal community including regular project updates.

2.2 Registration of interest

Aboriginal people who hold knowledge relevant to determining the cultural heritage significance of Aboriginal objects and Aboriginal places in the study area were invited to register an interest in a process of community consultation. Investigations for the current project have included consultation with 17 Aboriginal community individuals and groups as listed in Table 2.

Table 2. Registered Aboriginal Stakeholders

Group/Individual	Contact person
Muragadi Heritage Indigenous Corporation	Jesse Carroll Johnson
Barking Owl Aboriginal Corporation	Jody Kulakowski
Ginninderra Aboriginal Corporation	Krystle Carroll-Elliott
Didge Ngunawal Clan	Paul Boyd & Lilly Carroll
Goodradigbee Cultural & Heritage Aboriginal Corporation	Caine Carroll
Dharug Ngurra Aboriginal Corporation	Corina Marino
Murra Bidgee Mullangari Aboriginal Corporation	Darleen Johnson
*Registered Aboriginal Stakeholder	Registered Aboriginal Stakeholder
*Registered Aboriginal Stakeholder	Registered Aboriginal Stakeholder
A1 Indigenous Services	Carolyn Hickey
Yulay Cultural Services	Arika Jalomaki
Yurrandaali	Bo Field
Barraby Cultural Services	Lee Field
Darug Custodian Aboriginal Corporation	Justine Coplin
Wailwan Aboriginal Group	Phil Boney
Butucarbin Aboriginal Corporation	Lowanna Gibson
AHCS	Amanda DeZwart

**Two stakeholders who registered interest in the project have chosen to withhold their details in accordance with Section 4.1.5 of the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*

2.3 Consultation regarding the land and proposed activity

Following on from Stage 1 of the consultation process (stakeholder identification and registration), project-specific consultation was undertaken. Information regarding the proposed development and study area location was provided to registered Aboriginal stakeholder groups in a letter dated 28/08/2020. Information included an outline of the proposal, location of the study area and an invitation to consult during the assessment.

Stakeholders were provided with the proposed assessment methodology for the Cultural Heritage Assessment Report on 21/09/2020, and invited to review and provide feedback (review period of 28 days, closing on 19/10/2020). An invitation was extended for Aboriginal cultural knowledge holders and stakeholders to provide comments on the proposed cultural heritage assessment methodology, including any protocols regarding the gathering of information and any matters such as issues/areas of cultural significance that might affect, inform or refine the assessment methodology.

All stakeholders were provided with a copy of the draft CHAR report for review and comment. In particular, feedback regarding the Aboriginal cultural values and significance of the study area was sought, as well as input on the proposed management and mitigation measures for identified archaeological sites.

2.4 Stakeholder responses to the proposed assessment methodology for the Cultural Heritage Assessment Report

Responses to the proposed assessment methodology were received from A1 Indigenous Services (A1), Barraby Cultural Services (Barraby), Ginninderra Aboriginal Corporation (Ginninderra), Murra Bidgee Mullangari Aboriginal Corporation (MBMAC), Muragadi Heritage Indigenous Corporation (MHIC) and Yulay Cultural Services (Yulay). Responses are summarised below and attached in full in Appendix C.

A1 stated they had read and reviewed the document and supported the information and heritage assessment methodology (email dated 22/09/2020).

Barraby stated they had reviewed the proposed assessment methodology and supported it (email dated 23/09/2020).

Ginninderra stated that they found the proposed methodology consistent with their organisation's views regarding the protection and preservation of Aboriginal heritage and noted no objections (email/letter dated 08/10/2020).

MBMAC stated they had read and reviewed the proposed assessment methodology, and endorsed the assessment recommendations made (email dated 08/10/2020).

MHIC stated their agreement with the recommendations of the project methodology (email dated 13/10/2020).

Yulay stated they had read and agreed with the proposed assessment methodology (email dated 30/09/2020).

2.5 Review of draft CHAR

The draft CHAR was provided to registered Aboriginal stakeholders for review and comment. All registered Aboriginal stakeholders were provided with a 28 day period for review, ending on 24/05/2021. Stakeholders were invited to review the findings of the report and the management recommendations.

One response to the draft CHAR was received, from a stakeholder who chose to withhold their details and correspondence in accordance with Section 4.1.5. This stakeholder stated they agreed with the findings of the draft CHAR (email dated 10/05/2021).

2.6 Site visit

An unpaid site visit was organised following the CHAR review period to provide stakeholders with an opportunity to visit the study area and inspect some of the identified Aboriginal archaeological sites. The site visit was organised for Friday 28 May 2021 and was attended by representatives from KNC and registered stakeholder groups.

General discussion among attendees confirmed the importance of avoiding impact to the rockshelters and grinding groove sites, and the high cultural value of the area. It was agreed that avoidance of impacts represented a positive outcome for Aboriginal heritage.

2.7 Aboriginal cultural values

It has been identified during the consultation process that the wider local area has cultural heritage value to the Aboriginal community. Some of the Aboriginal cultural heritage values expressed by stakeholders include:

- strong association with the land
- responsibility to look after the land, including the heritage sites, plants and animals, creeks, rivers and the land itself
- highly significant engraving and ceremonial sites
- rockshelters containing art and artefactual deposit
- widespread presence of grinding grooves
- scarred trees, artefact sites and landscape features
- creek lines, especially permanent water sources and springs and larger landscape features such as the Hawkesbury River, their tributaries and their floodplains
- indigenous plants and animals
- sacred or spiritual sites in the landscape which may not have material, archaeological features associated with them
- general concern for burials, as their locations are not always known and they can be found anywhere.

Aboriginal archaeological sites within the study area form part of a wider Aboriginal heritage landscape across the edge of the Hornsby Plateau. This wider landscape holds high levels of significance. Comments on cultural heritage values received during the consultation process to date are summarised below.

Barking Owl Aboriginal Corporation expressed that the general area was an important part of Aboriginal culture due to previous generations living in and around the area. It was noted that the contemporary Aboriginal community maintained a special connection and had responsibility as the current generation (email/letter dated 30/08/2020).

Darug Custodian Aboriginal Corporation (DCAC) noted that the Maroota area was considered significant to the Darug due to the connection of sites across the landscape and evidence of continued occupation (email/letter dated 13/09/2020).

Ginninderra noted that several of their organisation's members held strong cultural ties to the area, and that locating and preserving evidence of Aboriginal occupation was very important to the group (email/letter dated 08/10/2020).

Goodradigbee Cultural and Heritage Aboriginal Corporation (GCAHAC) expressed that their organisation knew of significant cultural details in the area (email dated 01/09/2020).

One of the Registered Aboriginal Stakeholders who chose to withhold their details stated that the study area had the potential to contain evidence of Aboriginal occupation, and the cultural links this provided to their ancestors was of great value and significance (email dated 05/09/2020).

3 Landscape Context

3.1 Geology

The study area is located within the Yengo subregion of the Sydney Basin (NSW National Parks and Wildlife Service (NPWS) 2003), a large geological feature stretching from Batemans Bay in the south to Newcastle in the north and Lithgow in the west. The formation of the basin began between 250 to 300 million years ago when river deltas gradually replaced the ocean that had extended as far west as Lithgow. By the Triassic period the basin consisted of a large coastal plain, with geological deposits from this period divided into three main groups: the Narrabeen Group, Hawkesbury Sandstone and the Wianamatta Group. The Yengo subregion stretches north west from the Hornsby Plateau to the Hunter subregion south west of Singleton, and comprises a benched sandstone plateau with steep slopes dropping into narrow valleys with low clifflines. The Hawkesbury River gorge cuts through the southern part of the subregion. The study area is located south and east of the Hawkesbury River, in the south eastern corner of the subregion where it abuts the Cumberland Plain and Hornsby Plateau.

Underlying geology of the Yengo subregion comprises Triassic Hawkesbury Sandstone, with valleys generally incised to Narrabeen sandstone. Scattered volcanic necks and basalt caps occur on the plateau tops, with Quaternary sandy alluvium and high-level sands on the Mellong Range and at Maroota. Two separate geological units occur within the study area (Figure 3). The majority of the study area is underlain by the Triassic Hawkesbury Sandstone, which generally comprises a mostly medium to coarse grained lithic sandstone with minor shale and laminate lenses. This unit forms the primary extraction resource for the project. In the eastern part of the study area, more recent Tertiary deposits of the Maroota Sand Formation occur, associated with deposition along ancient river systems before the uplift of the Hornsby Plateau above the Cumberland Plain. The unit comprises an unconsolidated to partly consolidated sand with clay lenses and local gravel rich zones overlying the older sandstone bedrock. The Maroota Sand Formation occurs in discrete deposits along the main north-south running ridgeline occupied by Old Northern Road (known as Maroota Ridge). Previous geological assessment of the study area (including field drilling) has also confirmed the presence of lenses of Ashfield Shale (unmapped) (Graham Lee & Associates 2017).

Gravels occurring in the Maroota Sand Formation include raw materials suitable for stone tool-making, specifically silcrete, petrified wood, jasper, quartz, agates and chert. Chert and quartz may also have been obtained from cobble and pebble clasts in the Hawkesbury Sandstone. The Hawkesbury Sandstone is conducive to the formation of overhang and cave weathered formations suitable for human habitation (rockshelter sites). The sandstone also outcrops as benches and slabs which can provide flat or gently sloping surfaces suitable for engraving sites and grinding grooves.

3.2 Topography and hydrology

Topography of the study area is defined by a sandstone ridge spur extending north west from the property frontage on Wisemans Ferry Road. This ridge forms the focus of the proposed extraction activities and is part of a spur formation running off the main north-south line of Maroota Ridge. Shorter parallel spurs run along either side, separated by narrow drainage gullies. These gullies contain headwater creeklines which run north west. The larger northern gully has a 2nd order stream, with headwaters rising near the eastern study area boundary, next to Wisemans Ferry Road. This is fed by minor drainage lines from the north. To the south is another gully with a 1st order watercourse. Two more 1st order streams run from the southern boundary. These creeklines meet at a confluence at the end of the ridge spur approximately 830 metres from the study area. The joined creeks then reach a tributary confluence with Douglass Creek and its wider creek valley a further 1.4 kilometres downstream. Douglass Creek then flows to the Hawkesbury River, with this larger confluence approximately 3.3 kilometres from the study area.

Gully slopes are shallow and gentle near the eastern boundary, and become very steep sided to the west with increased stream incision. The eastern part of the study area is at a generally higher elevation closer to Maroota Ridge, around 200 metres Australian Height Datum (mAHD), falling to 100 mAHD at the western study area boundary within the creek gully. The ridge spur where extraction is proposed is mostly above 180 mAHD with a saddle connecting to a low crest of 175 mAHD in the southern portion of Lot 213. The spur crest is long and often level, ranging in width from approximately 50 – 150 metres. A second saddle is present on the eastern end of the spur, below an elevated knoll near the centre of Lot 7005.

Within the wider landscape, Maroota Ridge forms the catchment divide between Douglass Creek to the west and Dalgetys Creek to the east, running north towards Wisemans Ferry and the confluence between the Hawkesbury River and the Macdonald River. Surrounding landforms include elevated ridgelines and spurs dissected by creek gullies that drain to the larger creeks and eventually the river. Slopes range from gentle on the broader ridgetops to very steep in the drainage gullies, becoming precipitous along clifflines.

3.3 Soil landscapes

Soils within the study area are influenced by the underlying geology and topography and result from a variety of processes acting on parent material. Three soil landscapes occur within the study area: Sydney Town, Gymea and Maroota (McInnes 1997) (Figure 3). There is also an area mapped as 'Disturbed Terrain'.

The erosional Sydney Town soil landscape occurs across the majority of the study area and proposed extraction area, and occupies the eastern half of the property extending along the ridge crests and adjacent upper slopes. In general, Sydney Town soils occur on undulating to rolling low hills and moderately inclined slopes on Hawkesbury Sandstone extending north of the study area into the Macdonald Ranges. Elevation ranges between 100 – 200 metres, with local relief of up to 80 metres and slope gradients generally between 5-25%. Ridges and crests are moderately broad, slopes moderately inclined and drainage lines narrow. Occasional rock benches are present. Soils comprise shallow to deep well to imperfectly drained Yellow Earths, Earthy Sands and Siliceous Sands on crests and slopes, shallow to deep Siliceous Sands, leached sands and Grey Earths in poorly drained areas and along drainage lines, and moderately deep to deep Yellow Podzolics and Gleyed Podzolics where shale lenses dominate the underlying geology. Dominant materials include loose brown sandy loam topsoils and sandy clay loams as a B horizon, underlain by strongly pedal clays. Intact topsoils are generally <30cm in depth. This soil landscape displays a very high erosion hazard, localised permanent waterlogging, and extensive sheet and rill erosion where vegetation clearance has occurred.

The erosional Gymea soil landscape occurs in the western part of the study area within the steeper drainage gullies below the ridge spur crests. Gymea soils occur where elevation is <100 metres and local relief varies from 20-80 metres. Landforms include sideslopes with narrow to wide (10 - 100 metre) outcropping sandstone rock benches, often forming broken scarps of <5 metres. Commonly up to 50% of the surface may be covered by surface rock. Steep sideslopes can be subject to rock falls. Soils are generally shallow but may be moderately deep inside of benches and in drainage lines. Soil types include shallow Siliceous Sands and rudimentary Lithosols associated with rock outcrop and on leading edges of benches, deeper Earthy Sands and Yellow Earths on crests and inside benches, some Yellow and Red Podzolics on shale lenses and Siliceous Sands, leached sands and Earthy Sand along drainage lines. Materials consist of loose, coarse sandy loam topsoils and clayey sands above sandy clay B horizons. Removal of vegetation can cause severe sheet erosion and gully erosion is common along tracks and trails. Gymea soils are also highly susceptible to erosion from both concentrated and non-concentrated flows.

A small section in the eastern part of the study area along Wisemans Ferry Road sits atop the residual Maroota soil landscape, associated with the underlying elevated alluvial Tertiary sand and gravel geology of the Maroota Sand Formation along the main ridgeline. As a residual soil landscape, Maroota soils have developed in situ from weathering of the underlying parent material. The landscape is gently undulating with local relief <20 metres and overall elevation from 190-220 metres. Crests are broad and slopes are long and gently inclined. Soils comprise moderately deep to deep Yellow Earths on crests and slopes with Podzols at the heads of drainage lines, and deep Gleyed Podzolics above clay deposits. Materials comprise dark brown or grey loose quartz sands as topsoil with earthy clayey sand subsoils and occasional black earthy iron and organic pans. The sandy topsoils are particularly susceptible to erosion when disturbed and may be gravelly.

Part of the study area is also mapped as Disturbed Terrain. This unit extends south into Lot 7005 from the vicinity of the existing PF Formation quarry. Areas mapped as Disturbed Terrain are characterised as lands so disturbed by human activity that original soils have been completely disturbed, removed or lost. Isolated occurrences of this extensively disturbed terrain occur on a variety of geologies in the surrounding area, with those around Maroota primarily related to sand and gravel quarries (mostly on Hawkesbury Sandstone) and rubbish tips/landfill. Given the large scale at which Soil Landscapes are mapped and assigned, the actual position of this disturbance in the landscape is unlikely to be exact, and should be considered more as an indication that the northern part of the Lot has undergone some level of previous disturbance. The exact nature and extent of this disturbance is likely to vary depending on the activities that have taken place.

The presence and survivability of archaeological objects in the study area is closely tied to topography and soil landscape. While archaeological objects can be found anywhere, open artefact scatters and isolated finds in open landscape contexts are unlikely to have been conserved across the majority of the study area due to erosion and soil movement, particularly on the steeper side slopes where poorly developed Lithosols occur. More level areas of the ridge spur crest are more likely to retain soils with sufficient integrity to preserve subsurface deposits, but this depends on disturbance and microtopographic factors. The level ridge crests are also more likely to have been used for contemporary land use practices, which increases disturbance. Elsewhere, surface rock outcropping allows for the creation of rock engravings, while benched outcropping on gully sideslopes and resulting sandstone overhang is conducive to the formation of rockshelters. Outcropping sandstone along creekbeds may also contain grinding grooves. Artefactual deposit within the slope and gully landforms is likely to survive almost exclusively in the closed environmental context of rockshelters, where material may accumulate and remain relatively undisturbed. Modified trees may occur anywhere but given the frequent bushfires and previous clearing, will be restricted to areas of mature old growth vegetation.

3.4 Vegetation and land use

Native vegetation is also related to underlying soil types and topography. Based on broad-scale vegetation mapping (Keith and Simpson 2012), the study area is part of the Sydney Hinterland Dry Sclerophyll Forest (shrubby subformation) vegetation pattern, which occurs on sandstone ridges, slopes and gullies with infertile soils, mostly below about 600 metres elevation, where mean annual rainfall is between 650 and 950 mm. Structurally, this community forms open eucalypt forests and woodlands 10-25 metres tall with a prominent sclerophyll shrub understorey and open groundcover of sclerophyll sedges. There is a strong structural contrast between the stunted woodlands on ridges and dry slopes, and the taller forests in gorges and on sheltered slopes (Ryan et al 1996).

Both remnant and regrowth vegetation is present across the study area. More specific species listing is given for each soil landscape present within the study area (McInnes 1997). Common native species on the broad ridge crests associated with the Sydney Town soil landscape include *Eucalyptus haemastoma* (scribbly gum), *E. capitellata* (brown stringybark), *Corymbia gummifera* (red bloodwood), *Angophora costata* (smooth-barked apple) and *E. piperita* ssp. *piperita* (Sydney peppermint). Common understorey shrubs include *Grevillea* spp. (grey spider flower), *Leptospermum attenuatum* (flaky-barked tea-tree) and *Isopogon* spp. (drumsticks). On the steeper Gymea soils, typical tree species on exposed crests and slopes also include *Corymbia eximia* (yellow bloodwood), *Eucalyptus punctata* (grey gum), *A. bakeri* (narrow-leaved apple) and *E. sclerophylla* (hard-leaved scribbly gum). On protected slopes and gullies, *E. sparsifolia* (narrow-leaved stringybark) and *Syncarpia glomulifera* (turpentine) are common. *E. crebra* (narrow-leaved ironbark) and *E. beyeri* (Beyer's ironbark) are associated with shale lenses. A shrubby understorey is present which consists of shrubs from the families Epacridaceae, Myrtaceae, Fabaceae and Proteaceae. Typical species on drier slopes include *Banksia spinulosa* var. *collina* (hill banksia), *Acacia ulicifolia* (prickly moses), *A. linifolia* (flax wattle), *Grevillea buxifolia* (grey spider flower) and *Persoonia linearis* (narrow-leaf geebung). On more sheltered slopes, *Hakea dactyloides* (broad-leaved hakea), *Telopea speciosissima* (waratah), *Lambertia formosa* (mountain devil) and *Indigofera australis* (native indigo) occur. *Themeda triandra* (kangaroo grass) and *Danthonia* sp. (wallaby grass) are also common. In the eastern extent of the study area atop the residual Maroota soil landscape, additional species include *Allocasuarina torulosa* (forest oak), with common understorey species such as *Banksia serrata* (old man banksia), *Acacia* spp. (wattle) and *Pteridium esculentum* (bracken).

The study area currently comprises uncleared remnant and regrowth vegetation and is largely vegetated and undeveloped. A number of unformed access tracks cross the ridge crests and upper slopes. A larger access road is present in the eastern part of the study area, between Wisemans Ferry Road and the existing PF Formation sand quarry adjoining the northern boundary of Lot 7005. The south western corner of Lot 7005 also contains a formerly cleared, fenced area with numerous access tracks running north from the property boundary. Five water storages (both contour and online dams) are present in the eastern part of the study area. Smaller cleared areas also occur throughout the site, and the frontage along Wisemans Ferry Road is mostly cleared for a transmission easement. Areas of disturbance evident from a broadscale landscape review include some areas of possible former sand mining scattered across the property, particularly in the north east corners of both Lots 7005 and 213, which display some altered terrain. Large parts of the area have also formerly been cleared, predominantly along the central ridge, but are now covered with young regrowth woodland. Surrounding land use along the Maroota Ridge includes agriculture/horticulture, extractive industries, rural residential and bushland.

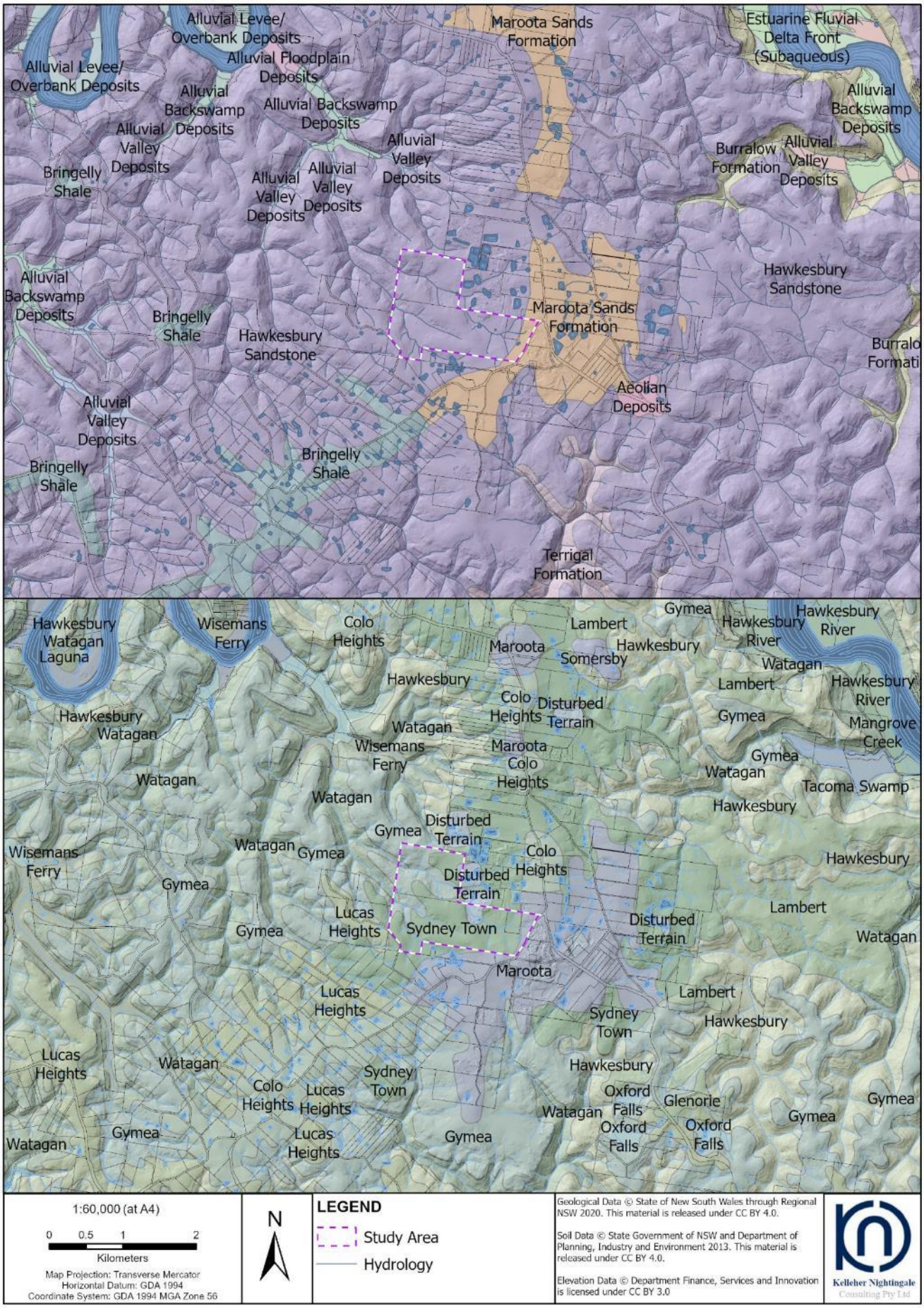

Figure 3. Geology and soil landscapes of the study area

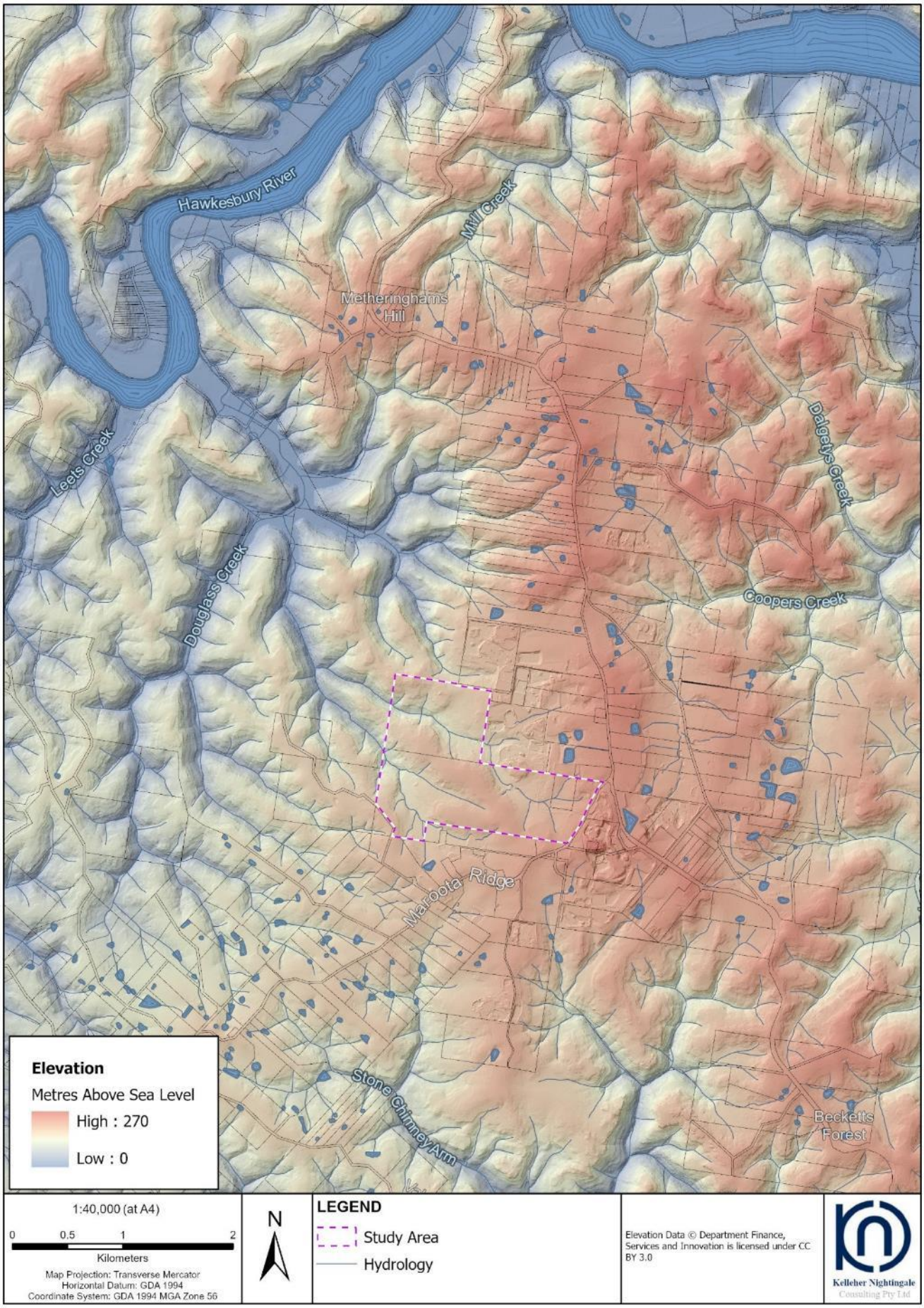

Figure 4. Topography and hydrology of the study area

4 Ethnohistoric context

Historic accounts of the Indigenous inhabitants of the region provide an insight into Aboriginal life at the time of initial European exploration and settlement. The study area lies within a landscape which was important to, and frequently used by, past Aboriginal peoples. The interactions between early British settlers and the local Aboriginal people around Sydney varied between friendly and inquisitive to outright hostility. The official British policy was to gather information about the local inhabitants of the Sydney region to determine what role they could play in the colony (Attenbrow 2002:13). The reality of the situation was the colony's expansion and establishment of farmland subsumed the traditional areas used to gather and hunt subsistence needs. After their arrival in Sydney Cove in 1788, the British set about exploring the surrounding area. In the first three years of settlement many areas of the Cumberland Plain and surrounds were explored including Broken Bay, Botany Bay, Rose Hill (Parramatta), Prospect Hill and overland to the Nepean, Hawkesbury and Georges Rivers.

