



Mamre Road Precinct

Aboriginal Heritage Study

Prepared for Department of Planning, Industry and Environment
August 2020





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Mamre Road Precinct

Aboriginal Heritage Study

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4 August 2020

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4 August 2020

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Executive Summary

EMM Consulting Pty Ltd (EMM) has been engaged by the Department of Planning, Industry and Environment (DPIE) to prepare an Aboriginal Heritage Study (AHS) for the Mamre Road Precinct (the project), within Western Sydney Employment Area (WSEA). The AHS will inform planning for the development of the Mamre Rd Precinct based on the final structure plan and provide inputs to the Development Control Plan (DCP) being prepared for the whole precinct. The AHS has been undertaken in broad accordance with DPIE Aboriginal heritage guidelines with some modifications to meet project timeframes and to more suitably address the early planning nature of the project.

The AHS included Aboriginal consultation, initially adopting early stages of DPIE's *Aboriginal Consultation Requirements for Proponents in NSW* (including liaison with government agencies and a formal notification process), before implementing an alternative approach with targeted community members. Ultimately, the project identified 58 Aboriginal organisations, with 14 registering an interest in the project, and six involved in subsequent meetings and field investigation. All registered parties were provided a copy of the draft report for review and comment. Three responses indicated support for the findings and recommendations.

The desktop and field survey investigations for this AHS demonstrate that the precinct is comparable with the wider cultural landscape of the Cumberland Plain. Archaeological evidence suggests that people utilised a wide range of resources across the region, and especially the silcrete raw materials from the Blacktown, Riverstone and Plumpton Ridge areas. These materials were moved along the major river systems across much of the Sydney Basin. Foci of occupation also appears to be primarily associated with the major river systems, although a transient use of all environments was known to occur. While a range of archaeological sites types are found across the

Cumberland Plain reflecting these activities, much of the landscape constrains cultural material to stone artefacts located on the surface and/or in the upper soil profile. With specific reference to the study area, it is situated between two of the major river systems connecting the northern and southern parts of the Cumberland Plain, including Ropes Creek, Kemps Creek and South Creek. Previous investigations both within and near the study area confirm these wider models, which demonstrate a focus of past occupation along these waterways, and especially on elevated land near these resources.

A review of previously recorded sites in the region, show that 20 are documented within the study area. Of these, nine are erroneously located and situated in Erskine Park to the north, leaving 11 remaining in the study area. These are primarily situated along the edges of the main creek systems and/or on a ridgeline in the north of the study area. With one exception, #45-5-5188 - a high density artefact scatter on South Creek - the sites are all characterised as isolated objects and/or low-density artefact scatters (usually consisting of <10 artefacts). Excavations of several of these suggest that they are primarily found in shallow duplex and/or fabric contrast soil profiles commonly <30 cm deep, with rare examples extending to 60-80 cm. A limited field investigation due to access issues, identified a further two previously unidentified sites, MPR-01 (#45-5-0316) and MPR-02 (#45-5-0315), both consisting of low numbers of artefacts in the vicinity of Kemps Creek and Ropes Creek, respectively, and validating some of the previously documented sites.

In addition to the identified Aboriginal sites and objects, areas of archaeological potential were also identified. These included a 200m buffer around Ropes Creek, and a 100m buffer around Kemps Creek, South Creek and second order tributaries - the reduction in these latter areas relating to the local topography and significant disturbance in these locales. In all cases, it is considered that elevations, such as levees, terraces, etc, have a greater potential within these buffers for significant cultural material to be present. In addition, a number of ridgelines were also identified as having potential based on the AHS' findings and Aboriginal community feedback.

Nine of the identified Aboriginal sites, and the majority of the areas of archaeological potential for second order creeks are within proposed zonings that would result in ground disturbance and likely harm to cultural materials. Four sites, including #45-5-5188, and the majority of areas of archaeological potential along the major tributaries of Kemps Creek, South Creek and Ropes Creek, are within zones where limited, if any, ground disturbance is considered likely (ie E2 environmental conservation or RE1 public recreation).