Aboriginal people living in the Sydney region at the time of European arrival were distinguished by various language groups. The study area and the nearby section of the Hawkesbury River are in the vicinity of a transitional area between the suggested extent of two chief language groups: Darug (south of the Hawkesbury River, including the study area, into the Cumberland Plain) and Darkinjung (north/west of the Hawkesbury River between Wisemans Ferry and Wilberforce, and along the Macdonald River) (Attenbrow 2002). To the east were Guringai groups who lived on the plateau between Port Jackson and somewhere around Wyong, inland to Berowra Creek. Within these broad language groups were various dialects spoken across territorial ranges, and it is likely that people living in the vicinity of the current study area would have spoken or understood both Darug and Darkinjung as well as dialects of surrounding groups. People appear to have been organised into economic units of small residential groups or 'bands' who had an association with certain areas of land and spoke the same dialect of language. Most European attempts at mapping the fluid and intangible boundaries of these language groups place the study area south of the point where the Darkinjung and Darug language groups meet, potentially associated with the natural topographical boundary evident in the landscape along the Hawkesbury River (known as Deerubbin/Dyarubbin in local dialect) and Maroota Ridge. Similar ridge lines in the region formed major access routes through 'zones of intermediacy' on the periphery of larger group areas (McDonald 2008:22).

In April 1791 a British expedition was launched to determine if the Hawkesbury and Nepean Rivers were the same water body. During the expedition, members of the party made a number of observations regarding the local Aboriginal people that they encountered and travelled with that were later published. Whilst the observations made by these men must be understood within the 18th century context in which they were written, they provide valuable information on the ethnohistorical context as it existed in the 18th century for the region of the study area. The expedition encountered several Aboriginal people in the border country between the Cumberland Plain and the Hornsby Plateau and on the Hawkesbury around the area of present day Pitt Town. George Collins noted that "the dialect spoken by the natives at Sydney differs […] from that spoken by those […] on the banks of the Hawkesbury. In an excursion to the banks of the Hawkesbury, accompanied by two Sydney natives, we first discovered this difference; but our companions conversed with the river natives without any apparent difficulty, each understanding or comprehending the other" (Collins 1798[1975]:506).

Attenbrow (2002:31) notes that during this excursion, conversations took place with two groups of Aboriginal people: the first, about two hours before they reached the river, identified themselves as Buruberongal, a clan of the Darug. The second group was encountered on the river itself, and some of these people stayed on the opposite bank. Watkin Tench recorded that these individuals spoke a different dialect (potentially a Darkinjung group) but again encountered no problems communicating (Tench 1793:122). Governor Phillip's account of the same journey noted that this language appeared completely dissimilar from that they were familiar with being spoken around Sydney, but that their Aboriginal guides appeared to have some knowledge of it, and explained to the British that it was a different language than they spoke themselves. Later work by linguist RH Mathews described the Darug language extending along the Hawkesbury River from the coast, inland to Windsor, Penrith, Campbelltown and intervening towns (Mathews 1901:155), adjoined by Darkinjung to the northwest of the Hawkesbury River, with which it had close grammatical affinity.

Historical observations described the Cumberland Plain and surrounds as a mosaic of Aboriginal groups associated with particular areas of land. These groups were described as 'tribes' in many historical observations, when in fact they were more likely small territorial clans or local clans consisting of extended family groups. The groups were interconnected through marriage and large gatherings of several groups occurred for specific purposes such as communal participation in subsistence gathering activities, initiations, funerals and ritual combat (Attenbrow 2002:22, Brook and Kohen 1991:2). Interactions both within and between groups were commonplace as people moved around Country. The size of groups which came together to participate in particular events could be large, with some occasions seeing up to 300 people gathering for ceremonial activities.

Aboriginal people living inland were not as dependant on fish and shellfish as groups closer to the coast, but relied on small animals and plant foods in addition to seasonally available freshwater mullet and eels (Kohen 1986:77; Tench 1793:230). Tench (1793:230) observed that 'they depend but little on fish, as the river yields only millets and that their principal support is derived from small animals which they kill and some roots (a species of wild yam chiefly) which they dig out of the earth'. These wild yams were found in considerable quantities along the banks of the Nepean and Hawkesbury Rivers. Banksia flowers and wild honey were also recorded as foods of the local inhabitants (Collins 1798; Tench 1793:230). A particularly important plant food was the Burrawang (*Macrozamia communis*), which provided a nutritious nut that was pounded and soaked in running water to leach out toxins before the flour-like extract was made into small cakes and baked over a fire (Kohen 1993:8).

Small animals provided the main protein component of the Aboriginal diet, with hunting comprising a major economic role of the men. Along the river, traps and snares were set for bandicoots and wallabies, while decoys for snaring birds were also a commonly employed technique, "these are formed of underwood and reeds, long and narrow, shaped like a mound raised over a grave, with a small aperture at one end for the admission of the prey" (Tench 1793). Possums and gliders were hunted in a number of ways, including smoking out the animal by lighting a fire in the base of a hollow tree, burning large tracts of land and gathering the stranded animals, as well as cutting toe-holds in trees (Kohen 1993:10; Tench 1793:82). Large groups of Aboriginal people also hunted kangaroos by lighting small grass fires to flush the animals out of areas and toward awaiting hunters (Bladen 1896). The controlled used of fire was employed by Aboriginal people for a range of purposes that included hunting and the reduction of undergrowth. A commensalism between the Aboriginal people of the Sydney region and dingoes was also present during the late eighteenth and nineteenth centuries with dingoes often observed with Aboriginal people by the British (Tench 1793).

Aboriginal people living in the region during the late eighteenth and nineteenth centuries made a range of items from perishable materials including canoes, containers, nets, spears, womera, clubs and shields. Cloaks made from skins were also worn by Aboriginal people living in the mountainous areas. Ochres of red, yellow and white were used on items and as personal decoration while individual body piercings and scarification were also practiced. These materials usually are not preserved in the archaeological record, but depictions of them are common in rock art and numerous examples were collected by the British during the early years of the colony. Aboriginal people holding spears and clothed in skins were also a common feature of European landscape art, often serving to highlight the exaggerated 'wildness' of the landscape around the young colony (Plate 1). The rugged sandstone country around the lower reaches of the Hawkesbury River was particularly romanticised in early work, given its remoteness, overland inaccessibility and exoticism compared to the gentler country of the Cumberland Plain and more familiar lands around the settlements at Port Jackson and Parramatta.

Plate 1. "River Hawkesbury, near Wiseman's Ferry, N.S.W.". Conrad Martens, 1838.
Available at: http://nla.gov.au/nla.obj-13438509

As far as spiritual/religious practice, only relatively brief descriptions of beliefs, rituals and ceremonial rites were ever recorded. As Attenbrow (2002:126) notes, "the British colonists obviously understood very little about the original inhabitants' complex belief system, which was quite different to that of Europeans". The relationship between Aboriginal people, their landscape and their spiritual beliefs was poorly documented. Beginning in the 1870s, later authors such as the Rev. William Ridley, AW Howitt and RH Mathews provided more detailed observances and information on belief systems and ceremonial life but by that stage a large body of ritual knowledge may have already been lost to the devastating effects of European settlement. This information provides but a brief outline of a rich and complex spiritual life, especially considering that Aboriginal people may have chosen not to share certain aspects and information with those who were uninitiated or otherwise not in an appropriate position to receive the knowledge.

The association between ceremonial or spiritual activities and Aboriginal art was also a later point of interest. While members of the First Fleet made some limited observations of the prolific rock engraving sites around the Sydney region, it was not until later that more focused studies took place. Governor Phillip noted in a letter in 1788 that during his travels around Port Jackson, Botany Bay and Broken Bay he had seen many engravings of "men, shields, and fish roughly cut on the rocks; and on top of a mountain I saw the figure of a man in the attitude they put themselves in when they are going to dance" as well as a "large lizard". White and Tench add in their own writings that they also saw engraved figures of canoes and birds.

Later observations by GF Angas and WR Govett in the 19th century described engravings from Port Hacking to Broken Bay. Angas in particular was intrigued by the engravings and sought to discover their meaning and significance to Aboriginal people in the Sydney area. Queen Gooseberry, an Aboriginal elder living near Pittwater, was asked by Angas about the engravings around Sydney's north shore and on the Hornsby Plateau. She initially expressed reluctance to discuss their significance, maintaining that "such places were all koradjee ground, or 'priests' ground' and that she must not visit them" (Attenbrow 2002:135).

The supernatural associations Gooseberry held with the engravings made her reluctant to visit them as "too much dibble-dibble walk about" and that mystic dances and/or festivals were held at the sites, as well as fights and other dances. For this reason, the engravings were not regular sites of habitation. Attenbrow (2002:135) infers that the various rites referred to by Gooseberry were conducted by koradjee at the sites, including initiation ceremonies when other people would visit them. The local area around Maroota contains numerous rock engraving sites with various significant motifs (including the well-known 'Devils Rock') and it is possible they were used by Aboriginal people in this way. The traditional and spiritual associations of Aboriginal people with such ceremonial areas remain present in the contemporary Aboriginal community, with the art sites providing a direct physical link with the landscape and with their heritage.

The expanding settlements of the colonists led to severe changes in the Aboriginal way of life. The loss of traditional lands and access to various resources, conflict with the new arrivals and the spread of diseases such as smallpox and measles contributed to drastic population decline amongst Sydney's original inhabitants. Within two years of the arrival of the First Fleet, a second expedition Governor Phillip made to Broken Bay was met with less friendliness than the first, and the party saw evidence that smallpox had badly affected the local population, with human remains seen in rock hollows along the harbour (Attenbrow 2002).

Ongoing change led to an environment of uncertainty – previously abundant resources were either taken directly by the settlers, destroyed to make way for farms and townships, or had their traditional access cut off. Many groups and individuals moved away from their traditional areas and other people from further afield moved into the Sydney region. Conflict with settlers in areas such as the upper Hawkesbury displaced people who had been living on the land for generations. Specific mentions of Aboriginal people in the area around Maroota are few, as the river formed the primary 'highway' in the early years of the colony and the reaches between the Colo River and Wisemans Ferry were not settled as early as the areas around Wilberforce, Sackville and Windsor. Access across the plateau as opposed to along the river was sporadic until construction of the Great Northern Road, built using convict labour between 1825-1836 to link Sydney with the Hunter valley to the north.

The Great Northern Road commenced at Parramatta Road in Five Dock, through Ryde and Dural, and reached the Hawkesbury at Wisemans Ferry. The river crossing was negotiated via a ferry service run by Solomon Wiseman, for whom the village was later named, a former convict who received a land grant along the riverfront in 1817 from Governor Macquarie. The ferry service commenced in 1827 to transport provisions north to the convict work gangs building the road, and continued upon its completion to move stock and people from one side of the river to the other. The Maroota Ridge itself was not settled, with one description of the area in 1827 given as "a lofty ridge […] level all the way to the Hawkesbury, and without the interruption of a single stream of water […] At Maroota, a district so called by the Aboriginal blacks, it has been proposed to form a township, but this is evidently not the spot calculated for a town; without as much soil on their sand stone rocks as would grow a cabbage, no population could be maintained" (*The Australian,* 1827*).*

The earliest available parish map, from 1885, shows numerous land grants fronting the river, a few along the ridgetop and almost none on the intervening plateau. A 50 acre grant to William McIver to the south of the study area (Portion 92) is visible on the subsequent 1899 parish map. Records from the early 20th century show Lot 7005 marked as a water reserve (notified 9 May 1903), while Lot 213 is shown as Crown Land. Lot 202 was portioned some time after the 1917 edition but shows no indication of private ownership or land use. For the remainder of the study area, the parish map in use between 1942-1963 shows a 'sawmill site' along the ridge spur within Lot 7005, suggesting logging and vegetation clearance across the area was being undertaken after the second world war.

The region remains important to local Aboriginal people, who have maintained their traditional ties to the area through the sharing of knowledge and lore down generations, despite the devastating effects of European arrival and a complex and often painful history since white settlement. Aboriginal culture and cultural heritage are dynamic and continues to evolve in contemporary times. While the ethnohistorical and historical record may be limited in some areas, there is no denying the strong contemporary cultural associations that Aboriginal people and groups hold for the landscape, and the archaeological evidence that provides a direct physical link with Aboriginal cultural heritage. It is the aim of the consultation process to illuminate the way in which Aboriginal people relate to the area today, based on their own traditional affiliations, identities and cultural histories. The consultation process to date has identified a number of people who have indicated their interest in the local area, demonstrating the tangible link that members of the contemporary Aboriginal community retain to the land. Aboriginal cultural values identified during the consultation process enrich our understanding of the area and contribute to a more holistic understanding of Aboriginal heritage significance.

5 Archaeological Context

5.1 Database search (AHIMS)

The Aboriginal Heritage Information Management System (AHIMS) is a database operated by Heritage NSW, 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. An AHIMS search was undertaken to identify registered (known) Aboriginal sites or declared Aboriginal places within or adjacent to the study area (Client Service ID 555855). The search results are attached as Appendix A.

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

Eastings: 309400 - 315600
Northings: 6293300 - 6298900
Buffer: 0m (search coordinates included a buffer around the study area)

The AHIMS search results showed:

21	**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 5. The frequencies of site types (site context/features) within the AHIMS database search area are listed in Table 3.

Table 3. Site features and site context from AHIMS database search

Site Context	Site Feature	Number	*% Frequency*
Open	Art (Pigment or Engraved)	3	*14.3*
	Artefact	2	*9.5*
	Grinding Groove	11	*52.4*
Closed	Art (Pigment or Engraved); Artefact	1	*4.8*
	Artefact	2	*9.5*
	Artefact; Potential Archaeological Deposit (PAD)	2	*9.5*
Total		**21**	***100***

Three previously recorded sites are located within 1.5 kilometres of the study area: MQIF1 (AHIMS 45-2-2381), Maroota Trig (45-2-0081) and MR1 (45-2-2300). No previously recorded AHIMS sites were located in the study area. Two sites recorded during a previous investigation are located within the study area but were not registered on AHIMS (DM01 and DM02; see Section 5.5)

5.2 Other heritage registers and databases

A search was undertaken of the following statutory and non-statutory heritage registers for Aboriginal heritage items:

- The Hills Local Environmental Plan 2019
- State Heritage Register and State Heritage Inventory
- Section 170 Heritage and Conservation Registers
- National Heritage List
- Commonwealth Heritage List
- Australian Heritage Database
- Australian Heritage Places Inventory
- Register of the National Estate – (Non-statutory archive).

No Aboriginal heritage sites or items of Aboriginal heritage were identified on these registers within the study area. Schedule 5 of The Hills LEP 2019 lists archaeological item “A14” adjoining the north western study area boundary. This item relates to a convict-built road (Mr Sharps Track) located within the former Crown Reserve of Lot 7304 DP1144116. It is not listed for Aboriginal heritage values.

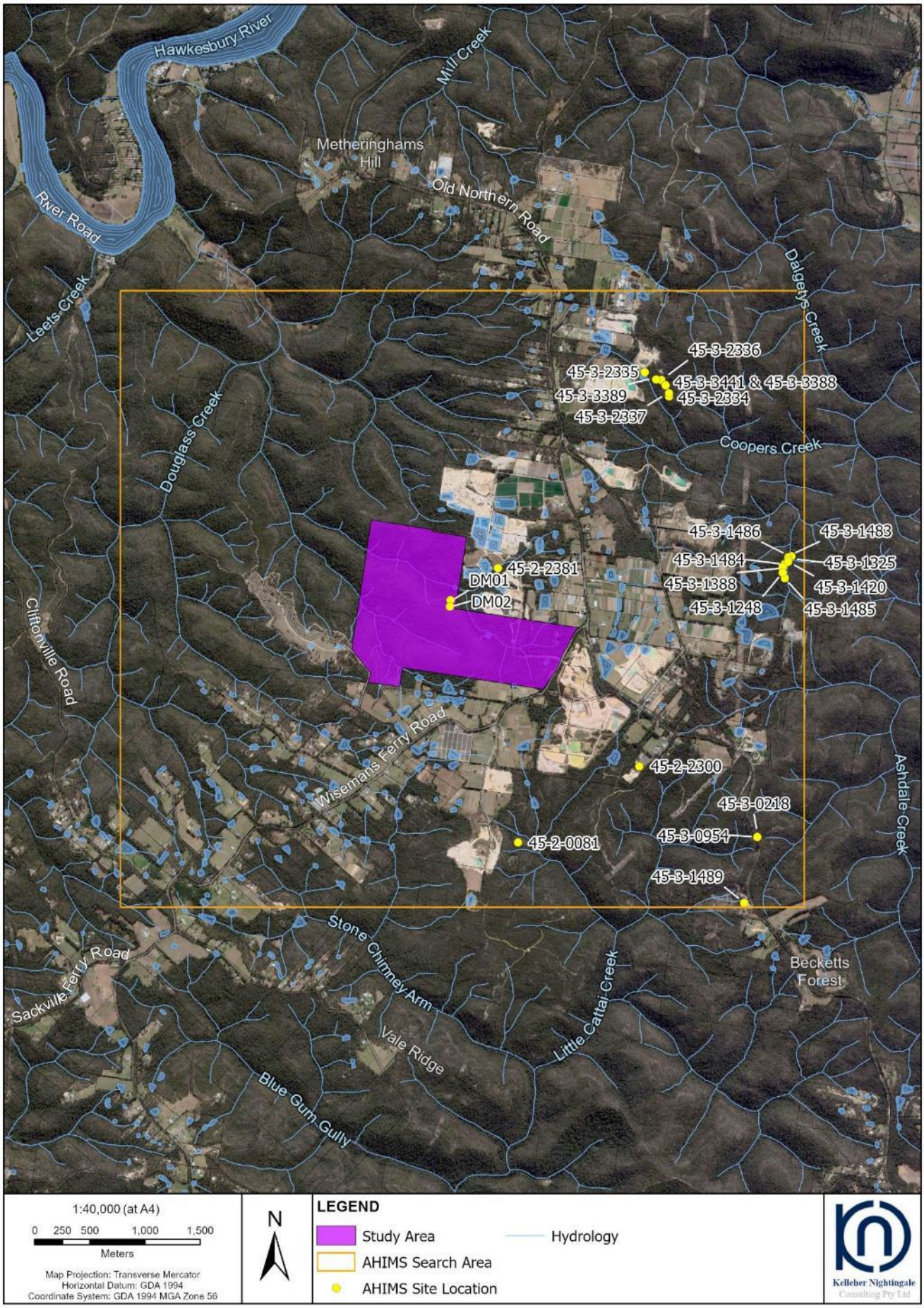

Figure 5. AHIMS extensive search results

5.3 AHIMS results and previously recorded sites

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. Given that sites are registered on the AHIMS database primarily as a result of systematic investigations or environmental assessments, the distribution of registered sites is more often a reflection of survey effort rather than the actual archaeological record in an area. 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. Both site contexts have been recorded within the AHIMS search area. The occurrence of closed context sites is linked to underlying geology and the requirement for suitable outcroppings of Hawkesbury Sandstone, making them more common on the elevated sandstone plateaux surrounding the Cumberland Plain. Suitable outcropping is also a requirement for the presence of grinding grooves and rock engraving art sites, both of which have been recorded in the area.

Based on the AHIMS search results, the most common site type recorded around the local area is grinding grooves (n=11, 52.4% of sites). Most of these have been recorded in two clusters to the northeast and east of the current study area, located on headwaters of Coopers Creek (a tributary of Dalgetys Creek on the eastern side of the main ridgeline). Outcropping sandstone in the creek beds and the presence of water made these areas suitable for shaping and sharpening stone axes. Three open context art sites have also been recorded, comprising rock engravings on exposed sandstone platforms located to the south east of the study area, along the Old Northern Road. Two of these relate to the same site, known as “Little Devils Rock”, an extensive collection of engravings on a platform above the roadway. Another well-known engraving site is located approximately 4.5 kilometres north of the current study area (outside the AHIMS search). This is the Guragalung Gayanayung Maroota Historic Site (also known as ‘Devils Rock’), a Registered Aboriginal Place under the NPW Act (gazetted 26 June 2015). This listed statement of significance states that “art features at Guragalung Gayanayung are dense, with the main rock platform comprising 85 engravings, 54 grinding grooves and two caves with art and archaeological deposits. There is also a variety of outlying sites. Notable depictions include the Creator Baiame and Daramulan. The site is of special heritage significance to the Aboriginal groups of the local area, the wider Sydney area and the state as a significant example of the living history of Aboriginal people and as a very important initiation site. The art includes the outline of the people who made these artefacts as well as depicting important cultural stories and practices. The site includes a portion of a Bora initiation ground, where ceremonies were performed”.

Five further rock shelter sites occur within the AHIMS search area. Four of these occur to the north east, along one of the same headwater tributaries of Coopers Creek as some of the grinding grooves. One other occurs approximately 1.4 kilometres south of the study area, on a headwater of Little Cattai Creek. All of these are recorded as containing archaeological material (artefacts), while two had associated Potential Archaeological Deposit (PAD) and the site to the south also contained pigment art. Open context artefact sites are relatively rare, with just two recorded within the AHIMS search area (9.5% of sites). One is listed as an open camp site (artefact scatter) and the other is an isolated find. Both were recorded within 1.5 kilometres of the current study area, with site 45-2-2381 (MQIF1) the closest previously identified site in the area, located approximately 330 metres from the eastern boundary of Lot 213 within the PF Formation site. The low frequency of open context sites is related to underlying topography/geology and erosional soils, which decrease the likelihood material will be preserved in situ. The more level areas of the ridge crests, where movement of materials may have been lesser, were also often the focus of early European settlement and land use and have a longer history of ongoing landscape disturbance.

Overall, recorded site types in the local area are typical of what may be expected based on an understanding of landscape context. The Hawkesbury Sandstone Formation provides suitable platform outcrops for the creation of grinding groove and engraving sites, while overhangs on the steeper slopes above drainage gullies provide rockshelters suitable for habitation and the creation of pigment art. Open context artefact sites (artefact scatters and isolated finds) are less frequent due to thin, erosion-prone soils, with these materials more commonly preserved within rock shelter sites.

5.4 Previous Aboriginal archaeological investigations

A number of previous archaeological investigations have been undertaken in the surrounding area, primarily as a result of extractive industry projects along the main ridgeline. Previous preliminary assessment has also been undertaken within the current study area. A summary of relevant studies is presented in this section.

Lot 3 DP 567166 and other areas

Corkill undertook a series of archaeological assessments through the late 1980s and 1990s for various proposed sand extraction projects around the current study area. These included review of background information, landscape assessment and archaeological field surveys of the proposed extraction sites. Several of the sites present on the current AHIMS search were recorded during a survey at Lot 3 DP 567166, approximately 2.1 kilometres north east of the study area (Corkill 1994). This assessment included review of existing archaeological information, landscape context, environmental resources that would likely have been available to Aboriginal people in the area, and a field survey with a representative of the Metropolitan LALC. A series of previous assessments were summarised, most of which are relevant in describing the local archaeological context around the current study area and their findings are listed below (after Corkill 1994: 7-8). A number of these surveys took place in properties directly adjoining the current study area.

Table 4. Previous surveys reported in Corkill 1994

Reference	Summary
Corkill 1989 and 1991 a, c, and d	Surveys at Maroota, adjoining the north and east of the current study area, for proposed sandmining developments (including Lots 196 and 29 DP 752025, Lots 1-2 DP 5955389 and the haul road within the current study area). No sites identified.
Corkill 1991b	Survey to west of Maroota for proposed waste disposal area. Survey undertaken with Lot 208 DP752025, and Lots 1-5 DP 869911, immediately south west of the study area). One shelter with PAD identified. Nine potential habitation shelters (no archaeology) also identified. Numerous sandstone platforms but no engravings or grinding grooves noted.
Kelly 1979	Survey of a proposed bush-rock removal lease, on Crown Land, west of current study area. No sites found.
Koettig 1989	Survey in former Maroota State Forest, south east of the current study area near the headwaters of Little Cattai Creek, for proposed waste disposal area. Around 400 hectares surveyed. 15 sites found, including shelters with art/artefacts, grinding grooves and one engraving. 90 PADs also found & many recommended for testing prior to development (development did not proceed so no shelters were tested).
Kohen 1992	Further survey of Lots 196 and 29 DP 752025 adjoining the current study area for proposed sandmining. No sites found.
McDonald 1986	A survey of the area surrounding the Maroota Historic Site/Devil's Rock Aboriginal engraving site, approximately 4.5 kilometres north of current study area. A number of engraving, grinding groove, rock shelter and other sites were found.
Ross 1979	Survey prior to proposed sandmining operations, south of current study area at Haerses Road. One rock shelter with art and artefacts found outside development area.