Based on the findings of this study, the following recommendations should be adopted:

- The exhibited structure plan does not require amendment based on the findings of this AHS. While cultural materials are identified within the study area and may be harmed as a result of the rezoning, areas identified as containing significant archaeological and cultural value would be largely unaffected.
- The Development Control Plan developed from the structure plan should include appropriate management requirements for Aboriginal heritage based on the findings of this study. These should include:
 - Any ground disturbance proposed in areas where cultural material has not been identified and/or is considered of low potential to occur (see Figure 10.1) should be subject to a due diligence investigation in accordance with DPIE and/or best practice guidelines (eg *Due Diligence Code of Practise for the Protection of Aboriginal Objects in NSW*). The findings of the due diligence should guide future assessment and approval requirements for the activity (if any).
 - Any ground disturbance proposed in areas where cultural material has been identified and/or is considered to have potential for them to occur (see Figure 10.1) should be subject to an Aboriginal cultural heritage assessment or equivalent in accordance with DPIE and/or best practice guidelines (eg *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*). The findings of the assessment should guide future assessment and approval requirements for the activity (if any).
 - Any activity should undertake interpretive, educational and/or recognition opportunities to promote local Aboriginal culture, society and people.
- This AHS has identified several Aboriginal objects and sites that are erroneously positioned within the study area in the DPIE Aboriginal Heritage Information Management System (AHIMS) database (45-5-3028 – 45-5-3036 inclusive; Table 5.2). The AHIMS database should be notified and these sites correctly positioned to avoid future management issues for the precinct.
- If re-location of any element of the re-zoning, land release and/or development are proposed outside the area assessed in this study, further assessment of the additional area(s) should be undertaken to identify and appropriately manage Aboriginal objects/sites/places that may be in this additional area(s).
- A copy of the report should be lodged with DPIE’s AHIMS database, and each of the RAPs.

Consultation should be maintained with the Aboriginal community (Section 2) during the finalisation of the assessment and subsequent stages of the re-zoning/land release process. This should focus on conservation options, the development control plan inputs, any future investigations of the key archaeological sites and areas of potential, and exploration of interpretative opportunities for the study area.

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1 Introduction

1.1 Overview

The Department of Planning, Industry and Environment (DPIE) is undertaking master-planning to guide industrial development of the Mamre Road Precinct (the project), located within the Penrith Local Government Area (LGA) and Western Sydney Employment Area (WSEA; Figure 1.1).

DPIE exhibited a draft Structure Plan for the Mamre Road Precinct in November 2019. The site was rezoned in June 2020, and comprises:

- 848 hectares (ha) general industrial (IN1);
- 28 ha public recreation (RE1);
- 23 ha private recreation (RE2)
- 73 ha environmental conservation (E2); and
- 27 ha special uses – classified road.

In accordance with Schedule 4 of the *Western Sydney Employment Area State Environmental Planning Policy* (WSEA SEPP), heritage conservation is required to be addressed in the preparation of a development control plan (DCP) for a project. This includes addressing the impact of the proposed development on Aboriginal heritage values and opportunities to offset impacts on areas of heritage significance.

EMM Consulting Pty Ltd (EMM) has been engaged by DPIE to prepare an Aboriginal Heritage Study (AHS) for the project to assist in finalisation of the structure plan and zoning map and to inform the DCP.

Given the approval pathway being implemented for the project, an ACHS was undertaken to present the findings of the Aboriginal community consultation process and assess the Aboriginal cultural and archaeological heritage values of the study area. It provides information on the location, distribution and significance of Aboriginal objects; the likely harm to objects by the proposed development; and recommendations for the management of such harm.

The principle objectives of the report are to:

- identify Aboriginal cultural heritage places and landscapes within the study area;
- identify prospective conservation areas based on their heritage values;
- consult with Aboriginal stakeholder communities; and
- provide foundational information for future studies in the event that approvals under the *National Parks and Wildlife Act 1974* (NPW Act) are required.