Large-scale AHIMS searches were also undertaken, identifying over 70 sites within five kilometres of the assessment area. These included sites originally recorded by government surveyor WD Campbell in the late 19th century, followed by early work by F McCarthy in the 20th century, the majority of which comprised rock engraving sites located along the main ridgeline. Corkill notes that there was an apparent divide in site types present on the eastern and western sides of the main ridgeline: engraving sites occurred almost exclusively on the eastern side of the ridge and were rare on the western side, with just one recorded example. Based on background information, it was considered that the most likely site types in Corkill's assessment area would be engraving sites, grinding grooves and rockshelters containing art and/or archaeological deposit. Open context artefact sites were considered unlikely given the topography and soils. Both background review and information from the field noted the extensive effects of bushfires on the vegetation across the ridgetops, noting that soils across the slopes had been destabilised and were actively eroding. Scarred trees were also considered unlikely due to bushfires and some clearing.

The field survey identified five sites within the area. One of these comprised grinding grooves located on exposed sandstone in the bed of a first order tributary of Coopers Creek. The second site comprised both engravings and grinding grooves located on a sandstone outcrop approximately 100 metres from Coopers Creek. The engravings included two animal figures formed by both pecked and abraded groove techniques. The associated grinding grooves were approximately 10 metres downhill in a shallow, rock-lined watercourse. The third site comprised a rockshelter beneath a southwest facing sandstone overhang, with a silcrete flake identified in the dripline. The second rockshelter was located about 30 metres to the south of the first, with an apparently undisturbed level sandy floor containing two basalt flakes off a groundstone tool. The third rockshelter contained no artefacts but was considered to display PAD. The survey also noted the presence of outcropping cobbles and pebbles related to the Maroota Sand Formation, including rock types suitable for use as raw materials in tool-making. All identified sites were located in designated 'exclusion zones' and would not be impacted by the proposed sandmining project, given their topographic position below the mineable ridges and within the creek gullies. It was recommended that the sites be protected and the general area avoided during the life of the development, with regular monitoring to ensure no inadvertent impacts. Protective fencing and signage were also recommended.

The area was reassessed in 2007 for a proposed expansion to the extraction area (Total Earth Care 2008). The assessment included Aboriginal community consultation, review of background information and an additional field survey. Forty previously recorded sites were identified within a 5x5 kilometre area around the property, with distribution considered typical of sites located within elevated sandstone country; namely, that grinding grooves, rock art engravings and rockshelters were the most common site type. The high proportion of grinding grooves relative to other site types was considered somewhat notable, possibly related to the use of the Maroota Ridge as a travel corridor along a potential cultural group boundary (Darug/Darkinjung/Guringai) where people and raw materials including hatchets/axes moved to other parts of the Sydney Basin. It was considered that the Old Northern Road and Wisemans Ferry Road, given their logical topography along the level ridgelines, likely mirrored earlier Aboriginal pathways.

Field survey relocated the sites previously recorded by Corkill and recorded one additional site. The shelter with PAD was confirmed to contain archaeological deposit, with two artefacts (a quartz flake and a silcrete core/hammerstone) identified on the shelter floor. A further silcrete flake was recorded in the rockshelter that previously contained the basalt artefacts. The newly identified site comprised two shallow grinding grooves located on an ephemeral creekline south east of the previously identified grinding groove/engraving site, considered to display moderate significance. The other sites were considered to display high to potentially high archaeological significance, given their association within a site complex, variety of archaeological features, and their combined research potential. Aboriginal community consultation confirmed the sites displayed high cultural significance. It was recommended that all sites be avoided and protected from impact with 40 metre buffers to be instituted as well as regular monitoring during the life of the project.

Little Devil's Rock

Jo McDonald prepared a management plan for the engraving site at Little Devils Rock ahead of proposed widening of Old Northern Road, approximately 2.3 kilometres south east of the current study area (McDonald 1997). The report included a detailed review of previous recordings at the site and assessments of significance. Review of landscape context identified that the engravings were located on an undulating platform of exposed Hawkesbury Sandstone atop the main ridgeline forming the watershed between the Hawkesbury River (to the west) and Berowra Creek (to the east). It was noted that the area around the site had been previously disturbed by road construction (including the convict-built Great North Road in the 1830s and the present alignment of Old Northern Road) and some infrastructure including a telecommunications cable. Disturbance to the platform itself included an engraved European surveyor's mark and historic graffiti.

Little Devil's Rock is well-known and has been subject to numerous recordings, including early efforts by government surveyor RH Mathews in 1898 and F McCarthy in the 1950s. The surrounding area was considered to display a relatively high density of previously recorded Aboriginal sites, including the main Devils Rock complex (Guragalung Gayanayung Maroota Historic Site) to the north and a significant rockshelter site at Canoelands to the south east. Given the low level of archaeological survey off the main ridge, it was considered likely that many more unrecorded sites existed in the landscape. The Little Devils Rock site itself comprises a group of engraved figures on a rock platform above the road. The main grouping includes a Baiame 'culture hero' figure measuring almost three metres in length, three smaller anthropomorphs (all with internal body decoration), two anthropomorphs in profile (one female, the other ungendered), a bird, fish and several boomerang-like motifs. A second rock platform to the west contains two further figures comprising a snake and a circular motif.

Field survey undertaken with a representative from the (then) Daruk LALC confirmed that the engravings were generally in good condition. McDonald agreed with previous significance assessment of the site, which considered it to display high significance from both an archaeological and a cultural perspective. Recommendations included moving the road alignment further to the east to ensure a distance of at least 1.7 metres from the rock platform, and protection from inadvertent damage during construction.

Lots 1 & 2 DP 732708

Dominic Steele Consulting Archaeology (DSCA) undertook an archaeological assessment for both Aboriginal and non-Aboriginal heritage ahead of proposed sand extraction approximately one kilometre east of the current study area (DSCA 2014). The Aboriginal heritage component of the assessment included analysis of archaeological context, a review of landscape context and previous land use/disturbance, and a field survey accompanied by a representative from the Metropolitan LALC.

Landscape review identified the occurrence of both the Hawkesbury Sandstone and the Maroota Sands Formation in the vicinity of the assessment area, noting that "a number of stone raw materials commonly exploited by Aboriginal people in the past for the manufacture of flaked stone artefacts [are] associated with the Maroota Sands. These include silcrete, silicified wood, quartz, chert and occasional jasper, along with a range of metamorphic rocks which were used by people for the creation of edge-ground implements such as axe/hatchet heads that were manufactured and maintained (sharpened) in the surrounding sandstone country which have left behind the recorded axe grinding grooves". Within the Hawkesbury Sandstone, rock overhangs with occupation deposit and/or art, rock engravings and axe grinding grooves dominated the archaeological record. No previously recorded sites were identified within or in close proximity to the assessment area. Predicted site types based on a review of landscape factors and local archaeological context included rock engraving sites, axe grinding grooves and open context artefact scatters or isolated finds on the level ridge top.

Landscape assessment and review of previous land use identified that the property had been subject to disturbance due to long use as a citrus orchard. Widespread disturbance from past agricultural landuse included house building and farm improvement purposes, grading and levelling for the creation of a perimeter vehicle/trotting track, and adjacent excavation, as well as ongoing long-term horticulture. Field survey confirmed that no suitable sandstone outcrops for rockshelters, engravings or grinding grooves occurred on the site, and no Aboriginal objects (artefacts) were identified. The potential for any subsurface archaeological deposit was assessed as low due to the extent of land use disturbance across the property. It was considered that the proposal was unlikely to impact on any Aboriginal archaeological material and no further assessment was recommended.

Lots 1 & 2 DP 547255

Archaeological & Heritage Management Solutions (AHMS) completed an Aboriginal cultural heritage assessment for proposed sand extraction at Lots 1 & 2 DP 547255, Old Northern Road, approximately 500 metres north east of the current study area (AHMS 2013). The area was previously assessed by Corkill & Edgar (1998) and required an updated assessment to comply with the requirements of the Department of Planning. The assessment included a review of the environmental, archaeological and Aboriginal historic context for the subject area and surrounding region. A field survey was also undertaken of the subject area, accompanied by a representative from Deerubbin LALC.

Review of the environmental context identified that Aboriginal site types and distribution in the area were influenced by landscape factors including topography and soils. Within the identified soil landscapes (Sydney Town and Colo Heights), sites were considered most likely to occur in association with outcropping benches of the underlying Hawkesbury Sandstone. The low fertility and productivity of identified soil landscapes was considered to have had certain consequences for Aboriginal land use, particularly that "foraging returns would have been relatively low, particularly when compared to the river lands of the Hawkesbury system" (AHMS 2013:7), the inference being that "a significant portion of Aboriginal land use would have been directed at travelling through the area, between places of higher resource use, for trade [of raw materials from the Maroota Sands Formation], and to and from significant ritual sites such as are likely to be represented by rock art site complexes such as 'Maroota Historic Site' ". It was also suggested that the Maroota Ridge may have formed part of a landscape 'boundary' between the Darug of the Cumberland Plain and the Guringai of the coastal sandstone plateau from Sydney to the Central Coast, as well as the Darkinjung to the north west.

Previously recorded sites in the area were dominated by those occurring on open sandstone platforms, including rock engravings and grinding grooves. Rockshelter sites were also common, mostly containing pigment art and/or artefactual deposit. Less frequent site types included two scarred trees and three stone arrangements. Taken together, sites associated with outcropping sandstone accounted for 93% of all sites in a 10x10 kilometre AHIMS search area. Site distribution showed a clustered, high density pattern in large areas of sandstone exposure, particularly where this coincided with relatively close fresh water, either in a creekline or in sandstone potholes.

The closest previously recorded site to the assessment area was MQIF1 (Maroota Quarry Find 1; AHIMS 45-2-2381), which is also the closest known site to the current study area. The site was recorded by Navin Officer in 2004 and comprised an isolated find of a chert distal flake fragment. The artefact was located in a disturbed context adjacent to a modified 1st order drainage gully/artificial drain at the edge of existing quarry operations. Landform comprised gentle lower slope with a small area of flat ground. The surrounding area had been previously cleared and disturbed, with some (low) potential for further artefacts.

Within the proposed extraction area, review of historical aerial photography indicated that the area had been partially cleared and was cultivated as fruit orchards by the 1950s, which also involved construction of dams and other drainage modifications within the landscape. By the mid 1980s the majority of the area had been disturbed by these activities, which were considered likely to have removed any once present surface artefact sites. The only area of apparent sandstone exposure was removed by previous quarrying. The subsequent field survey concentrated on those areas that had been identified as not having been heavily disturbed through former land uses including orcharding and sandstone extraction. No archaeological sites, Aboriginal objects or areas of Aboriginal archaeological potential were identified during the survey.

Haerses Road Quarry

Aboriginal archaeological and cultural heritage assessment has also been undertaken to the south of the current study area, at the Haerses Road Quarry which operates upon the Tertiary Maroota Sands. Umwelt (2017) undertook an Aboriginal heritage assessment for a proposed modification to the existing approval area, to allow for the extraction of friable Hawkesbury Sandstone to the west of the original extraction area. The assessment included review of environmental, ethnohistorical/cultural and archaeological context, a field survey, and Aboriginal community consultation in accordance with the OEH 2010 requirements.

Environmental assessment identified that the landforms present within the area included the upper slopes of a ridge spur descending south from the Maroota Ridge, with first order tributaries of Stone Chimney Arm flowing to the west. Given the mostly gentle gradients of the ridge slopes, sandstone overhangs suitable for shelters were considered unlikely. Soil landscapes were comparable to those present within the current study area and predominantly erosional. Extensive disturbance to the immediate east of the proposed modification area was present from quarrying, but the remainder of the area was vegetated with the occasional unformed track. It was considered that the area was likely to have been previously cleared, but that sufficient time had elapsed to allow for significant regrowth.

Review of archaeological context and previous investigations identified that the most common site types in the vicinity were open context engraving sites, grinding grooves, and rockshelters containing any combination of art, artefacts and PAD. It was noted that previous work by Corkill indicated that engraving sites were rare on the western side of the main ridgeline, despite the occurrence of apparently suitable sandstone platform outcrops, instead being substituted by rockshelters with pigment art (Umwelt 2017:24). Review of other surveys and assessments in the local area identified this as a relatively common finding. Despite the density of vegetation in some of the 'undeveloped' areas, large portions of this was in fact regrowth following previous clearing of the ridge crests and upper slopes and/or bushfires. Previous studies also commonly located overhangs of a size suitable for human use which did not contain archaeological material or PAD, but were considered likely to have been used for shelter on a casual basis and considered as potential habitation shelters. These were not recorded as Aboriginal archaeological sites.

The review also summarised a previous survey undertaken on Old Northern Road for proposed sand mining, approximately one kilometre south east of the current study area (Edgar 1995). The assessed area contained some existing agricultural areas, orchards, gentle upper slopes with regrowth vegetation and one area of steeper slopes. Ground surface visibility was generally good due to ploughing and agricultural disturbance. Three open context sites were recorded during the survey, comprising one open artefact scatter (site MR1; AHIMS 45-2-2300) and two isolated finds (not registered on the AHIMS database, as was the practice at the time). MR1 comprised a low density surface scatter of three mudstone flakes, a silcrete flaked piece and a fine-grained siliceous (FGS) flake on a large cleared area. The isolated finds both comprised mudstone flakes. All three sites were described as occurring in disturbed contexts, which limited their archaeological significance despite the rarity of this site type in the local area.

AHIMS site 45-2-0081 (Maroota Trig) was recorded during an earlier assessment of the Haerses Road quarry area, located on the boundary with the then State Forest (Ross 1979). The site comprises a rockshelter with pigment art and deposit (artefacts). Art motifs included eight white ochre hand stencils in two groups, charcoal line drawings, a boomerang and a figure interpreted as a man in a canoe. Stone artefacts were recorded on the shelter floor. A second rockshelter site was reported by local informants, but the location of this was not identified. Other sandstone platforms and outcrops in the undisturbed portion of the property were inspected but no archaeological sites were identified.

Field survey for the Umwelt assessment was undertaken with registered Aboriginal stakeholder representatives including Deerubbin LALC. No Aboriginal artefacts or archaeological sites were identified. Outcrops of sandstone on the slope landforms were inspected for engravings or grinding grooves, but these were found to be highly weathered and no sites were identified. No overhangs/shelters were recorded. Soils were sandy and skeletal and no areas of PAD were identified. The area was considered to have low archaeological potential due to unfavourable landforms for camping, lack of permanent water and no suitable occupation shelters. Open context artefact sites were considered likely to be of low density, reflecting casual transitory resource-gathering on the ridgetop during travel rather than focused or sustained camping/occupation, but none were identified. Management recommendations included ensuring employees and contractors were aware of obligations relating to the protection of Aboriginal heritage and a procedure for unexpected Aboriginal archaeological finds during the works, with no further assessment recommended.

5.5 Preliminary assessment within the current study area

Mary Dallas Consulting Archaeologists (MDCA) undertook a preliminary archaeological assessment of the current study area in 2011 to identify known and potential items and areas of Aboriginal heritage constraints within the subject lands and outline required further investigations which may need to be undertaken in relation to any future development. As a preliminary study, the assessment included background documentary research, a short field inspection and consultation with Deerubbin LALC.

Background research included an AHIMS search which identified that no previously recorded sites were present within the study area. The three closest sites were the same as those identified during the current study. Previous archaeological investigations and their findings were reviewed, including the assessment by Corkill (1991a) which surveyed a proposed 800 metre haul road running through the south east portion of the current study area. No Aboriginal archaeological sites were identified and the area was assessed as displaying low archaeological potential. An area of outcropping sandstone adjacent to the proposed route was recommended for avoidance. The road has subsequently been constructed and now provides access through Lot 7005 to the PF Formation quarry in Lot 198 DP 752025 adjacent to the northern study area boundary. The results of previous assessments indicated that archaeological site distribution within the study area would most likely be concentrated along creeklines (grinding grooves) and in rockshelters, where these occurred. The potential for modified trees was low, given the extent and frequency of bushfires. The possibility for isolated artefacts and low density surface scatters was thought to be high, with potential areas of PAD along the level crests and saddles of the main ridgelines. The potential for rock engraving sites was considered to be low, due to the relative rarity of this site type on the western side of the main Maroota Ridge.

A field inspection was undertaken of a portion of the study area with a Deerubbin LALC representative, covering the majority of the main ridge spur crest, a section of adjoining slope, and the north eastern corner of Lot 213. General observations noted that the majority of timber within the area was regrowth eucalypts and no trees of sufficient age or size to bear cultural modifications were identified. There was evidence of the frequent and intense bushfire activity within the area over the preceding 5-10 years. Despite the presence of sizable outcropping sandstone platforms of good quality, no engraving sites were identified, consistent with the previously-noted lack of this site type on the western side of the ridge. Natural depressions/rock pools likely to contain water were also present on the platforms but no grinding grooves were recorded in association with these, as is common elsewhere in the local area. Along the creeks, visibility was low due to thick vegetation and no sites were identified. On the level ridge crest, sandy topsoils of some apparent depth were observed across the level portions of the landform, and no outcropping sandstone was recorded, this being present instead off the crest on the upper slopes.

Two new Aboriginal archaeological sites were recorded during the preliminary field survey. DM01 comprised a rockshelter with art recorded on the northern slopes of the main ridge spur. Art comprised four figures in red ochre with line infill and some charcoal drawings, arranged in two separate panels at the eastern and western ends of the seven metre long shelter. The shelter had a bedrock floor and no associated archaeological deposit. A second smaller shelter with PAD was located under the same overhang, immediately to the west. The second recorded site, DM02, was an open context artefact scatter located to the south of and above DM01. A low density scatter of one quartz flake and two tuff flaked pieces was identified on a large sandstone outcrop on the upper ridge spur slope. It was considered likely that the study area contained more sites within the non-surveyed areas, including grinding grooves, additional shelters with art, artefacts and/or PAD, low density open context artefact sites on the ridgelines and potentially engravings. It was recommended that DM01 be avoided by any future development. Overall, it was considered that the study area was unlikely to have been used for intensive habitation and more likely functioned as part of a travel corridor along the ridgelines, although the presence of archaeological sites indicated that evidence of Aboriginal landscape use did survive in the area.

A general assessment of archaeological sensitivity was made, with areas of high sensitivity identified on areas of exposed sandstone outcrop and around the two recorded sites and moderate sensitivity along the ridge crests and creek gullies. Further assessment was recommended including a full field survey, particularly along the creeklines where the potential for grinding grooves was considered to be high, and of overhangs below the ridge crests which could contain shelter sites. It was identified that any future development would require the formulation of management recommendations for the identified sites and a full impact assessment (including direct and indirect impacts). The current CHAR assessment fulfills these recommendations.

6 Regional character

Review of background archaeological information indicates that large parts of the region have not been subject to previous archaeological investigation and the number of recorded sites in the area west of the main ridgeline is low, more likely as a reflection of previous survey effort and not as a result of Aboriginal land use patterns. Where sites have been recorded, these tend to occur in high density clusters associated with creeklines and areas of outcropping sandstone. A diversity of site types is evident, ranging from grinding grooves and extensive and significant engravings on sandstone platforms, to numerous shelters with art, artefacts and/or PAD and scattered open context artefact sites that have survived on the more level ground of the ridge crests.

The range of site types and successful identification of archaeology indicates that material traces of Aboriginal landscape use do survive in the region across a range of landforms, and are variably affected by disturbance factors including erosion/colluviation and historic and contemporary European land use practices. Elevated landforms containing suitable platform outcroppings of Hawkesbury Sandstone on the main ridgeline commonly contain engravings and/or grinding grooves. Grinding grooves are also common on exposed sandstone along creekbeds and drainage gullies. Shelter sites occur below suitable overhangs and are concentrated on the sideslopes of the drainage gullies. These commonly contain pigment art, stone artefacts and/or PAD on the shelter floors. 'Potential habitation shelters' have also been described, meaning those that are of a suitable size and environmental context for human use, but do not contain any identified archaeological material or PAD. These are not Aboriginal archaeological sites but they were almost certainly used by Aboriginal people and form part of the wider cultural landscape. Open context artefact scatter sites tend to occur on the more elevated, stable and level areas on the ridge and spur crests. Isolated artefacts resulting from accidental loss or deliberate discard while moving through the landscape may occur anywhere.

A review of the environmental context of the study area determined that the soil types around the study area have variable capacity to conserve Aboriginal objects in situ. Soils on the flatter crest landforms are typically deeper and have been subject to less erosion and colluvial movement as is common on the sideslopes. Soils are generally sandy and shallow and may be stony and subject to destabilisation and movement following vegetation clearance. On steeper gradient slopes, soil movement is common and subsurface deposit is unlikely to be preserved in situ, particularly in rocky areas where poorly developed Lithosols occur. The valley side slopes are also affected by colluvial movement and soil transfer accelerated by European vegetation clearance and increased water runoff. In these contexts, Aboriginal objects are unlikely to survive in buried deposits outside of protected, closed context rockshelter sites. The frequency and intensity of bushfires in the area has been noted by several previous assessments, increasing soil movement in affected areas and reducing the likelihood of culturally modified trees. Mature trees of a suitable size and age to bear cultural markings/scars are more likely to occur in sheltered gullies where the effects of bushfires and vegetation clearance are lesser. The broader crest of the main Maroota Ridge is more disturbed by land use practices, as these areas have been the focus for agriculture and transport following European settlement. Archaeological potential and integrity will depend on the extent of disturbance.

6.1 Site predictions

Based on information from previous archaeological investigations, landscape context and regional character, site predictions for the study area include the following:

- Archaeological sites are likely to consist of grinding grooves on exposed sandstone in association with water sources (creeks or rock pools) and rockshelter sites
- Shelters may contain art, artefacts or PAD where sufficient deposit has built up on the shelter floor. Potential habitation shelters may also occur. These are not archaeological features but are likely to have been used by Aboriginal people as they travelled through the landscape.
- Engraving sites may occur on suitable sandstone exposures but are not expected to be common given their rarity on the western ridge slopes.
- Mature trees of a suitable size and age to bear cultural markings/scars are more likely to occur in sheltered gullies where the effects of bushfires and vegetation clearance are lesser. Culturally modified trees are likely to be rare.
- Open context artefact scatters and isolated finds may occur anywhere but are more likely on the level, stable areas of the ridge crest and/or saddles. Higher levels of landscape disturbance which increase ground surface exposure increase the likelihood of identifying these sites. Areas of open context PAD may occur in similar landscape contexts where the area has been subject to low levels of disturbance.
- A wide range of raw materials may be expected given the presence of the Maroota Sand Formation, including silcrete, petrified wood, jasper, quartz, agates and chert. Chert and quartz may also have been obtained from cobble and pebble clasts in the Hawkesbury Sandstone.
- The identification of surface artefacts is likely to be affected by differential visibility of the ground surface, but successful assessment of areas of potential archaeological deposit can be made based on landform and other environmental factors such as disturbance and distance to water.

7 Aboriginal archaeological survey

7.1 Sampling strategy and field methods

The aim of the archaeological survey was to conduct a comprehensive field inspection of the study area and to record any Aboriginal archaeological sites or areas with potential to contain Aboriginal objects. The survey focused on the area of the main ridge spur where extraction is proposed, and the adjoining slopes and creek gullies. It was intended to provide a full coverage survey of the potential impact area to ensure appropriate management recommendations could be made, with the adjoining areas of the property also assessed in order to identify and characterise any Aboriginal archaeological sites with regards to their nature and significance. An additional aim of the survey was to relocate previously recorded sites DM01 and DM02.

The study area was inspected across ten days between September 2020 and February 2021 by KNC Senior Archaeologist Mark Rawson and Deerubbin LALC Aboriginal Cultural Heritage Officers Steve Randall and Kayne Moreton. Based on the archaeological background and landform context of the study area, the survey closely inspected any areas of outcropping sandstone for engravings or grinding grooves and checked overhangs for potential shelter sites. A desktop study of satellite imagery was first undertaken to look for large open sandstone platforms, and other outcrops that may conceal rockshelters, that could be targeted during fieldwork. Areas of ground surface exposure were inspected for artefacts, evidence of intact soils and subsurface archaeological potential and any mature trees for evidence of Aboriginal bark removal. Survey was conducted on foot, with existing access tracks used to facilitate movement on and around the main ridge spur.

The survey team were equipped with high resolution aerial photography and topographic maps showing the study area and proposed extraction area. A non-differential GPS receiver was used for spatial recordings. All GPS recordings were made using the Geocentric Datum of Australia (GDA) coordinate system (GDA 94, Zone 56). The study area was assessed as a single survey unit divided into its component landforms (Figure 6). A single survey unit was considered appropriate given the clearly known extent of the proposed impact area and study area boundaries across variable terrain. Detailed notes on the condition of the study area were compiled by the survey team including an assessment of surface visibility, vegetation coverage, modern disturbance and current land use.

7.2 Field notes

Vegetation on ridges and upper gully slopes is generally Sydney Hinterland Dry Sclerophyll Forest. Common dominant tree species included Sydney Red Gum /smooth-barked Apple (*Angophora costata*), Grey Gum (*Eucalyptus punctata*), and Red Bloodwood (*Corymbia gummifera*). There is wet sclerophyll vegetation along some creek lines, especially nearer the western boundary where gullies are deeper. The gully slopes were often covered in thick scrub including Hakeas, Banksias, Persoonias, and creeping plants and vines, sometimes forming thickets which limited visibility and survey coverage. Sandstone on gully slopes included small benches, large open platforms, cliff lines, overhangs, and boulders. Sandstone is also exposed along creek beds. Open rock platforms and benches displayed potential for engraved art, grinding grooves, or even stone arrangements. These can occur anywhere in the study area from ridges to gully side slopes and were closely inspected. Cliff lines and large boulders have potential to contain weathered overhangs used as occupation shelters, or shelters with art. Creek beds with sandstone have potential for axe grinding grooves.