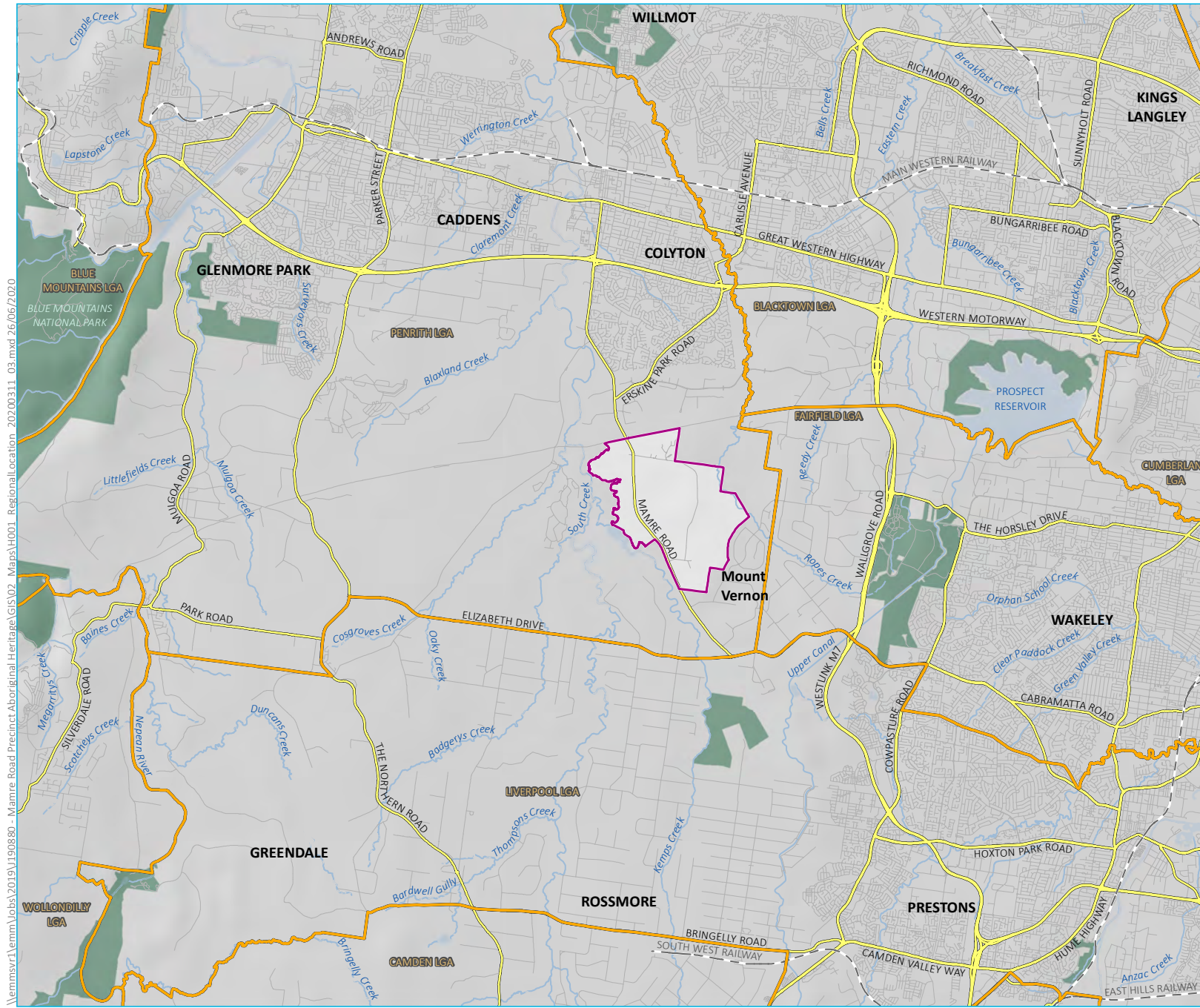
These aims were achieved through the following tasks:

- liaison and consultation with key Aboriginal community members and knowledge holders to identify areas and places of cultural value within or in the vicinity of the project;

- compilation of existing environmental, historical and archaeological information for the study area, by identifying and summarising known and previously recorded Aboriginal heritage places, cultural values areas and landforms of archaeological interest in its immediate surrounds. This included a review of previous reports and databases (such as AHIMS);
- determining if any Aboriginal objects, places, cultural values areas, or areas of archaeological potential are present (or are likely to be present) within the study area, as well as areas of existing disturbance, through ground-truthing;
- identifying the type, nature, and extent of any Aboriginal sites, objects, archaeological deposits, potential archaeological deposits, and cultural values areas within the study area;
- mapping the locations of known and potential Aboriginal sites, objects and deposits and cultural values areas identified;
- assessing the archaeological and cultural significance of the study area, including hierarchical consideration of all findings; and
- assessing and identifying heritage constraints and opportunities within the current master-plan, assist in the facilitation of the re-zoning and provide precinct specific DCP control recommendations in relation to the conservation of Aboriginal heritage values and any pertinent preliminary management recommendations.

The report has been prepared in broad accordance with:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (the Code; DECCW 2010a); and
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCRs; DECCW 2010b).



- KEY**
- Study area
 - Rail line
 - Major road
 - Minor road
 - Named watercourse
 - Named waterbody
 - NPWS reserve
 - State forest (refer to inset)
 - Local government area

Location of the Mamre Road Precinct study area

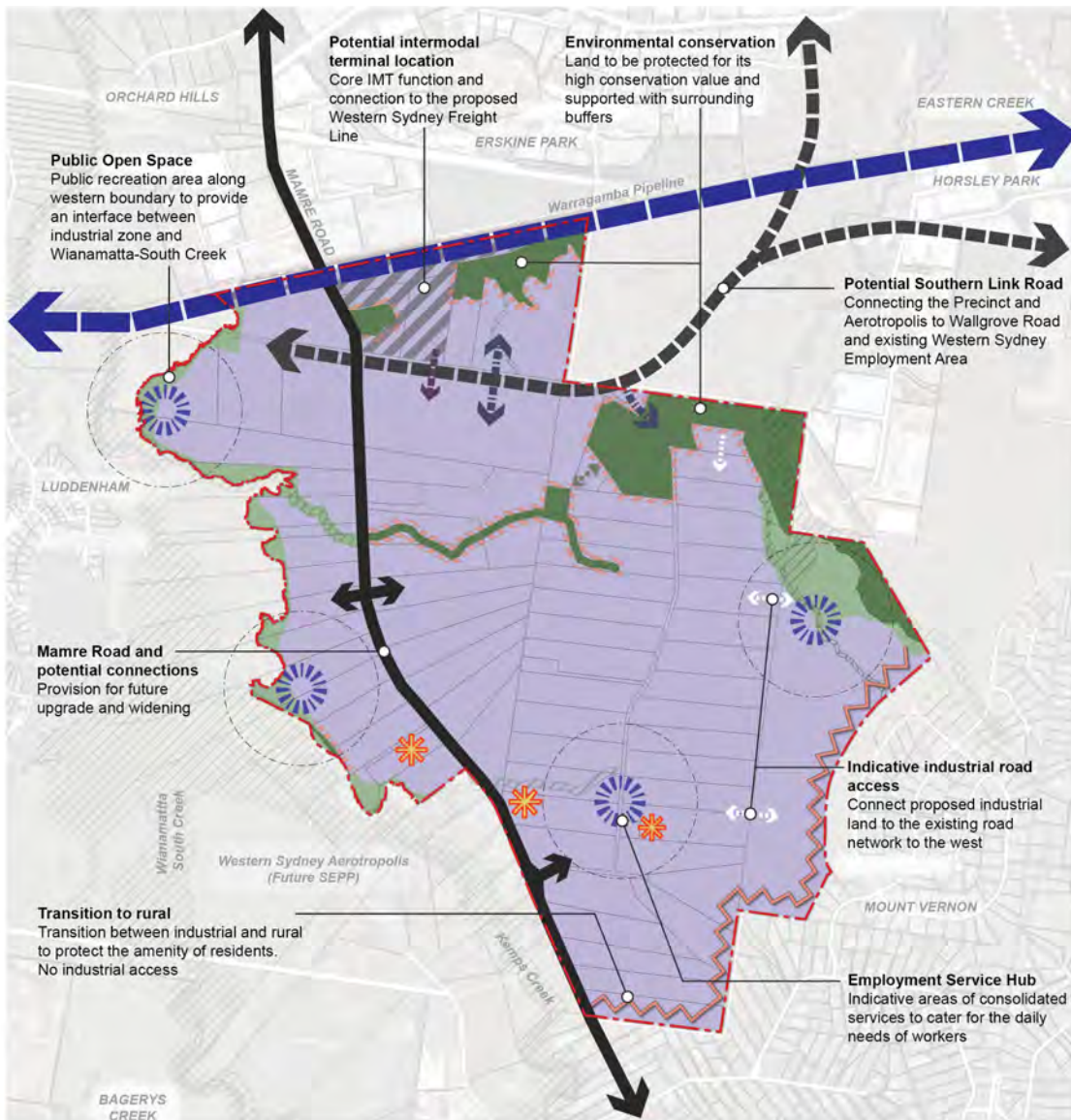
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Aboriginal heritage study
Figure 1.1