Access into the study area was mostly via a single 4wd track. This runs west from Wisemans Ferry Road, crossing heads of minor creeks, and follows the main ridge spur in the centre of the study area. A 4wd vehicle was used to get to vantage points along the main ridge spur, and then gullies were surveyed on foot. The main ridge spur is long and often level, and includes two saddle areas. Sandstone outcrops were not seen on the ridge crest. This is covered by open forest vegetation, with native grassy understorey, making it good for access and detection of outcrops. Ground surface visibility was limited to along the 3 metre wide vehicle track. Gully side slopes off this ridge have sandstone outcrops, which were inspected for rock overhangs. This included clifflines, boulders, and under open platforms. Open rock platforms were inspected for rock engravings, stone arrangements, and stone artefacts. Creek beds were inspected for axe grinding grooves. Mature and dead old trees were also inspected for modification scars.

A constraint to effective survey coverage was the steepness of terrain in deeper creek gullies, and lack of visibility due to thick scrub, especially on side slopes of the main 2nd order creek gully. This featured dense thickets of young Banksia and Hakea, and vines such as Devils Twine (*Cassytha* sp.) and Sarsaparilla (*Smilax glyciphylla*). Along creekbeds were often thickets of wet sclerophyll species such as large King ferns (*Todea barbara*), Umbrella ferns (*Sticherus* sp.), coachwoods (*Ceratopetalum apetalum*) and fallen branches. At the eastern end of the study area, west of a bend in the PF Formation haul road, headwaters of the 2nd order creek run through a deep natural sand body. Vegetation is tall open forest with Sydney Red Gum/ smooth-barked Apple (*Angophora costata*) and Grey Gum (*Eucalyptus punctata*), with ground cover of Bracken Fern (*Pteridium esculentum*) and Lomandra. Here the creek had sandy banks with no bedrock in the creekbed.

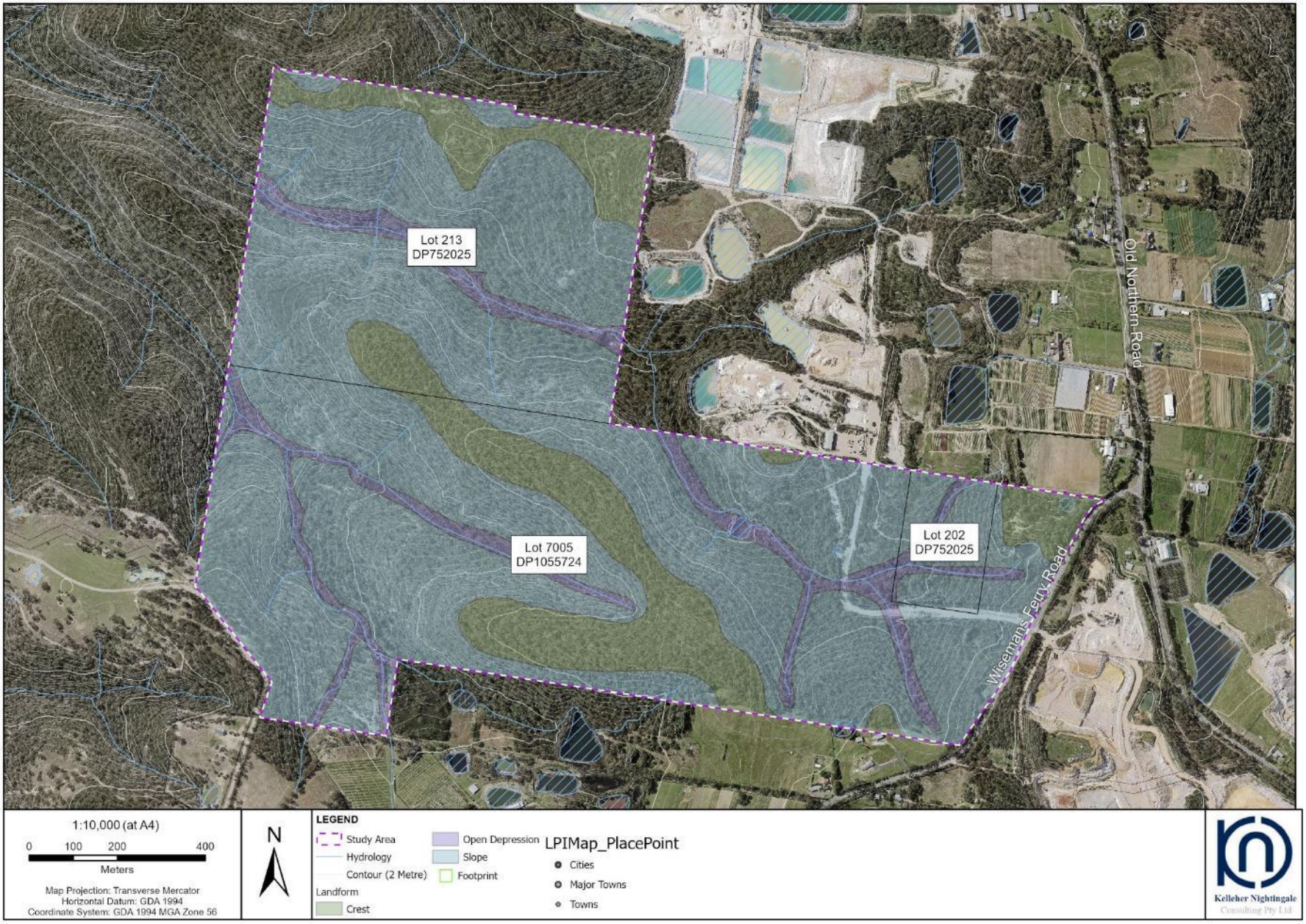

Figure 6. Survey area and landforms

Plate 2. View to west. Main ridge 4wd access track (Lot 213). The ridge crest is often level, and covered in open forest, with no large rock outcrops noted

Plate 3. View to west. Northern side of main ridge, top of 2nd order creek gully (Lot 213).

Plate 4. View to north-east. Open sandstone platforms on mid gully slopes, southern side of 2nd order creek. (Lot 213).

Plate 5. View to east. Mid gully slope sandstone outcrop (Lot 213).

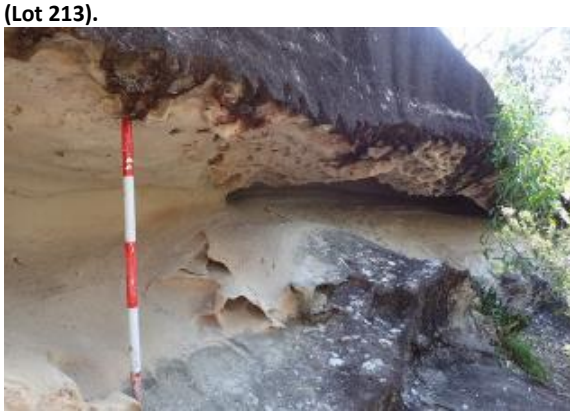

Plate 6. View to west. Overhang formed under large open platform. Mid slopes of 2nd order creek gully. (Lot 213).

Plate 7. View to west. Small overhang on lower gully slopes (Lot 7005).

Plate 8. View to north. Lower gully slopes of 2nd order creek with dense forest (Lot 7005).

Plate 9. View to east. Lower gully slopes of 2nd order creek. Thick regrowth limited visibility and access. (Lot 7005).

The survey commenced via the 4wd track along the main ridgeline in the centre of the study area. Pedestrian survey proceeded north to inspect the 2nd order creek gully. Targeted were open sandstone platforms seen on aerial imagery, and any outcrops with overhangs. On the ridge vegetation is regrowth forest. In the gully of the 2nd order creek, lower slopes had almost impenetrable scrub of young regrowth.

The upper part of the 2nd order creek which runs through the middle of the study area was closely inspected to look for any grinding grooves or possible overhangs. This section of creekline was found to flow through a deep natural sand body, with flats on either side. Vegetation is tall forest of Grey Gum and Sydney Red Gum some of which has been previously logged. Ground cover included Blechnum ferns (*Blechnum indicum*) and Bracken ferns (*Pteridium esculentum*) especially near to the creek. The creek has incised a deep channel through the sand. No sandstone was seen outcropping on this upper part of the creek. Ground surface visibility was limited by ferns, leaf litter, and fallen trees. Older trees were inspected for possible scars. Only a few small exposures were found at sandy entrances to animal burrows. Further downstream the creek runs to a large dam indicating previous land use disturbance.

Survey was undertaken on the northern side of the creek, opposite the dam, to inspect a large dome shaped sandstone outcrop seen on aerial imagery. It was inspected for possible rock engravings or overhangs, but none were found. Survey then continued up slope to the north, to inspect sandstone outcrops. The northern study area boundary was reached, on upper gully slopes just below the PF Formation quarry.

Plate 10. View to south-west. West of PF Formation haul road. Flats adjacent to headwaters of 2nd order creek (Lot 7005).

Plate 11. View to north-west, flats adjacent to 2nd order creek (Lot 7005). Visibility reduced by Bracken ferns and leaf litter. No sandstone in creek bed.

Plate 12. View to west. Large dam on 2nd order creek, encircled by earthen banks (Lot 7005).

Plate 13. View to south, northern side of 2nd order creek. Large sandstone outcrop opposite dam. This was inspected for engravings or overhangs (Lot 7005).

Further survey of the 2nd order creek, downstream of the large dam, searched for sandstone overhangs or platforms. There were some more creek flats, and a patch of paperbarks and fire blackened eucalypts, with Lomandras and Bracken ferns. Gully slopes on the south side of the creek were surveyed up to previously recorded shelter site DM01, and then further to the west as far as two large open sandstone platforms seen on aerial imagery. These were closely inspected for grinding grooves or engravings but none were identified.

Survey proceeded to the south of the main ridge, to inspect a smaller 1st order creek gully. This is within Lot 7005 DP1055724.Some small open platforms had been seen here on aerial imagery. Survey started at the head of the creek and gully, and proceeded west along the creek bed looking for possible grinding grooves, and on side slopes looking for rock overhangs or open platforms. Sandstone outcrops were smaller here than the wider and deeper 2nd order creek gully to the north. There was a lack of overhang development here. No grinding grooves were found on these upper sections of the creek. The south western part of Lot 7005 was found to have suffered some disturbance from former tree clearing, construction of tracks and fencing. All exposures were checked for Aboriginal objects

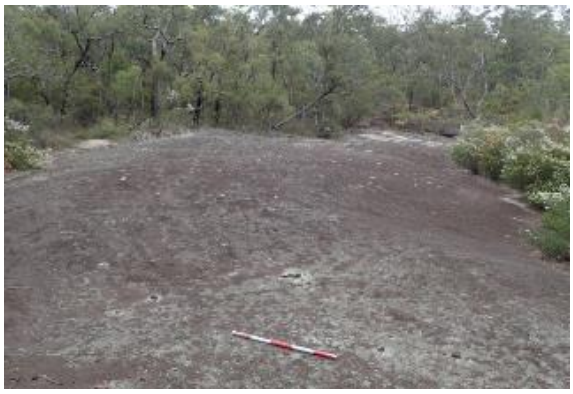

Plate 14. View to west. Large open platform west of DM01, south side of 2nd order creek gully. (Lot 213).

Plate 15. View to north-east. Same open platform. (Lot 213) South side of 2nd order creek.

Plate 16. View to north-west. Upper section of 1st order creek gully, to south of main ridge. The creekbed was inspected for possible grinding grooves, and gully slopes for overhangs. (Lot 7005).

Plate 17. View to east. Outcrops on side slopes of this 1st order creek gully were limited in size, with few overhangs (Lot 7005).

Survey also inspected the north-east corner of the study area, east of the PF Formation haul road. Open sandstone platforms had been seen on aerial imagery here. The land includes eastern portions of Lot 7005, and the smaller Lot 202. Lot 202 includes a small headwater drainage depression which runs south from the northern boundary. Vegetation is regrowth eucalypt forest with Lomandra ground cover. The north east corner of the study area, in Lot 7005, is bounded by an orchard. Previous disturbance was found, including two farm dams and vehicle access tracks. Ground surface visibility was limited to these tracks. No large sandstone outcrops were found, only occasional small sandstone boulders.

Survey proceeded back to the haul road, to inspect the sandstone platforms seen on aerial imagery in Lot 7005. These are well hidden by dense native shrubs. Some good level open platforms occur here, with surfaces suitable for rock engravings, but no engravings were found. There was evidence of previous disturbance in the form of old heavy machinery tracks on some platforms. A few tiny overhangs were seen along the western edges of one platform but none were large enough for shelter, and no art was seen.

Plate 18. View to east. Minor drainage gully in Lot 202. Soils were gravelly and sandy. No large sandstone outcrops were found here.

Plate 19. View to north-east. North east corner of Lot 7005. This area has been previously disturbed, possibly former sand mined. There were disused vehicle tracks, and two excavated dams. No sandstone outcrops were found.

Plate 20. View to north. North east portion of Lot 7005. East of haul road. This area had thick scrub concealing small open sandstone platforms

Plate 21. View to west. North east portion of Lot 7005. East of haul road. Larger open sandstone platforms were hidden by thick scrub. No rock engravings were found

Plate 22. View to west. Open sandstone platform, western end of main ridge (Lot 213).

Plate 23. View to north-east. Top of the 2nd order creek gully, north of main ridge. To left slopes drop down sharply to the creek below. (Lot 213).

Survey proceeded back to the south, to the main ridge spur, to inspect two large open platforms seen on aerial imagery. Access was via the main 4wd track on the central ridge. The vehicle was taken to the western end of the ridge, to where the track becomes overgrown. The open platforms are mostly level. While rock surfaces appeared suitable for engravings, none were found. There are views from here out to the Blue Mountains. Survey then continued to the north-east, to continue inspection of the 2nd order creek gully which is deep and incised. A series of narrow sandstone benches occur on upper gully slopes, then slopes drop sharply into the gully below. Mid slopes include a series of clifflines and bench outcrops.

Survey proceeded down into the gully, to inspect the 2nd order creek bed for grinding grooves. Large sandstone boulders occur on steep side slopes. At the creek, visibility became poor due to large ferns and coachwoods. Level sandstone was found in the creek bed here, with a few small waterfalls, and circular rock pools. Access and visibility were hampered by overhanging vegetation, fallen trees, leaf litter, and pooled water.

Plate 24. View to east. Typical sandstone outcrops on mid slopes. Gully of 2nd order creek. (Lot 213).

Plate 25. View to north-east. Sandstone boulders were found on steep mid slopes. (Lot 213).

Plate 26. View to east. Level sandstone in creek bed. Bedrock was inspected for axe grinding grooves. Visibility was limited by leaf litter, overhanging vegetation, and water flow. (Lot 213).

Plate 27. View to west. This section of creek had unusual erosional features in the sandstone, including hollows, worn through rock pools, and a natural bridge (Lot 213).

7.3 Survey coverage

Overall ground surface visibility across the study area was low, primarily limited to vehicle tracks, small erosion scours and areas of existing disturbance along the haul road, Wisemans Ferry Road frontage and south western corner of Lot 7005. Thick vegetation limited ground surface visibility for the majority of the study area. Low ground surface exposure and low visibility was an impediment to the identification of open context artefact scatters or isolated finds, but these site types were considered less likely to occur given the archaeological context of the study area. For this reason, the low ground surface exposure is not considered a particular limitation to the survey coverage. Table 5 below provides an estimate of exposure and visibility of open context artefact sites for the identified landforms within the survey area.

Table 5. Survey coverage analysis - open context artefact sites

Landform	Area	Exposure %	Visibility %	Effective survey coverage (m^2)	Effective survey coverage (%)
Crest	298, 300	3	50	4,474.5	1.5
Slope	1,322,900	2	40	10,583.2	0.8
Open Depression	155,660	1	40	622.6	0.4

Based on the obtrusive context of known sites in the local area and those considered most likely based on the site predictions, particular attention was paid to areas of outcropping sandstone. These occurred as platforms on some of the lesser crest landforms (no outcropping sandstone was identified on the main ridge spur), as benches and boulders on the slopes, and exposed within the creek beds of the drainage gullies. These were closely inspected for rock engravings and grinding grooves, while overhangs and shelters were inspected for the presence of art and archaeological deposit. Survey coverage of the sandstone platform outcrops was good, generally limited only by leaf litter and encroaching vegetation at platform margins. Exposures were generally readily visible despite thick surrounding bush land in some cases. Larger exposures were identified on aerial photographs and then located and inspected in the field. Within the creek gullies, thicker vegetation and pooled water limited visibility on exposures in the creek beds but the presence of the sandstone itself was readily apparent and all identified areas were inspected.

Shelter sites tended to be readily visible on the slopes, and not obscured by too much vegetation, with the younger regrowth trees and shrubs present across large parts of the study area allowing for a clear view of suitable overhangs which could then be inspected. Some of the sandstone forming the shelters was particularly weak and friable, creating an unstable floor which could not be walked on without risk of damaging any potential archaeological material. These were carefully inspected from outside the shelter to determine the presence of any art or deposit, and this factor did not constrain effective inspection. Within shelters with apparent depth of deposit, floor surface visibility was limited by vegetation, leaf litter and in some cases small areas of waterborne fine white sand, where water has flowed across the shelter floors.

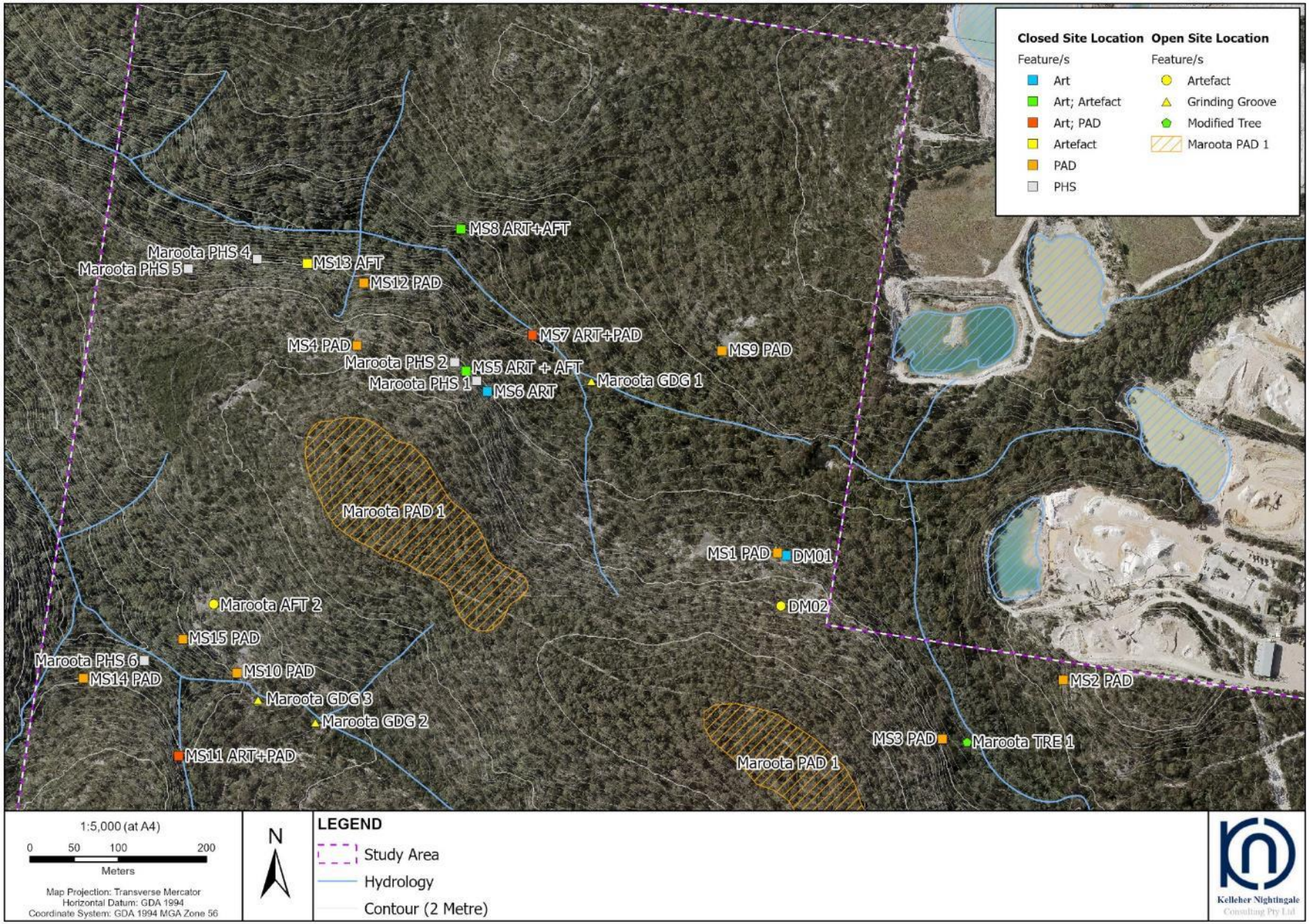

Figure 7. Survey results – north

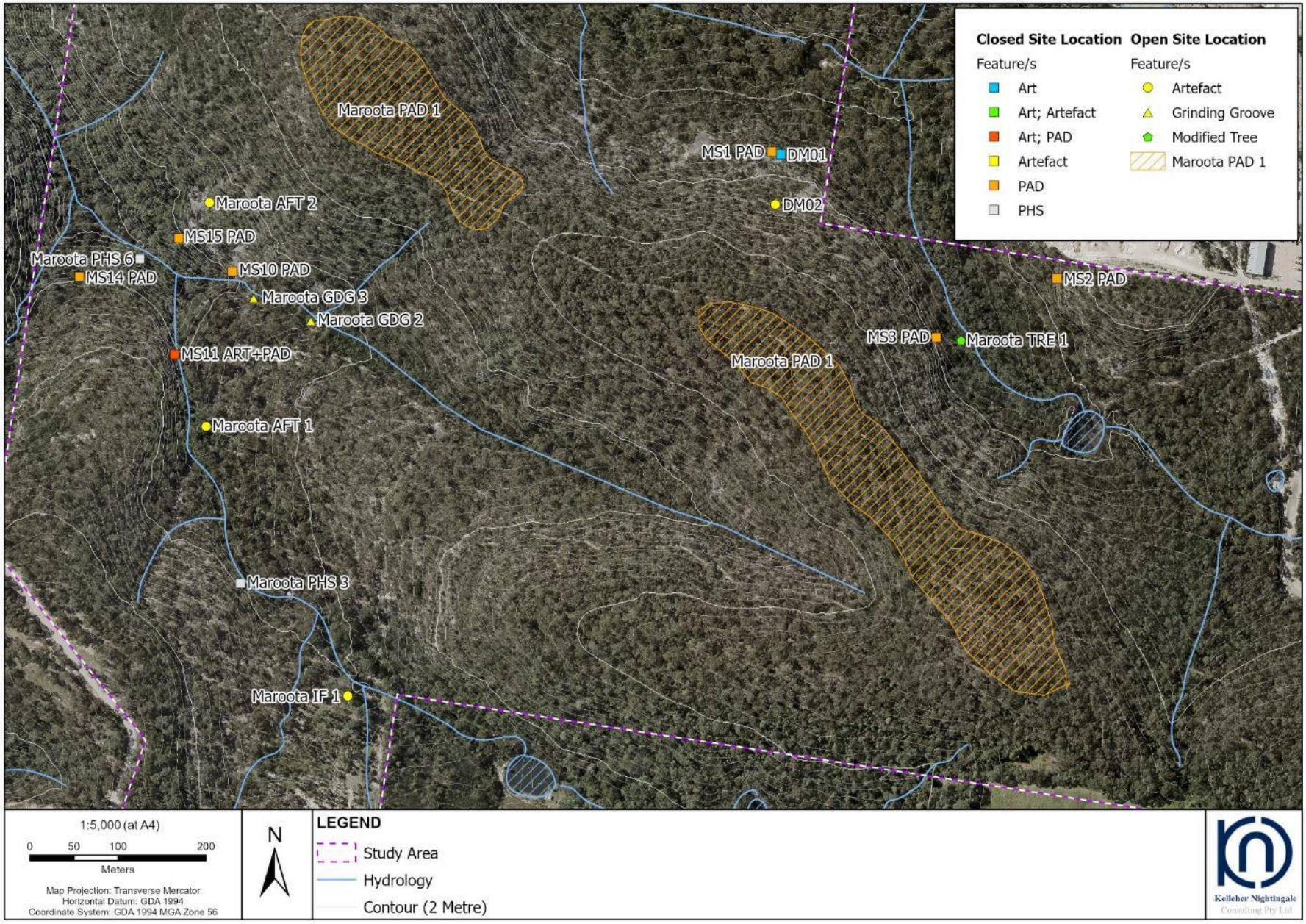

Figure 8. Survey results - south

7.4 Survey results

The archaeological survey resulted in the identification of 22 previously unrecorded Aboriginal archaeological sites and an area of PAD (Figures 7-8). Previously recorded sites DM01 and DM02 were relocated and reinspected.

7.4.1 Previously recorded sites

Site Name:	DM01
Coordinates:	312392E 6296090N
Site Type:	Shelter with Art

This shelter was previously identified by MDCA during a preliminary site inspection and named "DM01". This is in Lot 213 DP752025. For the current study, this shelter was relocated, new GPS coordinates taken, and additional information recorded. It is just east of a disused vehicle track which winds down into the 2nd order creek gully. The shelter is concealed under a natural curve in the northern edge of a large sandstone platform. The shelter faces north-east (40˚). Landform is mid slopes on the southern side of the creek gully. The creek is a 2nd order stream which flows north-west to Douglass Creek. Distance to the creek is 100 metres. Most of the shelter is low and difficult to stand in. It has varying degrees of honeycomb weathering, exposing white friable sandstone.

Shelter length is 11 metres, maximum depth 2.9 metres, and maximum height at dripline 1.9 metres. It has a narrow floor sloping down from east to west, mostly of exposed bedrock. Vegetation in front of the shelter includes Bloodwood, Persoonia, Bracken Fern, and Lomandra. At the eastern end of the shelter is a smooth concave wall with a panel of faded red pigment art. This includes faint traces of possible hand stencils, unidentified shapes, and blackened patches. Some of the pigment has flaked off from natural exfoliation of the rock surface. Above this panel is a faint red pigment line drawing with line infill. Below this panel is a 1.8 metre long row of small peck marks, possibly engraved art.

West of this panel is a deeper cavity in the shelter. In an alcove are two 'bird?' motifs drawn in red pigment with vertical stripe infill. Both have slender necks with heads turned to their left. One is larger with thick wings or arms. The smaller motif has drooping wings, possibly depicting a chick or penguin. The larger of the two 'bird' motifs measures 30 x 30cm. The smaller is 20cm high by 15cm wide. Higher on the back wall is a faded charcoal line motif, and other single charcoal lines. This is superimposed over another faint red pigment line. Further west, at the front of the shelter, is another faded patch of red pigment. Natural weathering of rock surfaces, and probable bushfire damage, has caused some of the red pigment to spall and flake off. The shelter and pigment art appears to be in generally good condition.

Plate 28. DM01 view to north-west. Panel of red pigment is left of range pole

Plate 29. DM01 view to east. Red pigment 'bird' drawings are in alcove to right of range pole.

Plate 30. Panel of red pigment at eastern end of shelter with possible stencils of hands and unidentified shapes.

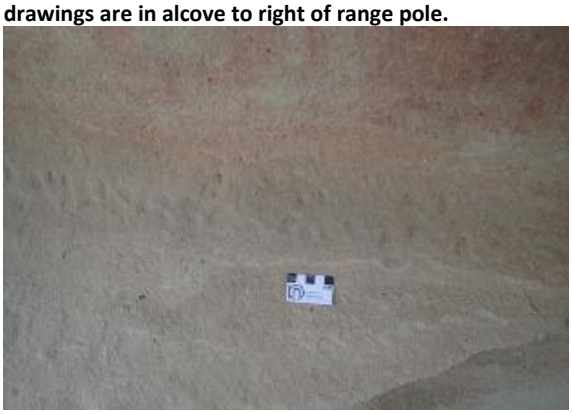

Plate 31. View to south. Detail of small peck marks below red pigment panel

Plate 32. View to south-east. Two red pigment 'bird' motifs in alcove.

Plate 33. Detail of larger 'bird' motif with slender neck and head.

Plate 34. Detail of smaller 'bird' motif, with drooping wings, possibly a chick.

Plate 35. Detail of charcoal drawings high on back wall. Main figure is superimposed over a faint red pigment line.

Site Name:	DM02
Coordinates:	312386E 6296033N
Site Type:	Artefact Scatter

This site comprised a low density scatter of three artefacts located on a large platform of outcropping sandstone, to the south of and above the DM01 shelter. Recorded artefacts included a quartz flake and two tuff flake pieces. The site location was revisited during survey, but the artefacts were not relocated and no other archaeological material was identified.

There is some potential for additional dispersed artefacts to occur on the large platform but potential for subsurface material is nil due to the site's location on sandstone bedrock.

Plate 36. Panoramic view to north/east, recorded location of DM02. Open sandstone platform on mid gully slopes

7.4.2 Newly recorded sites

Site Name:	Maroota Shelter 1 PAD (MS1 PAD)
Coordinates:	312382E 6296093N
Site Type:	Shelter with PAD

This shelter site was previously noted during field inspection by MDCA as a shelter with PAD but was not formally recorded. The current assessment revisited the site during the survey and rerecorded it.

The shelter is located beneath a small overhang immediately west of site DM01, along the same cliffline. The shelter is of habitable size, closely spatially associated with neighbouring site DM01, and retained a sandy deposit on the shelter floor, partially obscured by vegetation and leaf litter. The floor, dripline and adjacent slope were closely inspection for archaeological material and artefacts but none were identified.

The rear wall and roof have been affected by honeycomb weathering exposing white, friable sandstone. No art was identified despite close inspection. Instead, the back wall displays visually striking ironstone concretions, including a large cylindrical concretion protruding out into the overhang. The shelter displays potential for subsurface archaeological deposit.

Plate 37. Ironstone concretions and protrusion from rear shelter wall

Plate 38. View south east to DM01, MS1 PAD at right

Site Name:	Maroota Shelter 2 PAD (MS2 PAD)
Coordinates:	312706E 6295949N
Site Type:	Shelter with PAD

This sandstone overhang was found on upper slopes north of the 2nd order creekline, close to the northern boundary of Lot 7005. Excavated rock and sand from the PF Formation quarry was visible upslope. The overhang faces west (257˚). Length is 16 metres, depth 3.3 metres, and height at dripline 1.6 metres. The sloping ceiling runs back to a low back wall.

The floor was dry at time of survey and displayed some apparent depth of deposit, although no surface artefacts were identified. Some water entry was indicated by loose sand at the northern end. In front of the outcrop is dense scrub of Hakea and Persoonia, and then a steep drop down into the creek gully below. The shelter displays potential for subsurface archaeological deposit.

Plate 39. View to east. Overhang on upper gully slopes, MS2 PAD

Plate 40. View to west.

Site Name:	Maroota TRE 1
Coordinates:	312597E 6295879N
Site Type:	Modified Tree

A tall mature Grey Gum (*Eucalyptus punctata*) was found on the south side of the main 2nd order creek, on lower gully slopes. This is within Lot 7005 DP1055724. On the southern side of the trunk is an elongate scar. The scar faces south-west (209˚). This surface is convex, as the tree slightly bends over to the north.

The scar measures 4 metres long, by a maximum of 50cm wide. Regrowth is 10-15cm thick. There were no visible cut marks. The scar continues to just above ground level. Tree height is estimated at >25 metres. The trunk width is 90cm at 1.5 metres above ground level. Distance to the creek is c.30 metres.

Plate 41. View to north. Grey Gum with elongate scar on its convex southern side.

Site Name:	Maroota Shelter 3 PAD (MS3 PAD)
Coordinates:	312569E 6295882N
Site Type:	Shelter with PAD

This small overhang is on lower gully slopes, c.30 metres south of the 2nd order creek. This is within Lot 7005 DP1055724. It faces north-east (50˚). Shelter length is 6 metres and maximum depth 2.8 metres. Height at dripline is 2 metres. The ceiling and back wall are honeycomb weathered. No art was identified. Half of the interior space is sloping bedrock.

The floor area is small, 4m long by 2m wide, but with sandy soil. Ground surface visibility was limited by leaf litter and dry grass. No artefacts were observed but there is considered to be potential for subsurface deposit.

Plate 42. View to north-west.

Plate 43. View to south east.

Site Name:	Maroota Shelter 4 PAD (MS4 PAD)
Coordinates:	311905E 6296328N
Site Type:	Shelter with PAD

This overhang was found on upper gully slopes, which feature a number of small benches. It is within Lot 213, DP 752025. It faces north-west (330˚) towards the creek gully below. Length is 4 metres, depth 1.4 metres, and height at dripline is 1.3 metres. There is an area of pale yellow sandy floor, 3 metres long x 1 metre wide. No artefacts were identified however there is potential for subsurface deposit. Distance to the 2nd order creek is c.120 metres, down very steep rocky slopes.

Plate 44. View to south-west.

Plate 45. View to east.

Site Name:	Maroota Shelter 5 ART+AFT (MS5 ART+AFT)
Coordinates:	312029E 6296299N
Site Type:	Shelter with Art and Artefacts

This shelter was found on steep midslopes, on the southern side of the 2nd order creek gully, in a cliffline containing at least five to six overhangs. It is within Lot 213, DP752025. Distance to the creek is c.85 metres. The overhang is 6 metres long by 4.6 metres deep. Height above dripline is 5 metres. While the shelter is high, there is only a limited concave floor area, 4.2 metres long x 1 metre wide. The floor has a thin layer of sand over sandstone bedrock. Ground surface visibility was limited by leaf litter and ferns. One artefact, a flaked pebble fragment, was found on the floor. Some sandy deposit has eroded down the rocky slope in front of the overhang. There is low potential for intact subsurface deposit given the lack of soil/sediment within the shelter.

Above the floor is a sloping sandstone bench running up to a vertical back wall. On the back wall are at least 20 hand stencils, mostly outlined by red pigment, and a few in yellow. The pigment art is within an area c.1 metre high by 2 metres wide. Some stencils had clear outlines, while others had only a few fingers visible. Some hands are superimposed over others, and of different coloured pigment, possibly from repeat visits. Some stencils were applied with incomplete fingers. Many stencils are of left hands. Hand sizes vary, but are larger along the top row, and very small near the base of the art panel. The upper hands suggest adults, while the very small hands indicate children were brought to the site, either solely by women, or as a mixed family group. Further recording may help determine handedness, adult vs juvenile, or even gender.

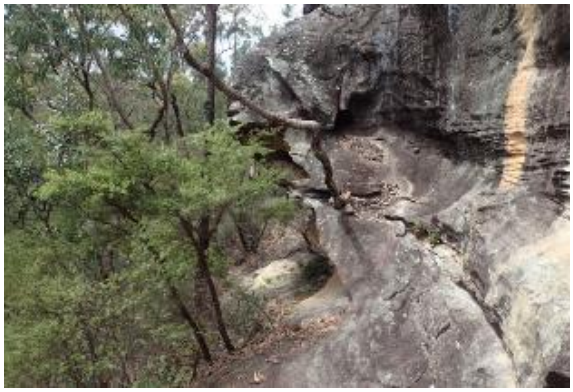

Plate 46. View to east. View along cliffline towards shelter with art and deposit.

Plate 47. View to east. View down to concave shaped floor of shelter.

Plate 48. View to south-west. Hand stencils were found on back wall to right of range pole.

Plate 49. View to south. Hand stencils on back wall. 5cm scale at bottom of photo.

Plate 50. Detail of upper row of stencils

Plate 51. Upper row. Left hand with superimposed fingers.

Plate 52. Upper row. Hand with incomplete fingers and tapering wrist.

Plate 53. Lower row. Small left hand.

Plate 54. Detail of incomplete hand

Plate 55. Artefact found on thin sandy floor. Flaked pebble fragment.

Site Name:	Maroota Shelter 6 ART (MS6 ART)
Coordinates:	312053E 6296276N
Site Type:	Shelter with Art

A second shelter with art was found 18 metres east of the shelter with red hand stencils (MS5 ART+AFT), and higher up in the cliffline. It is within Lot 213, DP752025. This is one of a complex of five weathered overhangs in close proximity. The overhang is c.90 metres from the 2nd order creek in the gully below. Length of the overhang is 10 metres, including a deeper alcove at its western end. There is only a narrow floor area, 80cm to 1 metre wide, and 8 metres long. This has only a thin layer of white sand on level bedrock, edged with a line of four sandstone slabs. In front of the shelter is a steep rocky slope. No artefacts were observed.

The wall of the overhang has visually striking red vertical stripes caused by natural iron staining. To the right of these are three 'bird' motifs, possibly emu chicks, drawn in red pigment, with red vertical stripe infill. These are 1.2 metres above the floor. The 'bird' motifs are depicted with heads raised and turned to their left. They measure, from left to right, 30cm high by 10 cm wide, 40cm high by 10 cm wide, and 25 cm high by 8 cm wide.

Approximately 1.5 metres east of the bird motifs are two short lines in red pigment, 1 metre above the shelter floor. Below the natural red iron staining is a small faint patch of red pigment, on a sloping bench just above the floor. The deeper alcove at the western end measures 4 metres long by 4 metres deep, and 3 metres high. This has extensive honeycomb weathering on its walls and ceiling. It has a sloping bench, stained by lichen or water seepage. No art could be found, but it is heavily weathered.

Plate 56. View to south-west. Three red pigment 'bird' motifs were found above range pole.

Plate 57. View to south-east. Three red pigment 'bird' motifs, above range pole.

Plate 58. Detail of three 'bird' motifs, possibly emu chicks.

Plate 59. Two red pigment lines were found 1.5 metres east of the three 'bird' motifs.

Plate 60. A small faint patch of red pigment was found on this sloping bench, just above floor level.

Plate 61. View to west. The narrow floor of the overhang has a thin sand layer onto bedrock, edged by four sandstone slabs. Traces of bushfire damage were seen.

Plate 62. View to east. Western end of overhang. This larger cavity has honeycomb weathered surfaces, and a sloping bench floor. No art was identified.

Site Name:	Maroota Potential Habitation Shelter 1 (Maroota PHS 1)
Coordinates:	312041E 6296288N
Site Type:	Potential Habitation Shelter

This small overhang is immediately downslope of the shelter with three bird motifs (MS6 ART), and is in the same row of lower overhangs to the east of the shelter with red hand stencils (MS5 ART+AFT). It is within Lot 213, DP752025. This is one of a group of five overhangs in close proximity along the same cliffline. The overhang measures 4 metres long and is 1.7 metres deep. It has a curved ceiling with room to stand. Maximum interior height is 2.4 metres, but the floor area is narrow, with bedrock exposed. There is no deposit. The overhang was inspected for pigment art but none could be found. The walls and ceiling are extensively honeycomb weathered. This small overhang is well protected and may have afforded temporary shelter. It is not an archaeological site due to the absence of Aboriginal objects.

Plate 63. View to west. This overhang is 18 metres east of the shelter with hand stencils.

Site Name:	Maroota Potential Habitation Shelter 2 (Maroota PHS 2)
Coordinates:	312041E 6296288N
Site Type:	Potential Habitation Shelter

This overhang faces north-east. It is within Lot 213, DP752025. It is in the same cliffline, to the west of the shelter with red hand stencils (MS5 ART+AFT). It has a horizontal ceiling with honeycomb weathering. Its floor is entirely sloping bedrock, with no deposit. In front of the overhang is sheer cliff. Shelter length is 8 metres, maximum depth is 2.6 metres, and height at dripline is 2 metres. This may have afforded temporary shelter. It is not an archaeological site due to the absence of Aboriginal objects.

Plate 64. View to east showing overhang and bedrock floor.

Site Name:	Maroota Shelter 7 ART+PAD (MS7 ART+PAD)
Coordinates:	312104E 6296340N
Site Type:	Shelter with Art and PAD

A small overhang was found low in the 2nd order tributary creek gully, only 3-5 metres from the creek, on its southern banks. It is within Lot 213 DP752025. The shelter faces north and is well concealed by thick vegetation. The overhang is 3.76 metres long by 1.5 metres deep, and is 1.45 metres high at the dripline. The floor has some sandy deposit with apparent depth, and displays potential for subsurface archaeological deposit. Other floor material included sandstone bedrock, umbrella ferns *(Sticherus flabellatus)*, and leaf litter.

At the eastern end near the top of the back wall is a large partial hand stencil (Hand Stencil 1). The stencil is 1.1 metres above the floor. Four fingers are visible outlined by purple-red pigment. The lower part of the hand has been damaged by exfoliation of the rock surface. Length of the stencilled fingers is 9cm and width 10cm. 1.1 metres further west there is a smooth concave surface, also high on the back wall, with two faint hand stencils in pink red pigment. One of these (Hand Stencil 2) is very faded. It measures 10cm long by 7cm wide and is 1.1 metres above the floor. The other (Hand Stencil 3) is a complete left hand. It measures 12cm long by 8cm wide, and is 1.13 metres above floor level.

Plate 65. View to east, MS7 ART+PAD

Plate 66. View to south. Eastern end of shelter. Hand Stencil 1 was found on the back wall, just below ceiling

Plate 67. Detail of hand stencil (1).

Plate 68. Detail of hand stencil (2).

Plate 69. Detail of hand stencil (3).

Site Name:	Maroota Shelter 8 ART+AFT (MS8 ART+AFT)
Coordinates:	312023E 6296460N
Site Type:	Shelter with Art and Artefacts

This large rockshelter is on steep midslopes, on the northern side of the 2nd order creek gully, c. 50 metres above the creek. It is within Lot 213, DP752025. It faces south. In front are steep slopes with tall forest and covered in dense bracken fern, vines, and shrubs. There are other smaller overhangs along the same cliffline. Elevation is c. 133 mAHD. Shelter length is 14 metres, depth from dripline to the back wall is 5 metres, and height at dripline is 5 metres. There are rockfall boulders at its western end. The floor is level, c.14 metres long by 2.5 metres wide, with sandy deposit, and broken shale fragments from a thin lens in the sandstone. The front of the floor is covered by umbrella ferns (*Sticherus flabellatus*).

Above the floor is a vertical rock face, c. 1.7 metres high, where the original floor has broken away. Above this is a smooth concave back wall, leading up to a natural cavity or 'dome' in the ceiling. The concave wall is greenish grey in colour, with pale exfoliation patches. Other parts of the shelter ceiling have honeycomb weathering.

On the ceiling and in the natural 'dome' is red pigment art. Predominant are two large motifs, a panel of vertical lines, curved lines, with a faint 'bird' motif further west. There are also other patches of red pigment in and around the dome indicating superimposition. Motifs are faded and some red pigment has flaked off the walls. Within the natural dome is a large motif in dark red pigment. It is elongate oval in shape, infilled with vertical lines. It is possibly painted, rather than drawn. Higher up is a sinuous red pigment line which utilises the curve of the natural 'dome' concavity. This line extends further to the west and suggests a very large motif.

To the left (west) of the dark red pigment motif is a panel of paler red vertical lines, and a curved red line under this. The vertical lines appear to continue up towards the ceiling dome. Near the western end of the shelter, also high up on the back wall, is the faint outline of a 'bird' motif with outstretched arms or wings. East of the ceiling dome is a large brighter red elongate oval motif. Below this has been damaged by natural exfoliation, but there are traces of red pigment. At the western end of the shelter, on a vertical face above rock fall, a thin red pigment line motif was found.

Three stone artefacts were also found in the dripline in front of the rockfall (Table 6). Deposit within the shelter is considered to have high archaeological potential.

Table 6. Artefacts identified at MS8 ART+AFT

Artefact type	Raw material	Length mm	Width mm	Thickness mm	Comments
Medial Fragment	Silcrete	21	15	5	Red, glossy, <30% cortex
Flake	Silcrete	16	10	3	Dark red grey, glossy, fine quality, central ridge, plain platform, feather termination
Flake	Quartz	11	14	6	Opaque white, good quality, unifacial cortical platform, step termination

Plate 70. View to west. Shelter with art and deposit.

Plate 71. Flaked stone artefacts found at western end of shelter, on dripline.

Plate 72. Artefacts in situ on dripline

Plate 73. View to north. Red pigment art in natural concave 'dome' in ceiling. It includes a central figure in dark red pigment, paler red vertical lines, a large dark red sinuous line inside the 'dome', and other faded motifs.

Plate 74. View to north. Red pigment art on ceiling to east of natural 'dome'. Below this are traces of more red pigment, damaged by natural exfoliation.

Plate 75. View to north. Closer view of pale red vertical lines, and curved line.

Plate 76. View to north. Faint red pigment drawing at western end of shelter, on vertical face above rockfall.

Plate 77. View to east. Shelter with art and deposit.

Site Name:	Maroota GDG 1
Coordinates:	312171E 6296288N
Site Type:	Grinding Grooves

A site comprising at least 47 grinding grooves were found in the sandstone bed of the 2nd order creek, 6 metres above a waterfall, and scattered for another 15 metres upstream. It is within Lot 213, DP752025.There are likely to be more grooves concealed by overhanging vegetation, or stream sediment. Some are partially submerged.

The grooves are 90 metres away from rockshelters with art MS5 and MS6, and may be considered as part of a site complex. The grooves have been placed near to a group of circular rock pools. One of the circular pools is large, 1 metre wide x 1 metre deep. The grooves vary in orientation, and some are in clusters, and others dispersed. Measurements taken of the 47 grooves (Table 7) resulted in a mean length of 23 cm, and mean width of 8 cm.

Plate 78. View to west. Grinding grooves were found around a series of circular rockpools, just upstream of a waterfall.

Plate 79. View to south. Grooves 1 to 5.

Plate 80. View to east. Grooves 6 -7.

Plate 81. View to south. Grooves 9 -11.

Plate 82. View to south. Grooves 12-33. On rock surface between large pools.

Plate 83. View to west. Grooves 37-47. Waterfall in background.

Table 7. Maroota GDG 1 - groove dimensions

Groove	Length (cm)	Width (cm)	Groove	Length (cm)	Width (cm)
1	23	8	**25**	23	7
2	20	7	**26**	23	6
3	22	6	**27**	24	6
4	20	7	**28**	27	7
5	20	8	**29**	26	5
6	22	8	**30**	27	5
7	25	8	**31**	20	5
8	27	6	**32**	23	6
9	19	9	**33**	28	7
10	20	9	**34**	30	5
11	22	10	**35**	22	9
12	22	7	**36**	26	8
13	13	7	**37**	28	12
14	15	7	**38**	24	10
15	16	8	**39**	27	8
16	20	8	**40**	17	8
17	24	9	**41**	26	10
18	25	10	**42**	28	7
19	22	7	**43**	26	7
20	25	9	**44**	20	7
21	15	7	**45**	33	8
22	22	8	**46**	25	7
23	24	9	**47**	18	7
24	15	7			

Site Name:	Maroota Shelter 9 PAD (MS9 PAD)
Coordinates:	312319E 6296322N
Site Type:	Shelter with PAD

This small overhang is under the southern edge of a large open sandstone platform, on the northern upper slopes of the main 2nd order creek gully. It is within Lot 213, DP752025. Distance to the creek is c.100 metres. Its sloping ceiling has unusual pillowy ironstone concretions. No art was identified.

The floor includes outcropping bedrock and whitish sand. The sandy deposit appears to have some depth and displays archaeological potential. Visibility was limited by abundant ferns and no artefacts were identified. Overhang length is c.7 metres, depth 1.5 metres, and height at dripline 1.37 metres.

Plate 84. View to south. An overhang was found under the southern end of this large open rock platform.

Plate 85. View to west.

Site Name:	Maroota GDG 2
Coordinates:	311858E 6295901N
Site Type:	Grinding Grooves

Eight grinding grooves were found on an ephemeral drainage line, which runs to a 1st order stream. This is in Lot 7005, DP1055724. Water erosion has sculpted a sinuous path through the outcrop here, leaving a smooth sided channel. During the survey the drainage line was mostly dry, except for water held in a series of circular rockpools.

Two grooves (Nos.1-2) were found next to a deep oval rockpool. A cluster of 5 more grooves (Nos.3-7) were found 5 metres further downstream, at the top of a small ledge or ephemeral waterfall. One of these (No.4) is circular and 3cm deep, and appears to be a small natural rockpool which has been modified. Another groove (No.8) was found 10 metres further downstream, next to a circular rockpool retaining water. All grooves were oriented roughly NNE, at right angles to the direction of ephemeral water flow. There are likely to be more grooves here, concealed under leaf litter or overhanging vegetation. Measurements taken of the 8 grooves (Table 8) resulted in a mean length of 27.4 cm, and mean width of 8.3 cm.

Table 8. Maroota GDG 2 - groove dimensions

Groove	Length (cm)	Width (cm)	Groove	Length (cm)	Width (cm)
1	30	9	**5**	23	7
2	25	8	**6**	40	10
3	34	8	**7**	26	8
4	16	9	**8**	25	7

Plate 86. View to east. Two grinding grooves were found next to a rockpool on this ephemeral watercourse.

Plate 87. View to east. Detail of the two grinding grooves, submerged by seepage from a rockpool.

Plate 88. View to east. Group of five grinding grooves, one a small natural rockpool, were found 5 metres downstream.

Plate 89. View to east. Single grinding groove next to circular rockpool, 10 metres downstream of previous.

Site Name:	Maroota GDG 3
Coordinates:	311793E 6295927N
Site Type:	Grinding Grooves

A group of three grinding grooves were found next to a larger rockpool, in the sandstone bed of a dry ephemeral watercourse. This is in Lot 7005, DP1055724. The grooves are c.70 metres downstream of Maroota GDG 2. The grooves are at the southern edge of the rockpool and are oriented NNE. Visibility along the creek is partly limited by leaf litter. There are traces of a possible fourth groove at the eastern end. Nearby are a few other rockpools on the same watercourse that hold water. Measurements taken of the 3 grooves (Table 9) resulted in a mean length of 24.6 cm, and mean width of 9.2 cm.

Table 9. Maroota GDG 3 - groove dimensions

Groove	Length (cm)	Width (cm)
1	25	10
2	25	8.5
3	24	9

Plate 90. View to west. Grinding grooves were found at rockpool to right of range pole.

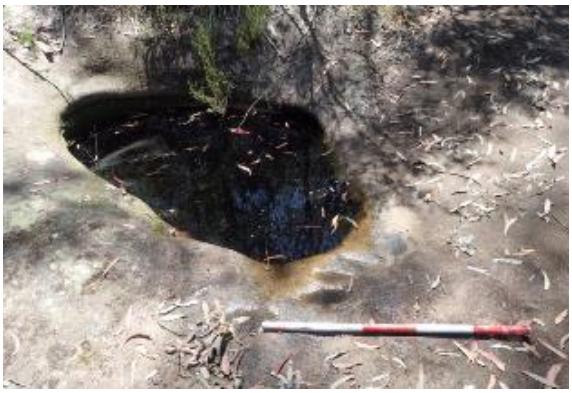

Plate 91. View to north-east. Three grinding grooves at southern end of rockpool

Site Name:	Maroota Shelter 10 PAD (MS10 PAD)
Coordinates:	311769E 6295957N
Site Type:	Shelter with PAD

A shelter was found under the southern end of a large open sandstone platform, on the northern side of a 1st order creek gully. This is in Lot 7005, DP1055724. The shelter faces 236˚south-west to the creek below, which has a small waterfall here, just above the confluence of another 1st order stream from the south. The overhang is well protected by the domed shape of the platform, and by large boulders and eucalypts at its entrance.

The back wall is concave, with honeycomb weathering on the ceiling. No art was observed within the shelter. In front there is a steep drop down to the creek. Distance to the creek is c.30 metres. Shelter length is 8 metres, depth is 3 metres, and height at dripline is 2.5 metres. The floor has become limited in space due to rockfall, and slopes down to the east, but there is an area of sandy deposit at its eastern end. This displays potential for subsurface archaeological material. Visibility was limited by leaf litter, Bracken ferns, and Sarsaparilla vines. No artefacts were identified but the shelter displays archaeological potential. The shelter is less than 50 metres north-west of site Maroota GDG 3 in the creek bed.

Plate 92. View to north. Looking up to overhang from 1st order creek.

Plate 93. View to east.

Plate 94. View to north-west.

Plate 95. View to north. Floor at eastern end includes a large animal burrow exposing sandy deposits.

Site Name:	Maroota IF 1
Coordinates:	311900E 6295475N
Site Type:	Isolated artefact

An isolated artefact was found 10 metres west of a deep gully and northerly flowing 1st order watercourse. This is in Lot 7005, DP1055724. The stream runs north-west towards another 1st order creek. The 2-3 metre deep gully has exposed layers of laminated dark grey sand. A heat shattered silcrete flaked artefact was found on a small patch of exposure, 10cm x 30cm, between leaf litter. Visibility was only 10-20%. Soil is dark grey sandy loam, with small quartz pebble inclusions.