\\lemmsvr1.emm\Jobs\2019\190880 - Mamre Road Precinct Aboriginal Heritage GIS\02 - Maps\H001 - Regional\Location - 20200311_03.mxd 26/06/2020

Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006)





Structure Plan

- | | | |
|--------------------------------------|--|---|
| Precinct boundary | Mamre Road and potential connections | Transition to rural |
| Cadastral boundaries | Potential Southern Link Road | Transition to Environmental Conservation |
| Industrial | Potential road access | Local heritage items |
| Environmental conservation | Potential freight connection to precinct | Indicative employment service hub (with 400m catchment) |
| Open space | Indicative road access | Opportunity for ecological corridor |
| Potential intermodal terminal | Indicative riparian buffers | |
| Proposed Western Sydney Freight Line | | |

Source: DPIE (2020)

Plate 1.1 Mamre Road Precinct Structure Plan

1.2 Study area

The study area comprises 999 ha of rural residential land within the Penrith LGA (Figure 1.1). It includes parts of the suburb of Kemps Creek as well as the north-western portion of Mount Vernon. The Mamre Road Precinct is one of twelve precincts in the WSEA which are being progressively released and rezoned for industrial development. The study area is bisected by Mamre Road and high voltage transmission lines which run parallel to the road on both the western and eastern sides. The study area features two prominent ridgelines in the northern and south-east, and is traversed by South Creek, Kemps Creek and Ropes Creek.

1.3 Legislative context

There are several Commonwealth and State Acts (and associated regulations) that manage and protect Aboriginal cultural heritage. These are summarised in Table 1.1.

Table 1.1 Commonwealth and State legislation relevant to the project

Legislation	Description	Relevant to the project?	Details
COMMONWEALTH			
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Recognises sites with universal value on the World Heritage List (WHL). Protects Indigenous heritage places with outstanding heritage value to the nation on the National Heritage List (NHL), and significant heritage value on the Commonwealth Heritage List (CHL).	No	There are no Indigenous heritage places within the study area that are listed on the WHL, NHL, or the CHL.
<i>Native Title Act 1993</i>	Administers rights and interests over lands and waters by Aboriginal people. Provides for negotiation and registration of Indigenous Land Use Agreements (ILUAs). Often used in NSW to identify relevant stakeholders for consultation.	No	There is one active (i.e. non finalised) claim encompassing the study area – South Coast People (NC2017/003). Representatives of this organisation have been consulted as part of the study.
<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>	Preserves and protects areas and objects of particular significance to Aboriginal people that are under threat from injury or desecration.	Yes	On the application of an Aboriginal person or group, the Environment Minister may make a declaration to protect an area or object. No such declaration is known to have been made for an area or object within the study area.
STATE			
<i>Environmental Planning and Assessment Act 1979</i>	Requires environmental impacts, including to Aboriginal heritage, to be considered in land use planning. Provides for the development of environmental planning instruments, including State Environmental Planning Policies and Local Environmental Plans.	Yes	The master-planning and rezoning of the study area is being undertaken to allow development to occur. Each development subsequently undertaken would require various assessments and/or approvals under this Act.
<i>National Parks and Wildlife Act 1974</i>	Provides blanket protection for all Aboriginal objects and declared Aboriginal places. Includes processes and mechanisms for development where Aboriginal objects are present, or where Aboriginal Places are proposed for harm.	Yes	The master-planning and rezoning of the study area is being undertaken to allow development to occur. Each development subsequently undertaken would require various assessments and/or approvals under this Act.