This area has tall forest of Sydney Red Gum (*Angophora costata*) and Turpentine (*Syncarpia glomulifera*) which has been partially cleared. There was evidence of some previous logging and grazing activity. Nearby were large tree trunks knocked over, clearings, and signs of old vehicle tracks. Further downstream were sheds for water pumps, and hoses running south up to an adjacent property. Despite some disturbance there is some potential for intact archaeological deposit, especially considering the deep sands exposed in the gully.

Table 10. Artefact identified at Maroota IF 1

Artefact type	Raw material	Length mm	Width mm	Thickness mm	Comments
Heat shatter off flaked artefact	Silcrete	20	15	12	Red, grey mottles, potlid scars. Off flaked artefact.

Plate 96. View to east. Isolated find at range pole. In background is a 1st order watercourse and deep gully erosion, exposing layers of dark grey sands.

Plate 97. Isolated find. Silcrete artefact.

Site Name:	Maroota Potential Habitation Shelter 3 (Maroota PHS 3)
Coordinates:	311778E 6295603N
Site Type:	Potential Habitation Shelter

A small overhang was found in sandstone on the mid slopes of a 1st order creek gully. This is in Lot 7005, DP1055724. The shelter is on the western side of the creek and faces 39˚NE. The creek is c.30 metres down steep slopes below. On the gully slopes are tall Grey Gums (*Eucalyptus punctata*) and Bracken Ferns. On the creek is dense moist gully vegetation, with a sandy creek bed.

Shelter length is 3 metres, depth 1 metre, and height at dripline 1.4 metres. The walls and ceiling are honeycomb weathered. No art was observed. Shelter floor is exposed bedrock with no deposit or artefacts identified. While small, this overhang would offer temporary shelter. It is not an archaeological site due to the absence of Aboriginal objects.

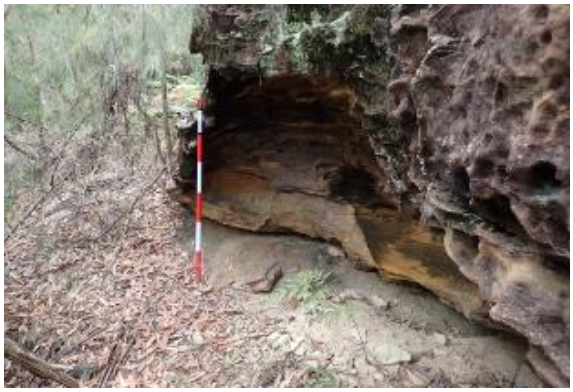

Plate 98. View to south

Plate 99. View to north-east. Tall forest and ferns in gully in front of shelter.

Site Name:	Maroota AFT 1
Coordinates:	311739E 6295781N
Site Type:	Artefact Scatter

Five stone artefacts were found in a clearing, on the eastern banks of a north-west flowing 1st order creekline. This is in Lot 7005 DP1055724.This location is a slight rise between the creek and a minor drainage line. Distance to the creek is 24 metres. The clearing is a 10 metre wide strip created for a stock fence and track. Artefacts were found on small patches of exposure between leaf litter. Visibility was 10%. Soils are dark grey sandy loam with small quartz gravel inclusions.

The artefacts were scattered over a 2 x 2 metre area and comprised silcrete, chert and quartz flakes and flake fragments and one retouched quartz flake (Table 11). Two artefacts were 1 metre apart, close to a solitary Sydney Red Gum (*Angophora costata*) in the centre of the clearing. Surrounding vegetation includes thick scrub of Bloodwood, Banksia, and Persoonia. Off the clearing to the north-west is almost impenetrable scrub and moist gully vegetation concealing the creek. Disturbance includes previous clearing, fence construction, old vehicle movements, and some cattle grazing. The site displays moderate potential for associated subsurface deposit.

Table 11. Artefacts identified at Maroota AFT 1

Artefact type	Raw material	Length mm	Width mm	Thickness mm	Comments
Flake	Silcrete	28	13	5	Grey pink, fine quality, blade, faceted platform, plunging termination.
Distal Frag	Chert	21	12	9	Grey, <30% cortex, unifacial rotated, plunging termination
Split Flake (R)	Quartz	22	14	7	Translucent, good quality, split pebble fragment, <30% cortex
Angular Frag	Quartz	27	17	10	Milky, medium to poor quality, zero cortex
Ret Flake	Quartz	20	17	10	Milky, medium quality, 100% cortex, retouched on right ventral margin.

Plate 100. View to north. Artefacts were found on this leaf litter covered clearing next to a fenceline.

Plate 101. View to south. Artefact findspot looking back to 1st order creek.

Plate 102. Dorsal surface of artefacts.

Site Name:	Maroota Shelter 11 ART+PAD (MS11 ART+PAD)
Coordinates:	311703E 6295863N
Site Type:	Shelter with Art and PAD

This shelter was found on the western mid slopes of a steep sided gully. This is within Lot 7005, DP1055724.The shelter faces 60˚ NE. This looks down to a northerly flowing 1st order creek, only 20 metres below, and its confluence with another 1st order creekline. The overhang is well hidden by dense scrub, with Geebungs (*Persoonia sp*.), Banksias, and Bracken ferns. Lower in the gully are tall forest eucalypts, bloodwoods, and Angophoras, and on the creek are large King ferns (*Todea barbara*), coachwoods, water gums, and sedges.

Shelter length is 12 metres, maximum depth is 3 metres, and maximum height at dripline is 3 metres. The floor is level and dry, with some flat rock fall and bedrock. In between are patches of sandy deposit, one area 3 metres long x 1 metre wide. This displays potential for subsurface archaeological deposit. The floor has leaf litter, Lomandras, and Bracken fern. While much of the overhang ceiling is sloping, its southern end has some vertical surfaces and smooth concavities. Within one of these concavities were two faint hand stencils.

Hand stencil 1 is outlined by a whitish pigment. It appears to be an adult left hand. The stencil measures 17 cm long x 16 cm wide. Rock surfaces around it have been weathered and blackened, possibly bushfire damage. The stencil is 1.45 to 1.6 metres above floor level. Hand stencil 2 is 38cm further to the right (north) of stencil 1. It is at a similar height, 1.72 metres above floor level. It is a partial stencil only, and its original pigment colour has weathered away. Traces of two fingers are visible above a blackened patch of rock surface. Two more fingers are just visible under the black coating. To the right are possible traces of other stencils.

The visible stencil area measures 10cm long x 12cm wide. On the shelter floor, below the hand stencils, were fragments of white shale from a natural lens in the back wall. It is possible this was utilised for the pigment. A faint white pigment or scratched line was found in a separate concavity further north. The lower part of this appears pecked.

Plate 103. View to south of shelter. Hand stencils were found to right of range pole.

Plate 104. View to west. Traces of two hand stencils were found in this concavity near the southern end the overhang. There were broken fragments of white shale on the floor.

Plate 105. Hand stencil 1.

Plate 106. Hand stencil 2.

Plate 107. Faint white pigment drawings

Plate 108. Sandy deposit on shelter floor (PAD)

Plate 109. Panel with hand stencils

Plate 110. View to south of overhang containing the site

Site Name:	Maroota Shelter 12 PAD (MS12 PAD)
Coordinates:	311913E 6296399N
Site Type:	Shelter with PAD

A small shelter was found on steep southern mid gully slopes, looking down to the main creekline, a 2nd order stream. This is within Lot 213 DP752025. The gully here is deeply incised. Distance to creek is c.60 metres. The overhang is in a sandstone cliffline at c.133 mAHD. More overhangs were found along this cliffline further west.

The shelter faces 349˚ north. Its length is 7 metres, depth 3 metres, and height at dripline 1.5 metres. The floor is level and dry. Floor area is c. 6 metres long x 2 metres wide, and includes a large rockfall fragment, with patches of sandy deposit with archaeological potential. Visibility on the floor was limited by leaf litter and bracken fern. Vegetation in front includes Banksia serrata, Persoonia linearis, Grey Gum, and bloodwood. No art was observed.

Plate 111. View to east

Plate 112. View to east. Floor of shelter was dry and sandy.

Plate 113. View to north-east. Top of cliffline above shelter with PAD. Steep slopes into creek gully at left.

Plate 114. View to west. Base of cliffline at c. 133 metres elevation. More overhangs were found along this.

Site Name:	Maroota Shelter 13 AFT (MS13 AFT)
Coordinates:	311849E 6296421N
Site Type:	Shelter with Artefacts

This large dry shelter is west of MS12 PAD, on the same cliffline, at an elevation of c.133 metres. It is within Lot 213, DP752025.The shelter faces 356˚ north. There is honeycomb weathering on the back wall and ceiling. Shelter length is 13 metres, maximum depth is 4.5 metres, and height at dripline is 2 - 2.5 metres. In front are large rockfall boulders at the top of very steep slopes which run down to the 2nd order creek gully below. Distance to the creek is c. 60 metres. Surrounding vegetation is dry sclerophyll forest including Casuarinas, Angophoras, and Banksias.

The concave shaped floor appears undisturbed. It has powdery grey fine sand, with scattered charcoal pieces near the western end, and fragments of rockfall. Deposit area is estimated at 12 metres long x 2.5 metres wide. One silcrete artefact was found, 4 metres from the western end, and 70cm out from the back wall. No art was identified but there is high potential for further archaeological deposit at this shelter.

Table 12. Artefacts identified at MS13 AFT

Artefact type	Raw material	Length mm	Width mm	Thickness mm	Comments
Retouched Proximal Fragment	Silcrete	34	35	16	Pink yellow, some remnant plain/focal platform, heat fracture scars, off former thick flake, small retouch scars on 2 margins.

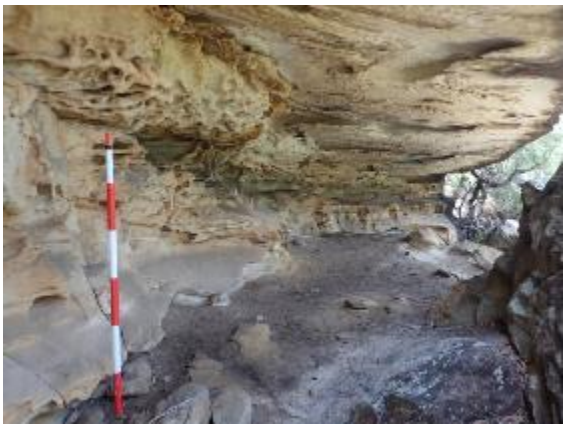

Plate 115. View to west

Plate 116. View to east.

Plate 117. View to south-east. One silcrete artefact (next to 5cm scale) was found near the western end of shelter, 70cm out from the back wall.

Plate 118. Silcrete artefact. Dorsal surface.

Site Name:	Maroota Potential Habitation Shelter 4 (Maroota PHS 4)
Coordinates:	311792E 6296426N
Site Type:	Potential Habitation Shelter

This overhang is west of MS13 AFT, in the same cliffline at a similar elevation, c.136 metres. It is within Lot 213, DP752025. It faces 28 degrees NE. Along this cliffline are a few other smaller and low overhangs. The floor has collapsed away, leaving a vertical wall. Inside is sloping bedrock, with no deposit. Overhang length is 4.5 metres, maximum depth 3 metres, height at dripline 3 metres, and interior height 2 metres. The ceiling is honeycomb weathered, and slightly concave. In front of the overhang is a steep slope to the creek gully below. Vegetation includes tall forest of Sydney Red Gum, Banksia, and Bracken fern. This may have provided temporary shelter. It is not an archaeological site due to the absence of Aboriginal objects.

Plate 119. View to west

Site Name:	Maroota Potential Habitation Shelter 5 (Maroota PHS 5)
Coordinates:	311714E 6296415N
Site Type:	Potential Habitation Shelter

This comprises a long low overhang with a higher cavity at its western end. This is within Lot 213, DP752025. It is west of Maroota Shelter 13 AFT and PSH 4 on the same cliffline at c. 133 metres elevation. The entire floor is bedrock with no deposit. In front are large sandstone slabs.

The eastern half of the overhang measures 11 metres long, with maximum depth of 2 metres, height at dripline of 1.2 metres, and interior height of 1 metre. The floor is a level bedrock shelf. The back wall and ceiling are partly honeycomb weathered, with some smooth concavities. The western end of the overhang is much higher but shallow. It has extensive honeycomb weathering with pale yellow walls and ironstone concretions. It is 4 metres in length, with maximum height at dripline of 4 metres, and maximum depth of 2.5 metres. It faces 352˚north. In front are large boulders, running down steep slopes into the creek gully. The overhang is completely enclosed and would be good shelter, however it is not an archaeological site due to the absence of Aboriginal objects.

Plate 120. View to east. Western end of overhang. This higher cavity is honeycomb weathered, with abundant ironstone concretions

Plate 121. View to south. Eastern end of overhang. This is low, but is deep and has a smooth flat sandstone floor

Site Name:	Maroota AFT 2
Coordinates:	311743E 6296035N
Site Type:	Artefact Scatter

A scatter of stone artefacts was found on a large open sandstone platform, in the south of the study area. Land is within Lot 7005, DP1055724.This outcrop is on northern slopes overlooking a gully and confluence of two 1st order creeks. Distance to creek is c.70 metres. The rock platform here is gently sloping down to the south. Artefacts were found near the northern end of the rock platform, in a natural crack which has filled with sand and small quartz gravels. The quartz pebbles, up to 2cm in size, are a possible raw material source.

Visibility was limited by quartz pebbles, leaf litter, and moss. Two of the silcrete artefacts were 20cm apart. One is completely backed. A large flake was found 1 metre further north, along the same natural fissure. Encircling the findspot are vegetated 'islands' of low shrubs, moss patches, and Lomandras. Surrounding bushland includes dry sclerophyll forest of Sydney Red Gum, Grey Gum, and Banksias. There is some potential for additional dispersed artefacts to occur on the large platform but potential for subsurface material is nil due to the site's location on sandstone bedrock.

Table 13. Artefacts identified at Maroota AFT 2

Artefact type	Raw material	Length mm	Width mm	Thickness mm	Comments
Backed Flake	Silcrete	23	10	4	Pink, fine, faceted platform, complete backed
Backed flake fragment	Silcrete	8	7	3	Red, tiny fragment, backing one margin
Flake utilised	Silcrete	28	34	7	Grey, ridged platform, plunging termination, unifacial rotated, distal edge fracture/usewear

Plate 122. View to north-west of open sandstone platform

Plate 123. View to south. Artefacts were found at range pole. Creek gully in distance.

Plate 124. View to north. Backed artefact next to 5cm scale. This was found amongst abundant quartz pebble gravels, with moss and leaf litter.

Plate 125. Dorsal surface of silcrete artefacts. One was completely backed.

Site Name:	Maroota Shelter 14 PAD (MS14 PAD)
Coordinates:	311595E 6295951N
Site Type:	Shelter with PAD

This deep overhang was found on mid gully slopes, above a 1st order creek, which is 30 metres to the west. This is in Lot 7005, DP1055724. Not far downstream to the north is a confluence with a 2nd order stream. Slopes below the shelter are steep. Elevation is 132 metres. The shelter faces 348˚ north. Most of the floor is a level sandstone bedrock shelf, but the overhang is deep and dry. The ceiling is honeycomb weathered and slightly concave, tapering to a low and narrow back wall. No art was identified.

At front is a small area of potential archaeological deposit, with sandstone rockfall and bracken ferns. Shelter length is 6 metres, depth is 5 metres, height at dripline is 2 metres, and interior height is 1.2 metres. Surrounding vegetation includes Sydney red gums (*Angophora costata*), Hair-pin Banksia (*Banksia spinilosa*), Persoonia, Bracken ferns. On the nearby creek are large King ferns, umbrella ferns (*Sticherus flabellatus*), and coachwoods. The shelter displays potential for subsurface archaeological deposit.

Plate 126. View to south west

Plate 127. View to south east, PAD area in foreground

Site Name:	Maroota Potential Habitation Shelter 6 (Maroota PHS 6)
Coordinates:	311664E 6295971N
Site Type:	Potential Habitation Shelter

This small overhang is on the southern side of a 2nd order creek gully, in Lot 7005, DP1055724. The shelter faces 20˚ north. Landform is lower gully slopes. Elevation is 120 metres. Shelter length is 4.5 metres, depth 3.5 metres, height at dripline 1.65 metres, and interior height 1 metre. The floor is all bedrock, on a raised shelf, with no deposit. On the floor and walls were large broken ironstone concretions. No art was identified. In front is a large grass tree (Xanthorrhoea sp.) and steep slopes with tall forest. There are dense large King ferns, umbrella ferns and coachwoods on the creek, c. 30 metres below. This overhang may have provided temporary shelter. It is not an archaeological site due to the absence of Aboriginal objects.

Plate 128. View to west

Plate 129. View to north. Tall forest in front of overhang looking down to creek gully.

Site Name:	Maroota Shelter 15 PAD (MS15 PAD)
Coordinates:	311708E 6295995N
Site Type:	Shelter with PAD

This overhang is low in the gully of a 2nd order creek, but perched 10 metres directly above the creekbed. This is within Lot 7005, DP1055724. It faces 219˚south west. Shelter length is c.20 metres, with maximum depth of 2.5-3 metres, and height at dripline is from 3 to 4 metres. Most of the floor is narrow, with fragments of rockfall from a sloping bench. In front is a narrow ledge with watergums and ferns, and then a sheer drop to the creekbed.

Ceiling and walls are honeycomb weathered, and rock surfaces fragile. The eastern end has a small area of sandy potential archaeological deposit, 3 x 2 metres. On the creek below is thick vegetation including large King ferns (*Todea Barbara*), coachwoods (*Ceratopetalum apetalum*), and fallen trees. There is a small waterfall c.40 metres to the west.

Plate 130. View to west

Plate 131. View to east

Plate 132. View to north-east. Area of dry deposit (PAD) at eastern end of overhang.

Site Name:	Maroota PAD 1
Coordinates:	311950E 6296145N (western portion); 312516E 6295709N (eastern portion)
Site Type:	Potential Archaeological Deposit

A discontinuous area of open context PAD was recorded along the main spur crest. The PAD comprised two areas of crest and adjoining saddle landforms, separated by an area of slightly steeper slopes. The eastern part of the PAD incorporates the high point of the spur crest that occurs near the southern boundary of the study area, and runs to the north west taking in an adjoining saddle and second, lower crest on the main ridge spur. The western part of the PAD is located on a crest at the end of the ridge spur overlooking the two main creek gullies below. This part of the PAD contains a circular pit, partially edged by a low stone wall, likely used as a stock-watering place by European settlers. These 'wells' were often modified natural depressions or hollows near springs that would likely also have been used by Aboriginal people as water sources. This is not an Aboriginal object or heritage feature but indicates the potential availability of water on the higher ground of the spur crest.

The crest and PAD areas are covered in regrowth forest of young Sydney Red Gums (*Angophora costata*), Grey Gums, and narrow-leaved Geebungs (*Persoonia linearis*). Some previous clearing, and bushfire activity, has removed old growth vegetation. The ground surface was covered in leaf litter and native grasses. Both areas had low to no ground surface visibility during the field survey, with exposures limited to the unformed vehicle track along the main spur line and occasional small areas of vegetation die-off and localised disturbance from tree falls and animal burrows. These were closely checked for Aboriginal objects but none were observed. No outcropping sandstone was identified. Soils visible in exposure were sandy, yellowish to whitish pale, and with little visible erosion on the level to undulating parts of the ridge spur.

The areas were designated as PAD due to their landform context, good apparent depth of intact soil, low level of visible disturbance and the known occurrence of other open context sites (albeit low density) elsewhere on similar suitable landforms in the region where disturbance levels are low and gradients gentle. There is considered to be moderate potential for subsurface archaeological deposit to occur in these areas of the spur crest and saddle landforms as they have retained apparently intact soils. Archaeological excavation would be required to record the nature and extent of any archaeological deposit.

Plate 133. Typical landscape within PAD area, zero visibility

Plate 134. Sandy soils in exposure associated with circular pit, western part of PAD

Plate 135. Low visibility exposures along existing vehicle track, ridge spur landform

Plate 136. Level crest landform, eastern part of PAD

8 Summary and Analysis of Background Information

Analysis of the background information presented in sections 2, 3, 4, 5, 6 and 7 allows an assessment of the cultural heritage values within the study area to be made. Combining data from historical/ethnographic sources, Aboriginal community consultation, landscape evaluation, background archaeological context and archaeological field survey provides an insight into how the landscape around the study area was used and what sort of events took place in the past. This section draws together a variety of information to bring further understanding to the cultural landscape of the study area.

The surrounding region is known to have been important to and extensively used by past Aboriginal people. Aboriginal people's use of the elevated sandstone country along the Hawkesbury River is well-documented in historic accounts, as are a range of subsistence activities, practices and material culture. Review of ethnographic and historical context indicates the study area occupies somewhat of a transitional zone between different language groups, matching the topographical boundary presented by the main ridgeline and the division of the hydrological catchments. While the study area is located in what is traditionally considered Darug country, it is in close association with the Darkinjung language group and the Guringai who occupied the Hornsby Plateau west of the Northern Beaches. The main Maroota Ridge has been identified as a key transit corridor facilitating the movement of people between the Cumberland Plain and Hornsby Plateau into the Macdonald Ranges and thence into the Hunter region, mirrored by its subsequent use during the early years of the colony as the Great Northern Road. The Hawkesbury River also provides ready access into the western Cumberland Plain and to Broken Bay and the coast. Given the environmental and topographical context of the study area, and its position along a cultural boundary landscape, it is likely Aboriginal land use in the immediate area was transitory in nature, with behaviours (and consequently an archaeological signature) more indicative of specialised use along a movement corridor rather than sustained domestic habitation.

The local area contains a number of resources which would have been important to local Aboriginal groups. The rolling hills and elevated ridgelines of sandstone country were useful for a range of Aboriginal land use activities. A wide variety of plant and animal resources would have been available to Aboriginal people to collect and use as they moved around the various parts of the landscape, with fresh water sourced from tributaries to the Hawkesbury River as well as natural springs on the main ridgeline. Raw materials suitable for stone tool-making would have been available from the Hawkesbury Sandstone and possibly the Maroota Sand Formation, with these sourced from outcrops and along the creek systems, where transported in gravel and cobble form down from the eroding ranges. Outcrops and overhangs provided rockshelters suitable for occupation and art making, while exposed platforms allowed for engraving sites and axe-grinding in the vicinity of potholes or along the numerous freshwater streams and creeks dissecting the landscape.

Where sites have been recorded both within and around the study area, these are associated with the underlying sandstone geology, more commonly being obtrusive site types such as rockshelters (with art, artefacts and/or PAD), grinding grooves, and, on the eastern side of the ridge, rock art engravings. The interpretation of the main Maroota Ridge as a key travel corridor and part of a transitional zone between groups may be reflected in some of the archaeological site patterning evident from the background information review and field survey. Maroota Ridge contains an abundance of spectacular rock engraving sites. These vary in style, depictions, level of detail and the number of engravings but all are highly culturally significant and likely related to Aboriginal ceremonial and spiritual practice. Such sites usually had specific cultural laws and rules around access and use, and the sort of activities that took place there. The absence of such engraving sites on the western side of the ridgeline may reflect a divide in how Aboriginal people thought about the landscape and what sort of activities were undertaken on the different sides of the ridge. Art on the western side of the ridge occurs as pigment-based motifs in shelters, despite the occurrence of apparently suitable sandstone platform outcrops. There is thus something of a continuum in the archaeological landscape from one site type to the other.

The range of site types and successful identification of archaeology indicates that material traces of Aboriginal landscape use survive in the region across a range of landforms, but are variably affected by disturbance factors including erosion/colluviation, flooding and European land use practices. Elevated landforms in association with water sources have consistently been identified as displaying higher potential for Aboriginal camp sites. More regular and repeated visitation is likely to have taken place near major water sources in the region which acted as focal points for subsistence and social activities. Repeated visitation is also likely associated with ceremonial and spiritual activities on the ridgetops and at engraving sites, but may leave less of a material trace in the archaeological record (apart from the engravings themselves) if these were separated from the more domestic activities that tend to generate a larger quantity of artefacts. Isolated artefacts resulting from accidental loss or deliberate discard while moving through the landscape may occur anywhere.

The erosional soils and steep gradients present across the majority of the study area lower the archaeological potential for open context artefact sites and archaeological deposit, which are more commonly preserved in the protected closed context of rockshelter sites, however several of these sites types have been recorded on level, elevated sections of the main ridgeline and spurs where soil integrity has been preserved and disturbance levels are low. This includes the identified area of PAD along the ridge spur in the study area.

Field survey confirmed the prior landscape assessment of the study area. Despite the limitations to surface visibility it was still possible to assess the archaeological potential based on landform, vegetation and disturbance. Soils on the flatter crest landforms of the main ridge spur appeared to be substantially intact, albeit affected by previous vegetation clearance. Archaeological excavation of the PAD site recorded in these areas would be required to record the nature and extent of any archaeological deposit. On steeper gradient slopes, subsurface deposit is unlikely, particularly in rocky areas where poorly developed Lithosols occur. The valley side slopes are also affected by colluvial movement and soil transfer accelerated by previous vegetation clearance and frequent and intense bushfire activity. Sandstone overhangs are frequent and a number of rockshelter sites have been identified within the current study area. These contain a variety of archaeological material including stone artefacts, pigment art and areas of PAD associated with sandy deposit on the shelter floors. Several other overhangs were also recorded as 'Potential Habitation Shelters'. These did not contain archaeological material and are not Aboriginal sites, but may have been used by Aboriginal people for temporary shelter or activity while moving around and between other sites in the vicinity. Grinding groove sites were also identified in the tributary creek gullies of the study area and there are likely additional examples of this site type present along the creeks within the study area.

The field survey included a particular focus on the main ridge spur and adjoining side slopes where the extraction impact is proposed. Given that no outcropping sandstone was identified along the crest, the likelihood of unidentified engraving, grinding groove or shelter sites occurring is low. This landform has low sensitivity for the obtrusive site types most common within the study area, which occur more frequently on the slopes and within creek gullies. Suitable outcropping material on the sideslopes was comprehensively inspected and assessed and the survey had a high degree of confidence in the identification of archaeological sites in these areas.

8.1 Identified Aboriginal heritage within the study area

Review of background information, Aboriginal community consultation, and archaeological assessment has resulted in the identification of 24 Aboriginal archaeological sites and one PAD within the study area (Table 14). Six Potential Habitation Shelters were also recorded but are not considered to be Aboriginal archaeological sites. Site locations are shown on Figure 9.

Table 14. Identified Aboriginal archaeological sites within the study area

Site Name	Landscape Context	Feature(s)
DM01	Closed	Art
DM02	Open	Artefact
Maroota Shelter 1 PAD	Closed	PAD
Maroota Shelter 2 PAD	Closed	PAD
Maroota TRE 1	Open	Modified Tree
Maroota Shelter 3 PAD	Closed	PAD
Maroota Shelter 4 PAD	Closed	PAD
Maroota Shelter 5 ART+AFT	Closed	Art; Artefact
Maroota Shelter 6 ART	Closed	Art
Maroota Shelter 7 ART+PAD	Closed	Art; PAD
Maroota Shelter 8 ART+AFT	Closed	Art; Artefact
Maroota GDG 1	Open	Grinding Groove
Maroota Shelter 9 PAD	Closed	PAD
Maroota GDG 2	Open	Grinding Groove
Maroota GDG 3	Open	Grinding Groove
Maroota Shelter 10 PAD	Closed	PAD
Maroota IF 1	Open	Artefact
Maroota AFT 1	Open	Artefact
Maroota Shelter 11 ART+PAD	Closed	Art; PAD
Maroota Shelter 12 PAD	Closed	PAD
Maroota Shelter 13 AFT	Closed	Artefact
Maroota AFT 2	Open	Artefact
Maroota Shelter 14 PAD	Closed	PAD
Maroota Shelter 15 PAD	Closed	PAD
Maroota PAD 1	Open	PAD
Maroota PHS 1	Closed	Potential Habitation Shelter (not a site)
Maroota PHS 2	Closed	Potential Habitation Shelter (not a site)
Maroota PHS 3	Closed	Potential Habitation Shelter (not a site)
Maroota PHS 4	Closed	Potential Habitation Shelter (not a site)
Maroota PHS 5	Closed	Potential Habitation Shelter (not a site)
Maroota PHS 6	Closed	Potential Habitation Shelter (not a site)

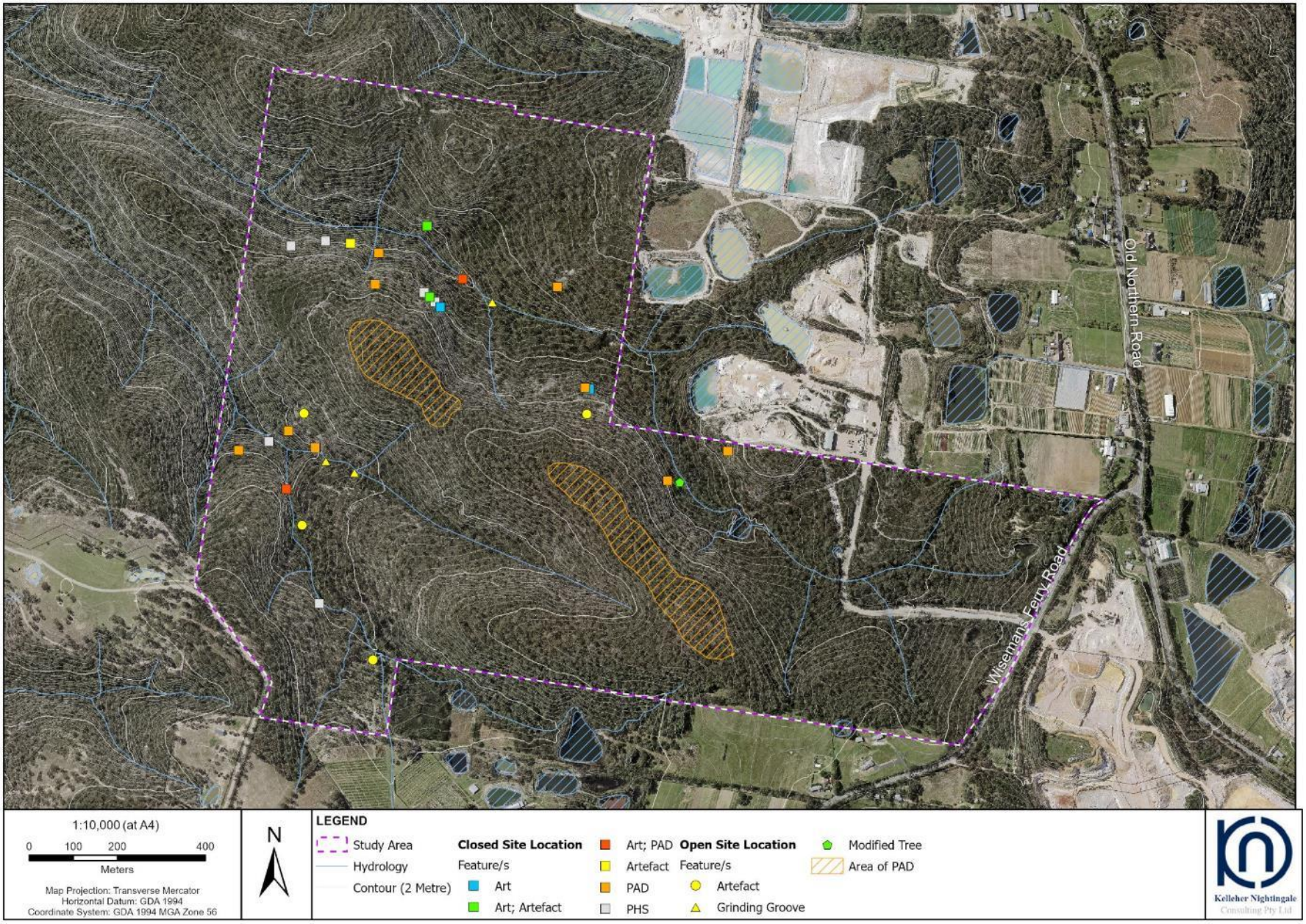

Figure 9. Identified sites within the study area

9 Cultural Heritage Values and Assessment of Significance

9.1 Significance 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 2010a) requires significance assessment according to criteria established in the Australia ICOMOS Burra Charter (Australia ICOMOS 2013). 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
- 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 *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. According to Heritage NSW, "social or cultural value can only be identified though consultation with Aboriginal people" (OEH 2011:8).

The significance assessment for the identified archaeological sites has focussed on the social/cultural, historic, scientific and aesthetic significance of Aboriginal heritage values as identified in *The Burra Charter*.

Social Values

This area of assessment concerns the value/s of a place, feature or site to a particular community group, in this case the local Aboriginal community. Aspects of social significance are relevant to sites, objects and landscapes that are important or have become important to the local Aboriginal community. This importance involves both traditional links with specific areas as well as an overall concern by Aboriginal people for sites generally and their continued protection. Aboriginal cultural significance may include social, spiritual, historic and archaeological values.

It has been identified during the consultation process that the local area has cultural heritage value (social value) to the local Aboriginal community (see Section 2.6). All archaeological sites display cultural significance to the Aboriginal community. Discussions held during the site visit confirmed the high significance and cultural value of the sites.

Regarding Aboriginal sites identified within the study area, no specific cultural or social values expressed by these sites have been identified to date.

Historic Values

Historical research did not identify any information regarding specific historical significance of identified Aboriginal archaeological sites within the study area. No specific historical significance for the sites within the study area has been provided by the registered Aboriginal stakeholders to date.

Scientific Values

For archaeologists, scientific significance refers to the potential of a site to contribute to current research questions. Alternately, a site may be an in situ repository of demonstrably important information, for example rare artefacts of unusually high antiquity.

Scientific significance is assessed using criteria to evaluate the contents of a site, state of preservation, integrity of deposits, representativeness of the site type, rarity/uniqueness and potential to answer research questions on past human behaviour. The recommended criteria for assessing archaeological significance include:

- Archaeological Research Potential - significance may be based on the potential of a site or landscape to explain past human behaviour and can incorporate the intactness, stratigraphic integrity or state of preservation of a site, the association of the site to other sites in the region (connectivity), or a datable chronology.

- Representativeness - all sites are representative of those in their class (site type/subtype) however the issue here relates to whether particular sites should be conserved to ensure a representative sample of the archaeological record is retained. Representativeness is based on an understanding of the regional archaeological context in terms of site variability in and around the study area, the resources already conserved and the relationship of sites across the landscape.

- Rarity – which defines how distinctive a site may be, based on an understanding of what is unique in the archaeological record and consideration of key archaeological research questions (i.e. some sites are considered more important due to their ability to provide certain information). It may be assessed at local, regional, state and national levels.

High significance is usually attributed to sites which are so rare or unique that the loss of the site would affect our ability to understand an aspect of past Aboriginal use/occupation of an area. In some cases a site may be considered highly significant because it is now rare due to destruction of the archaeological record through development. Moderate (medium) significance is attributed to sites which provide information on an established research question. Sites with moderate significance are those that offer the potential to yield information that will contribute to the growing holistic understanding of the Aboriginal cultural landscape of the area. Archaeological investigation of moderately significant sites will contribute knowledge regarding site type interrelationships, cultural use of landscape features and occupation patterns. Low significance is attributed to sites which cannot contribute new information about past Aboriginal use/occupation of an area. This may be due to site disturbance or the nature of the site's contents.

Aesthetic Values

Aesthetic values are often closely related to the social values of a site or broader cultural landscape. Aspects may include scenic sights, smells and sounds, architectural fabric and creative aspects of a place. Archaeological sites within the study area have no specific associated aesthetic values, or aesthetic values identified by registered Aboriginal community groups to date. General aesthetic values include the sites' landscape positions amongst native bushland along the creek corridors.

9.2 Statements of Significance

The study area contains 24 identified Aboriginal archaeological sites and one potential archaeological deposit. The majority of these comprise closed context rockshelter sites (67%) featuring art, artefacts and/or PAD. A smaller number of open context artefact sites, grinding grooves and one modified tree also occur. Archaeological sensitivity of the study area is strongly linked to geology and topography/landform. Aboriginal grinding grooves and rock shelter sites occur where there are suitable sandstone outcrops and overhangs on the slopes off the main ridge spur crest. These site types are typical and representative of what is expected based on regional archaeological models and previous recordings. Open scatters of artefacts are less prevalent in sandstone geology, but occur in low densities on exposed sandstone platforms and in stable, more level areas of lower disturbance. The PAD area occurs in a similar context. The modified tree occurs in a sheltered area which has retained some older vegetation. This site type may be considered relatively rare in close proximity to the ridgeline, where clearing has been more widespread.

The low level of development and native bushland within the study area (despite previous clearing) enhances the natural landscape context of the sites and the connectivity between them. When considered both individually and as a body, the sites display demonstrable value in their ability to express the Aboriginal cultural landscape still present within the area. Taken together, the identified archaeological sites express the Aboriginal cultural heritage of the area and form part of an archaeological continuum leading up to the main ridgeline. Several of the sites occur in close spatial proximity and may be considered as part of interrelated site complexes. The Aboriginal cultural heritage and history of the region is displayed physically through these sites.

Closed context sites are identified by Aboriginal stakeholders as having particular Aboriginal cultural heritage value, especially where these contain art. Existing damage and disturbance to shelters within the study area is mostly absent or minor and does not detract from their cultural heritage significance. Those containing artefacts or PAD generally display moderate to high archaeological research potential for their ability to inform on Aboriginal landscape use. Grinding groove sites mark the actual places people worked in the past. Rock marking sites (engravings, paintings and grinding grooves) are fixed points in the landscape and represent hard connections with the past. The spatially discrete nature of these site types often assists in site management and protection, given they usually have clearly defined boundaries. The majority of the open context artefact sites display low archaeological potential due to their location on exposed bedrock sandstone platforms or in a disturbed context. They are typical of the region in terms of artefact raw materials, types and low densities. Research potential and archaeological value is increased where the site is associated with a stable, low gradient landform and the potential for associated subsurface deposit. This is also true of the identified PAD area along the main ridge.

Based on the values assessment, the following levels of significance were ascribed to the sites within the study area:

Table 15. Assessed significance of Aboriginal archaeological sites/PAD within the study area

Site/PAD Name	Site Type	Assessed Significance/Potential
DM01	Shelter with Art	High
DM02	Artefact Scatter	Low
Maroota Shelter 1 PAD	Shelter with PAD	High
Maroota Shelter 2 PAD	Shelter with PAD	High
Maroota TRE 1	Modified Tree	Moderate
Maroota Shelter 3 PAD	Shelter with PAD	High
Maroota Shelter 4 PAD	Shelter with PAD	High
Maroota Shelter 5 ART+AFT	Shelter with Art and Artefacts	High
Maroota Shelter 6 ART	Shelter with Art	High
Maroota Shelter 7 ART+PAD	Shelter with Art and PAD	High
Maroota Shelter 8 ART+AFT	Shelter with Art and Artefacts	High
Maroota GDG 1	Grinding Grooves	Moderate
Maroota Shelter 9 PAD	Shelter with PAD	High
Maroota GDG 2	Grinding Grooves	Moderate
Maroota GDG 3	Grinding Grooves	Moderate
Maroota Shelter 10 PAD	Shelter with PAD	High
Maroota IF 1	Isolated Artefact	Moderate
Maroota AFT 1	Artefact Scatter	Moderate
Maroota Shelter 11 ART+PAD	Shelter with Art and PAD	High
Maroota Shelter 12 PAD	Shelter with PAD	High
Maroota Shelter 13 AFT	Shelter with Artefacts	High
Maroota AFT 2	Artefact Scatter	Low
Maroota Shelter 14 PAD	Shelter with PAD	High
Maroota Shelter 15 PAD	Shelter with PAD	High
Maroota PAD 1	PAD	Moderate potential

10 The Proposed Activity and Impact Assessment

The proposed activity is the extraction and processing of Hawkesbury and Maroota Sandstone into a fine-medium graded sand. Crushed sandstone, fine graded sand and a fine aggregate may also be produced as a by-product of the primary process. The project will involve the implementation of an extraction and rehabilitation plan simultaneously so that the study area will be suitable for other uses in the future. The proposal includes:

- the establishment of a processing plant and associated works such as a weighbridge, machinery sheds, office etc;
- the clearing of vegetation to expose working surfaces;
- the construction of haul roads, both temporary and permanent;
- the removal and storage of overburden;
- the extraction of Hawkesbury Sandstone within approved depths and setbacks;
- the haulage and delivery of extracted material to the processing plant;
- the establishment and operation of clean water supplies to the processing plant;
- the establishment and operation of a tailings disposal system;
- the stockpiling of processed sand;
- the loading and transport of processed sand for delivery to the metropolitan area via either the Old Northern Road or Wisemans Ferry Road;
- the construction of landforms within the extracted area in accordance with an approved rehabilitation plan, using the stored overburden; and
- the importation of clean material for the construction of landforms within the extracted area in accordance with approvals and an approved rehabilitation plan, and the revegetation of the constructed landforms.

The specific area to be affected by the extractive activities is the main ridge spur which runs northwest from Wisemans Ferry Road into the centre of the study area. This would be the focus of quarrying activity. Additional impacts are expected from associated infrastructure, some cut/fill earthworks adjacent to the quarried area, and establishment of water storage including a new dam immediately west of the extraction area.

The majority of the study area is not expected to be impacted by the proposed extraction and associated activities and will be retained as native bushland. The wider project boundary and the proposed impact area is shown in Figure 10. The proposed impact area has been restricted in the vicinity of Aboriginal heritage sites to ensure a 35 metre buffer is provided between direct impact and the site locations. While placement of some specific infrastructure elements would be determined at the detailed design stage, a maximum impact assessment presents the most comprehensive option for determining appropriate management and mitigation of Aboriginal heritage impacts.

10.1 Avoiding harm

Early identification and assessment of Aboriginal heritage sites and areas of archaeological potential has allowed for more informed management of impacts and avoidance of sites and archaeologically sensitive areas. In general, the extractive proposal is associated with the main ridge spur which is not a focus of Aboriginal archaeology within the study area: sites are more common on the slopes and in the creek gullies, associated with outcropping sandstone.

Deerubbin LALC is committed to industry-leading protection and preservation of Aboriginal heritage. The project represents a strong positive conservation outcome, with identified archaeological sites within the study area to be avoided by the proposal. This includes ensuring no impact to highly significant rock shelter sites within the study area. Where extractive activities are proposed in the vicinity of recorded shelter sites, a 35 metre radius buffer zone will be maintained between the extent of the direct impact area and the site locations to ensure complete avoidance and no inadvertent impact. The proposed impact area as shown in Figure 10 excludes direct impact within this 35 metre buffer zone. Potential Habitation Shelters do not constitute archaeological sites and are not included in the formal impact assessment; however, these landscape features are also located outside of the proposed impact area and are unlikely to be affected by the proposal. Following completion of the extraction operations, a portion of the landform will be reconstructed and rehabilitated, ensuring the landscape connection between sites is maintained for future generations.

10.2 Impact assessment

10.2.1 Direct impacts

The PAD area identified along the main ridge would be directly impacted by the proposal and suitable mitigation measures are outlined in Section 11.

No other identified Aboriginal archaeological sites would be directly impacted by the project.

10.2.2 Indirect impacts

Potential indirect impacts from vibration and changes in hydrological behaviour have also been considered, which are relevant when considering impacts to archaeological sites (particularly rockshelters and grinding grooves).

The proposed extraction methodology is the use of a bulldozer equipped with ripper bars or equivalent excavator attachment directly on the exposed sandstone face. A front-end loader or equivalent vehicle would then be used to load a dump truck with the excavated material to be taken the processing plant. These activities are unlikely to cause potentially shelter-damaging vibration effects, especially given they will not be undertaken within the buffer zones. The proposal is therefore unlikely to have any vibration impacts on the identified Aboriginal archaeological heritage. If any blasting activities are proposed as part of the extraction methodology these would require additional assessment to ensure they will not affect Aboriginal sites.

Water requirements for the project are likely to be met through a combination of surface storage (clear water dam(s)) and supplementary pumped groundwater. Surface water impacts are anticipated to be minor and will be adequately managed through the application of a Water Management Plan. Potential groundwater impacts include reduced flow to streams, and disruption to downgradient drainage patterns including location, quantity and quality of waters. Groundwater flow contributions will only be needed intermittently when water storage levels fall below a predetermined level, which is anticipated to happen infrequently. Management measures regarding the prevention of water impacts and sediment runoff from the extraction operation should also extend to ensuring deposition or scouring does not occur over the grinding groove sites or rockshelter floors downgradient of the extraction area.

Appropriate management and mitigation procedures have been developed to minimise harm caused to Aboriginal heritage sites, as described in Sections 11-12.

Based on the impact assessment and implementation of the proposed buffer zones, proposed impacts to sites identified within the study area are detailed in Table 16 and shown in Figure 10.

Table 16. Proposed impact to Aboriginal archaeological sites/PAD within the study area

Site/PAD Name	Assessed Significance/Potential	Type/Degree of harm	Consequence of harm
DM01	High	None	No loss of value
DM02	Low	None	No loss of value
Maroota Shelter 1 PAD	High	None	No loss of value
Maroota Shelter 2 PAD	High	None	No loss of value
Maroota TRE 1	Moderate	None	No loss of value
Maroota Shelter 3 PAD	High	None	No loss of value
Maroota Shelter 4 PAD	High	None	No loss of value
Maroota Shelter 5 ART+AFT	High	None	No loss of value
Maroota Shelter 6 ART	High	None	No loss of value
Maroota Shelter 7 ART+PAD	High	None	No loss of value
Maroota Shelter 8 ART+AFT	High	None	No loss of value
Maroota GDG 1	Moderate	None	No loss of value
Maroota Shelter 9 PAD	High	None	No loss of value
Maroota GDG 2	Moderate	None	No loss of value
Maroota GDG 3	Moderate	None	No loss of value
Maroota Shelter 10 PAD	High	None	No loss of value
Maroota IF 1	Moderate	None	No loss of value
Maroota AFT 1	Moderate	None	No loss of value
Maroota Shelter 11 ART+PAD	High	None	No loss of value
Maroota Shelter 12 PAD	High	None	No loss of value
Maroota Shelter 13 AFT	High	None	No loss of value
Maroota AFT 2	Low	None	No loss of value
Maroota Shelter 14 PAD	High	None	No loss of value
Maroota Shelter 15 PAD	High	None	No loss of value
Maroota PAD 1	Moderate potential	Direct / Total	Total loss of value

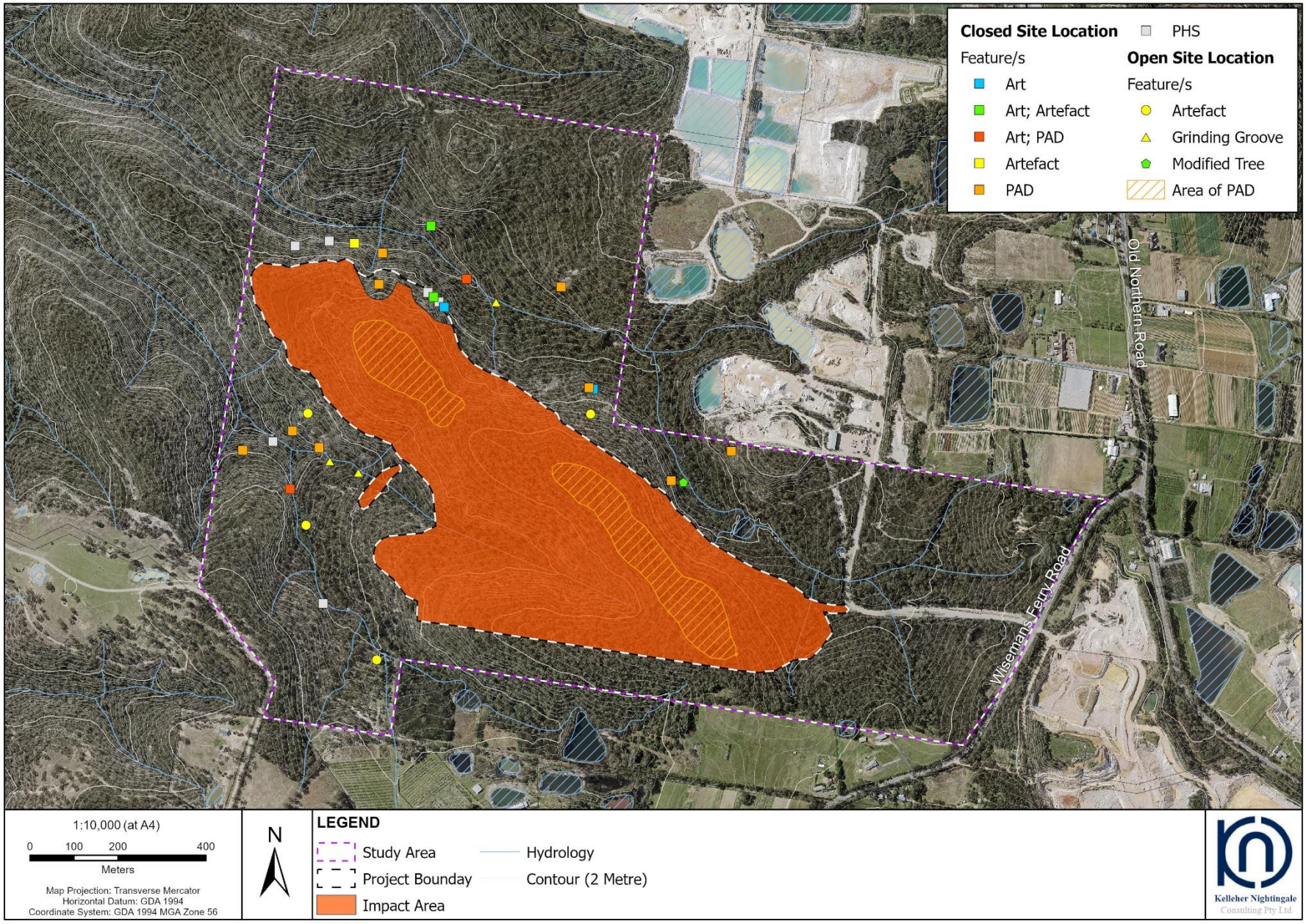

Figure 10. Proposed impact area and Aboriginal heritage

11 Mitigating Harm

All identified Aboriginal archaeological sites identified within the study area have been considered by Deerubbin LALC in relation to the development and ongoing design of the project. The first priority is to avoid harming Aboriginal cultural heritage where possible. Focusing the proposed extractive activity on the main ridge spur effectively avoids the more archaeologically sensitive slopes and creek gullies below, where significant archaeological sites have been identified.

Implementation of 35 metre radius buffer zones around archaeological shelter sites in proximity to the proposed extraction boundary will ensure these are avoided and not impacted by the proposed works. Indirect impacts such as vibration and changes in hydrological regime are not anticipated to cause impacts to the archaeological sites. Impact mitigation for the majority of identified sites is therefore not required.

Impact assessment identified that the PAD area located along the main ridge spur would be directly impacted by the proposal. Impact is unavoidable due to the PAD's location atop the proposed extraction resource.

The PAD does not contain confirmed Aboriginal objects but displays moderate potential for subsurface deposit. Appropriate mitigation for impact to the PAD would comprise an excavation program to record the nature and extent of any associated archaeological material. This should comprise a staged program with initial excavation to be undertaken prior to any impact from the proposal. Initial excavation should be undertaken in accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (OEH 2010a).

If the initial excavation determines that the PAD is an archaeological site, subsequent mitigation requirements and methodology (archaeological salvage excavation) would be determined on the basis of archaeological significance and in consultation with Deerubbin LALC and registered Aboriginal stakeholders. If the site is of moderate or higher archaeological significance, mitigative salvage excavation will be required.

The scientific value of archaeological sites is linked to the physical information the sites contain. The recovered archaeological information will increase our understanding, strengthen our interpretations and improve ongoing and future management of Aboriginal heritage in the surrounding area. The spatial extent, presence of archaeological deposits and activities related to Aboriginal occupation at open context archaeological sites in the surrounding area are not yet fully understood due to the relative rarity of this site type on the elevated sandstone country and limited excavation data.