Legislation	Description	Relevant to the project?	Details
<i>Aboriginal Land Rights Act 1983</i>	<p>Establishes Local Aboriginal Land Councils (LALCs). Allows transfer of ownership of vacant crown land to a Local Aboriginal Land Council.</p> <p>The Office of the Registrar, <i>Aboriginal Land Rights Act 1983 (ORALRA)</i>, registers Aboriginal land claims and maintains the Register of Aboriginal Owners. Often used in NSW to identify relevant stakeholders for consultation.</p>	No	<p>A request to search the Register of Aboriginal Owners was made to the ORALRA on 2 January 2020.</p> <p>The study area does not appear to have Registered Aboriginal Owners pursuant to Division 3 of the Act.</p>

1.4 Limitations

This report is based on existing and publicly available environmental and archaeological information (including AHIMS data) and reports relevant to the study area. Background research did not include any independent verification of the results and interpretations of externally sourced existing reports (except where the ground-truthing was undertaken).

The report further makes archaeological predictions based on these existing data and targeted ground-truthing, and which may contain errors depending on the accuracy of these third-party studies and the extent of ground-truthing (constrained to surface) investigations. Only a representative sample of the study area has been subject to ground-truthing investigations due to access not being permitted onto some private properties.

This report does not consider historical (non-Aboriginal) or built heritage unless specifically indicated.

1.5 Authorship and acknowledgements

This report was prepared by Morgan Wilcox (EMM Senior Archaeologist) and Pamela Chauvel (EMM Archaeologist) who also completed the field assessment, with report contributions from Greg Ho Sing (EMM Archaeologist).

The report was reviewed by Dr Alan Williams FSA MAACAI (EMM National Technical Leader - Aboriginal Heritage).

EMM Heritage would like to thank Sarah Waterworth and Melissa Rassack (DPIE) and all Registered Aboriginal Parties (RAPs) for their participation and valuable contributions to this assessment.

2 Aboriginal consultation

2.1 Process overview

Aboriginal consultation was initially undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCRs; OEH 2010), followed by an alternate approach to fulfil the project's timeframes and to ensure effective engagement with the Aboriginal community.

Consultation aimed to determine the key cultural and/or intangible values of the study area, as well as provide an opportunity for registered Aboriginal Parties (RAPs) to contribute perspective of any cultural material observed. The consultation process focused on potential Aboriginal heritage interpretation and public outreach for consideration in the master-planning process.

As such, the following tasks were undertaken:

- **Stage 1: Notification of project proposal and registration of interest**
 - Pre-notification: identification of the Aboriginal parties through contacting various state government agencies; and
 - Notification: contacting previously identified Aboriginal community organisations with interests in cultural heritage management to determine their interest (if any) in the project and the placement of advertisements in local media seeking any other expressions of interest from Aboriginal community.
- **Stage 2/3: Presentation of information about the proposed project and gathering information about cultural significance**
 - Undertaking an Aboriginal focus group meeting with six key stakeholders during the desktop review phase of the project; and
 - Undertaking the field survey with participation of six key stakeholders.
- **Stage 4: Review of draft Aboriginal cultural heritage assessment report**
 - Undertaking an Aboriginal focus group meeting with five key stakeholders once the report is nearing completion to discuss the key findings and proposed management of cultural heritage for the remainder of the master-planning process; and
 - Review of draft report – Review of the draft ACHS by all RAPs, to provide comments on the overall findings, assessment of cultural significance and recommendations for management of Aboriginal heritage within the study area.