In this light, the project offers an opportunity to advance the interpretation and management of Aboriginal heritage of the surrounding area by contributing to the baseline of information available to future heritage assessments. Aboriginal stakeholders have previously expressed that all archaeological sites hold cultural value and significance, regardless of disturbance or low artefact densities, and the loss of intrinsic Aboriginal cultural value of impacted sites cannot be offset. However, information recovered from mitigation activities is equally as valuable to the contemporary Aboriginal community as it is to archaeologists as it expresses the overall cultural story of the area and has cultural and social value independent of its scientific significance. Combining cultural and scientific values in this manner is a positive outcome for Aboriginal heritage.

As noted previously, the majority of identified sites are being avoided and will be protected by suitable buffer zones, where required. Mitigation measures (beyond the buffer zone) are not required where sites will not be impacted by the project.

General mitigation measures include development of a policy for the ongoing management of Aboriginal heritage for the project (see Section 13) including procedures for unexpected heritage items such as Aboriginal objects, procedures for handling human remains, procedures for proposed changes to the Approved Project, and ongoing regular monitoring of the sites.

Measures for mitigating harm to Maroota PAD 1 are outlined in Table 17 below.

Table 17. Mitigation measures for impacted Aboriginal PAD

PAD Name	Archaeological Potential	Mitigating Harm
Maroota PAD 1	Moderate	Project Approval from DPIE required. Archaeological excavation required prior to impact. Subsequent salvage requirements and methodology to be determined based on archaeological significance and consultation with Deerubbin LALC and registered Aboriginal stakeholders.

12 Management Outcomes

The following management outcomes will be implemented in accordance with the mitigation requirements for the proposal as outlined in Section 11 and the management policies in Section 13.

12.1 Active protection of archaeological sites

The identified Aboriginal archaeological sites listed in Table 18 occur in proximity to the project boundary and the proposed extraction direct impact area and require active protection measures. These sites require the establishment of a buffer zone to ensure no inadvertent direct or indirect impacts from the proposal. The 35 metre radius buffer zone should be established around each site area with no extraction works or associated activities to take place within the buffer zone.

Site locations should be clearly identified on the Construction Environmental Management Plan (CEMP) and the buffer zones between the direct impact area and the project boundary marked as environmentally sensitive "no-go" zones. Workers should be inducted as to appropriate Aboriginal heritage protection measures.

Temporary fencing or other clear demarcation should be installed around the edge of the impact boundary prior to pre-construction or construction/extraction activities occurring to provide a physical barrier against accidental access or impact.

Table 18. Aboriginal sites requiring active protection (buffer zones)

Archaeological sites requiring active protection	
Archaeological Sites (requiring buffer zones)	Maroota Shelter 3 PAD Maroota Shelter 5 ART + AFT Maroota Shelter 6 ART Maroota PHS 1 Maroota PHS 2

12.2 Mitigation through archaeological excavation

Where impact to the Aboriginal PAD in Table 17 cannot be avoided, archaeological excavation will be required as mitigation. The PAD is of moderate assessed potential and requires excavation to record the nature and extent of any archaeological deposit.

This should comprise a staged program with initial excavation to be undertaken prior to any impact from the proposal. If the initial excavation determines that the PAD is an archaeological site, subsequent mitigation requirements and methodology (archaeological salvage excavation) would be determined on the basis of archaeological significance and in consultation with Deerubbin LALC and registered Aboriginal stakeholders.

Any subsequent salvage excavation must be completed following the issue of Project Approval and prior to any activities which may harm Aboriginal objects at the identified site location(s). Salvage excavation activities and scope would be dependent on the archaeological content of the site.

Table 19. Aboriginal PAD requiring mitigation (archaeological excavation)

PAD requiring mitigation (archaeological excavation)	
Potential Archaeological Deposit (requiring archaeological excavation)	Maroota PAD 1

12.3 Site monitoring

Periodic site monitoring should be undertaken during the life of the project to ensure sites remain protected. This should comprise physical inspection of the sites every 12 months as part of environmental reporting/monitoring requirements for the project. Inspection should be undertaken by a qualified archaeologist and representative from Deerubbin LALC.

Site monitoring will also ensure that management measures regarding the prevention of water impacts and sediment runoff from the extraction operation are sufficient to protect the identified sites, and that no unanticipated impacts are occurring.

13 Management Plan

13.1 Management Policy for Aboriginal Heritage

The policy for the management of Aboriginal heritage in relation to site protection, mitigation activities and construction/extraction activities (or fencing, geotechnical investigations, minor clearing, establishing site compounds, adjustment to services/utilities etc.) is described below:

Responsibility for compliance with Management Policy

1. The Proponent must ensure all of its employees, contractors and subcontractors and agents are made aware of and comply with this management policy.
2. The Proponent must appoint a suitably qualified and experienced environmental manager who is responsible for overseeing the activities related to this management policy.
3. The Proponent must appoint a suitably qualified and experienced Archaeologist who is responsible for overseeing, for and on behalf of the Proponent, the archaeological activities relating to the project.

Operational constraints

4. Where archaeological excavation has been nominated for the impacted PAD, no construction or extraction activities (or fencing, geotechnical investigations, minor clearing, establishing site compounds, adjustment to services/utilities etc.) can occur on the lands to be investigated until the relevant archaeological excavation at the nominated PAD has been completed.
5. Prior to the commencement of early works activity (e.g. fencing, minor clearing, establishing site compounds etc.) a construction heritage site map identifying the Aboriginal PAD requiring archaeological excavation and Aboriginal sites to be avoided (for all sites in proximity to the project boundary, inclusive of buffer zones) must be prepared. The construction heritage site map should be prepared to the satisfaction of Deerubbin LALC.
6. All employees, contractors, subcontractors and agents carrying out early works activities (e.g. fencing, minor clearing, geotechnical investigations, establishing site compounds etc) must undertake a Project induction (including the distribution of a construction heritage site map) to ensure that they have an understanding of and are aware of the Aboriginal heritage issues affecting the activity.

Areas of Aboriginal archaeological sites and objects to be actively avoided

7. Active protection is required for the sites as listed in Table 18 of this report and in accordance with the Project Approval. Buffer zones should be established prior to the commencement of any early works activities to take place in the vicinity of the identified sites. The boundary of the impact area should be fenced or otherwise clearly demarcated to ensure no inadvertent access or impact to the buffer zones. Buffer zones should be maintained for the duration of the project.

Areas of Aboriginal PAD to be impacted

8. Where impact cannot be avoided, mitigation is required for the PAD as listed in Table 19 of this report and in accordance with the Project Approval.

Human Remains

9. This management policy does not authorise any damage of human remains.
10. If potential human remains are disturbed the Proponent must follow the procedures outlined in section 13.2 below.

Mitigation activities

11. Archaeological excavation where appropriate must be carried out in accordance with the recommendations specified in Section 12.2 of this report and in accordance with the Project Approval.

Management of Aboriginal objects

12. Department of Planning, Industry and Environment (DPIE), as the approval authority, will be consulted.
13. Registered Aboriginal stakeholders for the project will be consulted.
14. Requirement 26 “Stone artefact deposition and storage” in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (OEH 2010) must be complied with.
15. Management of any objects recovered from archaeological activities will comply with this requirement and conditions of Project Approval.

Reporting requirements

16. A written archaeological report documenting the excavation program must be provided to the Proponent within a reasonable time in accordance with the Project Approval following the completion of any archaeological excavation program for the project.
17. Where required, an Aboriginal Site Impact Recording Form (ASIRF) must be completed and lodged with Heritage NSW within a reasonable time after the approved activities have been completed.

Notification and reporting about incidents that breach this management policy

18. Incident reporting requirements in accordance with the Project Approval is to include Aboriginal heritage.

13.2 Procedures for Handling Human Remains

- **Note that Project Approvals do not include the destruction of Aboriginal remains**

This section outlines the procedure for handling human remains in accordance with the Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the *Heritage Act 1977* (NSW Heritage Office 1998) and the Aboriginal Cultural Heritage Standards and Guidelines Kit (NPWS 1997). In the event that construction/extraction activity reveals possible human skeletal material (remains), the following procedure is to be followed:

1. as soon as remains are exposed, all work is to halt at that location immediately and the Project environmental manager on site is to be immediately notified to allow assessment and management;
    i. stop all activities; and
    ii. secure the site.
2. contact police, the discovery of human remains triggers a process which assumes that they are associated with a crime. The NSW Police retain carriage of the process until such time as the remains are confirmed to be Aboriginal or historic;
3. DPIE, as the approval authority, will be notified when human remains are found;
4. once the police process is complete and if remains are not associated with a contemporary crime contact DPIE. DPIE will determine the process, in consultation with Heritage NSW as appropriate;
    i. if the remains are identified as Aboriginal, the site is to be secured and DPIE and all Aboriginal stakeholders are to be notified in writing. DPIE will act in consultation with Heritage NSW as appropriate. Heritage NSW will be notified in writing according to DPIE instructions; or
    ii. if the remains are identified as non-Aboriginal (historical) remains, the site is to be secured and the DPIE is to be contacted. DPIE will act in consultation with the Heritage NSW as appropriate. Heritage NSW will be notified in writing according to DPIE instructions;
5. once the police process is complete and if the remains are identified as not being human work can recommence once the appropriate clearances have been given.

13.3 Procedures for Handling Unexpected Aboriginal Objects

This section outlines the procedure for handling unexpected archaeological sites and objects. In the event that construction/extraction activity reveals possible Aboriginal objects other than those identified in Table 14 of this report, the following procedure is to be followed:

1. all work is to halt at that location immediately and the Project environmental manager on site is to be immediately notified to allow assessment and management;
    i. stop all activities; and
    ii. secure the site.
2. contact the project archaeologist to assess the find and determine if it is consistent with the Project Approval;
    i. if the find is consistent, the archaeologist will allow work to continue
    ii. if the find is inconsistent, Heritage NSW will be notified as soon as practical on 131555 providing any details of the Aboriginal object and its location. Work cannot recommence unless authorised in writing by Heritage NSW.

13.4 Procedure for proposed changes to Approved Projects

Deerubbin LALC recognises that during the construction of the project design alterations or other changes to the Approved Project may be required.

A proposed change to the Approved Project (such as an alteration of the current design, the location of ancillary facilities) within the project area may result in a:

- Reduced impact to Aboriginal cultural heritage; or an
- Increased impact to Aboriginal cultural heritage.

Note: the use of the word impact in this section is defined as an impact on the significance of Aboriginal cultural heritage rather than simply an increased physical impact.

To ensure consistency with the Approved Project and this document any change in the overall impact on Aboriginal cultural heritage will need to be considered. The process to determine consistency is outlined in section 13.4.1 below.

Where a proposed change to the Approved Project occurs outside of the project boundary considered for the EIS further heritage assessment will be required to determine if there would be an impact on Aboriginal cultural heritage and whether this represents a modification to the Approved Project (outlined below).

13.4.1 Changes in heritage impact

Where the Proponent seeks to make a change to the design and construction of the Approved Project which changes the assessed impact on Aboriginal cultural heritage the Proponent will need to prepare an assessment of the new impacts of this work in consultation with the appointed Archaeologist. The continued involvement of the Aboriginal stakeholders in this process is outlined in section 13.5.

- New impacts consistent with previously identified impacts

If a proposed change to the Approved Project is considered to have a neutral or lesser significant impact on Aboriginal cultural heritage than that identified in this document it would be considered a consistent impact.

If the proposed change is considered to be consistent with the Approved Project Deerubbin LALC may approve the change with no requirements to seek further approval. However, in certain circumstances, further consultation with Aboriginal stakeholders may still be required (see section 13.5 below).

- New impacts inconsistent with previously identified impacts

If a proposed change to the Approved Project is considered to have a more significant impact on Aboriginal cultural heritage than that identified in the EIS it would be considered an inconsistent impact.

If the proposed change is considered inconsistent with the assessed impact on Aboriginal cultural heritage, as detailed in the Project Approval, Deerubbin LALC would require an amendment to the mitigation measures agreed in this report. If this proposed change is considered inconsistent with the Approved Project Deerubbin LALC would require a modification of the Approved Project. Further consultation with Aboriginal stakeholders will be undertaken (see 13.5 below).

13.5 Process for continued consultation with Aboriginal stakeholders

The extent to which Deerubbin LALC will continue to consult with Aboriginal stakeholders is dependent upon the level of impact and whether the area was assessed as part of the EIS. The types of potential impacts are identified as reduced impacts, increased impacts or unknown impacts.

a) Reduced or neutral impact
If as a result of alterations to the project design (e.g. during detailed design phase) a previously identified impact to an Aboriginal heritage item is reduced or neutral then no further consultation is required.

If as a result of alterations to the project design an impact to an Aboriginal heritage item is proposed that results in a reduced impact on the overall heritage significance of the project area (i.e. the cumulative impact is reduced), then further consultation with Aboriginal stakeholders will be undertaken. This consultation may entail a site visit, phone call and phone log of comments received or the provision of a report for comment (10 working days).

b) Increased Impact
Where as a result of alterations to the project design an impact on Aboriginal heritage is considered to be greater than identified by the Approved Project further consultation will be undertaken. This consultation will entail either a site visit or the provision of a report for comment (10 working days).

c) Unknown impacts: Assessment process
Where a proposed change is in an area located outside of the project boundary assessed as part of the Approved Project the impact on Aboriginal cultural heritage is considered to be unknown. This area would require preliminary assessment to determine any impacts upon Aboriginal heritage. Should no impacts be identified then no consultation with Aboriginal stakeholders is required. Should potential impacts be identified consultation with Aboriginal stakeholders will be undertaken. This consultation will entail the provision of a report for stakeholder comment (10 working days) detailing the impacts and mitigation strategies proposed.

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Appendix A AHIMS Extensive Search

Office of Environment & Heritage NSW GOVERNMENT

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 2009
Client Service ID : 555855

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-2-2381	MQIF1 (Maroota Quarry Find 1)	AGD	56	312717	6296191	Open site	Valid	Artefact : 1		
	Contact T Russell	Recorders	Navin Officer Heritage Consultants Pty Ltd					Permits		
45-3-3441	CC5 (Rockshelter)	GDA	56	314343	6298044	Closed site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Oliver Brown Consulting Archaeology,Mr.Oliver Brown					Permits		
45-3-1483	Cooper's Creek 3;Hart Place, Maroota.;	AGD	56	315380	6296300	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	589
	Contact	Recorders	J.A Hatfield					Permits		
45-3-1484	Cooper's Creek 8;Hart Place, Maroota.;	AGD	56	315320	6296230	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	589
	Contact	Recorders	J.A Hatfield					Permits		
45-3-1485	Cooper's Creek 4;Old Telegraph Road, Maroota.;	AGD	56	315320	6296100	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	589
	Contact	Recorders	J.A Hatfield					Permits		
45-3-1486	Cooper's Creek 5;Hart Place. Maroota.;	AGD	56	315350	6296290	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	589
	Contact	Recorders	J.A Hatfield					Permits		
45-3-1325	Cooper's Creek 1;Hart Place Maroota.;	AGD	56	315350	6296270	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	J.A Hatfield					Permits		
45-3-1489	Wisemans Ferry; Becketts Forest	AGD	56	314950	6293150	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	589
	Contact	Recorders	Mr.S McCarthy					Permits		
45-3-1420	Cooper's Creek 2;Hart Place, Maroota;	AGD	56	315350	6296250	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	J.A Hatfield					Permits		
45-2-2300	MR1;	AGD	56	314000	6294390	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	John Edgar					Permits		
45-3-2334	Coopers Creek CC4	AGD	56	314270	6297750	Closed site	Valid	Artefact : -	Shelter with Deposit	2991
	Contact	Recorders	John Edgar,Ms.Tessa Corkill					Permits		
45-3-2336	Coopers Creek 2	AGD	56	314200	6297900	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	2991
	Contact	Recorders	John Edgar,Ms.Tessa Corkill					Permits		
45-3-2337	Coopers Creek 3	AGD	56	314270	6297780	Closed site	Valid	Artefact : -	Shelter with Deposit	2991
	Contact	Recorders	John Edgar,Ms.Tessa Corkill					Permits		

Report generated by AHIMS Web Service on 08/12/2020 for Matthew Kelleher for the following area at Datum :GDA, Zone : 56, Eastings : 309400 - 315600, Northings : 6293300 - 6298900 with a Buffer of 0 meters. Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 21

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.

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Office of Environment & Heritage
NSW GOVERNMENT

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 2009
Client Service ID : 555855

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-3-1388	Coopers Creek 7;Maroota;	AGD	56	315300	6296200	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	J.A Hatfield					Permits		
45-3-2335	Coopers Creek 1	AGD	56	314050	6297970	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	2991
	Contact	Recorders	John Edgar,Ms.Tessa Corkill					Permits		
45-3-3388	CC6 (Rockshelter)	GDA	56	314343	6298041	Closed site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : -		101370
	Contact	Recorders	Mr.Oliver Brown					Permits		
45-3-3389	CC6 (Grinding Groove)	GDA	56	314257	6298095	Open site	Valid	Grinding Groove : 2		101370
	Contact	Recorders	Mr.Oliver Brown					Permits		
45-3-1248	Cooper's Creek 6;Old Telegraph Road / Moroota.;	AGD	56	315300	6296150	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	J.A Hatfield					Permits		
45-3-0218	Maroota; Little Devils Rock	GDA	56	315175	6293940	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	3873
	Contact	Recorders	Mr.Kelvin Officer,Fred McCarthy,Tegan Burton					Permits		
45-3-0954	The Vale; Little Devils Rock	GDA	56	315175	6293940	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	3873
	Contact	Recorders	Fred McCarthy,Tegan Burton					Permits		
45-2-0081	Maroota Trig;	AGD	56	312900	6293700	Closed site	Valid	Art (Pigment or Engraved) : -, Artefact : -	Shelter with Art,Shelter with Deposit	
	Contact	Recorders	Andrew Ross					Permits		

Report generated by AHIMS Web Service on 08/12/2020 for Matthew Kelleher for the following area at Datum :GDA, Zone : 56, Eastings : 309400 - 315600, Northings : 6293300 - 6298900 with a Buffer of 0 meters. Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 21

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Appendix B Advertisement for Registration of Interest

Notice for Registration of Interest

Deerubbin Local Aboriginal Land Council ('DLALC') is proposing to establish a friable sandstone quarry on land at Wisemans Ferry Road, Maroota NSW. The proposal is known as the Maroota Friable Sandstone Extraction Project and is located within Lot 7005 DP 1055724, Lot 202 DP 752025 and Lot 213 DP 752025 within the Hills Shire Local Government Area. Design Collaborative has been engaged as the lead planning consultant for the proposal on behalf of DLALC as the proponent (Matthew Short, Suite 304/105 Pitt St, Sydney NSW 2000).

The proposal is subject to assessment and approval under the NSW Environmental Planning and Assessment Act 1979. The purpose of this consultation is to inform the preparation of an Environmental Impact Statement for the proposal in accordance with the Planning Secretary's Environmental Assessment Requirements issued in February 2020.

DLALC invites Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places at Maroota, NSW to register interest in a process of community consultation with the contact shown below (on behalf of DLALC):

Kelleher Nightingale Consulting
Level 10, 25 Bligh Street
Sydney NSW 2000
phone 9232 5373

The closing date for registration is 16 September 2020.

Please be advised that in accordance with Heritage NSW requirements, we are required to record the names and contact details of each Aboriginal person who has registered an interest in this project and provide a copy of that record to Heritage NSW and the Local Aboriginal Land Council. If you are registering your interest, please let us know if you do not want your details forwarded to these organisations.

Appeared in: *Hawkesbury Gazette,* Public Notices. Wednesday 02/09/2020

Appendix C Aboriginal Community Comments on proposed assessment methodology

Zac Thomas

From: Carolyn .H <cazadirect@live.com>
Sent: Tuesday, 22 September 2020 1:54 PM
To: Cristany Milicich; Zac Thomas
Subject: Re: 2009 Maroota - Proposed cultural heritage assessment methodology - A1

Follow Up Flag: Follow up
Flag Status: Flagged

A1 INDIGENOUS SERVICES PTY LTD
Contact: Carolyn Hickey
M: 0411650057
E: Cazadirect@live.com
A: 10 Marie Pitt Place, Glenmore Park, NSW 2745
ACN: 639 868 876
ABN: 31 639 868 876

Hi Zac,
I have reviewed the document and support the Information & Heritage assessment Methodology.
A1 would like to be involved in any future Meetings and field work.
Kind regards
Carolyn Hickey

KAWALKAN Youth Workforce Program
A1 INDIGENOUS SERVICES PTY LTD

From: Cristany Milicich <cristany.milicich@knconsult.com.au>
Sent: Monday, 21 September 2020 11:30 AM
To: cazadirect@live.com <cazadirect@live.com>
Subject: 2009 Maroota - Proposed cultural heritage assessment methodology - A1

Dear stakeholder,

1

Cristany Milicich

From: Lee Field <barrabyculturalservices@gmail.com>
Sent: Wednesday, 23 September 2020 11:56 AM
To: Cristany Milicich
Subject: Re: 2009 Maroota - Proposed cultural heritage assessment methodology - Barraby

Dear Cristany,

Barraby has reviewed and supports the methodology associated with this project.

Many Thanks
Lee

On 21 Sep 2020, at 11:32 am, Cristany Milicich <cristany.milicich@knconsult.com.au> wrote:

Dear stakeholder,

Thank you for registering your organisation's interest in the Aboriginal heritage consultation process for the Maroota Friable Sandstone Extraction Project, Maroota NSW. We look forward to consulting with you on the project.
Please find attached some additional project information and the proposed cultural heritage assessment methodology for the project.

Any comments on the proposed assessment methodology, including relevant cultural information that might affect, refine or inform the proposed methodology, should be provided by **19 October 2020**.
Please send any comments you may have through to zac.thomas@knconsult.com.au using the details on the attached letter or via reply email to me.

Kind regards,

Cristany Milicich
Project Archaeologist
Kelleher Nightingale Consulting Pty Ltd
Level 10, 25 Bligh St
Sydney NSW 2000
p 02 9232 5373

<4.2-4.3_Barraby.pdf>

1

GINNINDERRA ABORIGINAL CORPORATION
PRESERVATION FOR ABORIGINAL HERITAGE
LAND MANAGEMENT AND CONSERVATION

PO Box 3143
GROSE VALE 2753 NSW
ginninderra.corp@gmail.com
ICN: 8266

8 October 2020

Cristany Milicich
Kelleher Nightingale Constulting Pty Ltd
Level 10, 25 Bligh Street
Sydney NSW 2000

RE: MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT, MAROOTA NSW

Dear Cristany,

Our Ginninderra Aboriginal Corporation members appreciate the opportunity to consult on this project.

Our members have immense knowledge and experience in the identification and salvage of aboriginal artefacts. All of our members are experienced in surveys, excavations and recording archaeological information on site. Several of our organisation members hold strong cultural ties to the area.

Locating and preserving evidence of Aboriginal occupation is very important to us. We find the proposed methodology to be consistent with our views, with no objections noted.

Yours sincerely,

Krystle Carroll-Elliott
Ginninderra Aboriginal Corporation
E: ginninderra.corp@gmail.com

Cristany Milicich

From: Darleen Johnson <murrabidgeemullangari@yahoo.com.au>
Sent: Thursday, 8 October 2020 5:29 PM
To: Cristany Milicich; Zac Thomas
Subject: Re: 2009 Maroota - Proposed cultural heritage assessment methodology - MBMAC
Attachments: 4.2-4.3_MBMAC.pdf

Hi Zac
I have read the project information and methodology for the above project, I endorse the recommendations made.
Thanks
Darleen

On Monday, 21 September 2020, 11:41:51 am AEST, Cristany Milicich <cristany.milicich@knconsult.com.au> wrote:

Dear stakeholder,

Thank you for registering your organisation's interest in the Aboriginal heritage consultation process for the Maroota Friable Sandstone Extraction Project, Maroota NSW. We look forward to consulting with you on the project.

Please find attached some additional project information and the proposed cultural heritage assessment methodology for the project.

Any comments on the proposed assessment methodology, including relevant cultural information that might affect, refine or inform the proposed methodology, should be provided by **19 October 2020**.

Please send any comments you may have through to zac.thomas@knconsult.com.au using the details on the attached letter or via reply email to me.

Kind regards,

Cristany Milicich

Project Archaeologist

Kelleher Nightingale Consulting Pty Ltd

Level 10, 25 Bligh St

Sydney NSW 2000

p 02 9232 5373

1

Zac Thomas

From: jesse johnson <muragadi@yahoo.com.au>
Sent: Tuesday, 13 October 2020 10:00 AM
To: Cristany Milicich; Zac Thomas
Subject: Re: 2009 Maroota - Proposed cultural heritage assessment methodology - MHIC
Attachments: 4.2-4.3_MHIC.pdf

Hi Zac,
I have read the project information and methodology for the above project, I agree with the recommendations made.
Kind regards
Jesse Johnson
0418970389
On Monday, 21 September 2020, 11:42:20 am AEST, Cristany Milicich <cristany.milicich@knconsult.com.au> wrote:

Dear stakeholder,

Thank you for registering your organisation's interest in the Aboriginal heritage consultation process for the Maroota Friable Sandstone Extraction Project, Maroota NSW. We look forward to consulting with you on the project.

Please find attached some additional project information and the proposed cultural heritage assessment methodology for the project.

Any comments on the proposed assessment methodology, including relevant cultural information that might affect, refine or inform the proposed methodology, should be provided by **19 October 2020**.

Please send any comments you may have through to zac.thomas@knconsult.com.au using the details on the attached letter or via reply email to me.

Kind regards,

Cristany Milicich

Project Archaeologist

Kelleher Nightingale Consulting Pty Ltd

Level 10, 25 Bligh St

Sydney NSW 2000

p 02 9232 5373

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Cristany Milicich

From: Arika Jalomaki <yulayculturalservices@gmail.com>
Sent: Wednesday, 30 September 2020 8:48 AM
To: Cristany Milicich
Cc: Zac Thomas
Subject: Re: 2009 Maroota - Proposed cultural heritage assessment methodology - Yulay

Dear Zac,

On behalf of Yulay cultural service's I have read and agree with your proposal.

Kind regards
Arika Jalomaki

On Mon, 21 Sep 2020 at 11:43 am, Cristany Milicich <cristany.milicich@knconsult.com.au> wrote:

> Dear stakeholder,
>
> Thank you for registering your organisation's interest in the Aboriginal heritage consultation process for the Maroota Friable Sandstone Extraction Project, Maroota NSW. We look forward to consulting with you on the project.
>
> Please find attached some additional project information and the proposed cultural heritage assessment methodology for the project.

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