2.2 Consultation summary

A complete log of actions and correspondence regarding Aboriginal community consultation is provided in Appendix A and summarised in Table 2.1.

Overall, the consultation process identified 58 potential Aboriginal stakeholders in the region. Of these 14 registered an interest in the project and six participated in the workshops and field program (Table 2.2).

Table 2.1 Summary of Aboriginal consultation undertaken for the project

Consultation Stage	Description	Date Initiated	Date Completed
1	Government Agency Pre-Notification	7 January 2020	-
	Advertisement in the <i>Western Weekender</i>	17 January 2020	31 January 2020
	Notification and registration of potential Aboriginal stakeholders	14 January 2020	31 January 2020
2/3	Presentation of information about the proposed project; and gathering information about cultural significance	14 January 2020	31 January 2020
	Aboriginal Focus Group Meeting	6 February 2020	-
	Field Investigation	11 February 2020	12 February 2020
4	Review of draft report	30 June 2020	28 July 2020

Table 2.2 Registered Aboriginal Parties for the project (alphabetical order)

A1 Indigenous Services	Darug Ngurra Aboriginal Corporation ^{1 2}	Murra Bidgee Mullangari Aboriginal Corporation
Amanda Hickey Cultural Services	Deerubin Local Aboriginal Land Council ¹	Wailwan Aboriginal Group ^{1 2}
Barking Owl Aboriginal Corporation	Didge Ngunawal Clan (DNC)	Warragil Cultural Services
Butucarbin Aboriginal Corporation	Ginninderra Aboriginal Corporation	Widescope Indigenous Group
Darug Aboriginal Cultural Heritage Assessments	Goodradigbee Cultural and Heritage Aboriginal Corporation ^{1 2}	Wurrumay Consultancy
Darug Custodian Aboriginal Corporation ¹	Kamilaroi Yankuntjatjara Working Group ^{1 2}	

¹ Participated in field program

² Participated in AFG

2.3 Aboriginal stakeholder feedback

2.3.1 Aboriginal Focus Group meeting

An Aboriginal Focus Group (AFG) meeting was held on Thursday 6 February 2020. The meeting was attended by DPIE representative Melissa Rassack, and EMM Heritage representative's Dr Alan Williams and Pamela Chauvel, as well as RAPs as identified in Table 2.2.

Minutes from the meeting are provided in Appendix A.

Key points/feedback from the AFG are summarised below:

- John Riley (Darug Ngurra Aboriginal Corporation) gave an acknowledgement to Country;
- Melissa Rassack (DPIE) provided a brief outline of the Mamre Road Precinct rezoning and attendees were provided with maps of the draft structure plan showing the boundaries of the precinct (the study area) and the proposed zoning;
- Alan Williams (EMM) gave an overview of the aims of the archaeological investigations and fieldwork and provided context around the archaeology of the Cumberland Plain. Attendees were provided with a map showing known existing sites from the AHIMS database;
- comments from RAPs present were requested regarding the tangible and intangible Aboriginal cultural values within the study area. Extensive discussion followed regarding the existing sites and the importance of the waterways within the study area such as South Creek, Kemps Creek and Ropes Creek, and the potential for lithic resources, such as silcrete, to be present in the area;
- Philip Kahn (Kamilaroi Yankuntjatjara Working Group) drew attention to the significance of the creeks and their importance not only as occupation sites but also for the potential for burials to occur in these riparian zones;
- John Riley (Darug Ngurra Aboriginal Corporation) discussed his previous experience and knowledge of Lot 1 DP 104958 in the north of the study area where a number of artefact sites and a possible scar tree have been identified. He described the north south ridgeline and the area around the dam in the north east corner as areas of particular archaeological sensitivity;
- Alan Williams (EMM) stressed that the rezoning provides interpretive opportunities and encouraged everyone to consider possible locations and ideas for how this could be brought into the development; and
- details for the field program logistics were discussed.

2.3.2 Draft AHS review

The AHS was distributed for a period of 28 days in late June and early July 2020. Three responses were received from the Darug Custodian Aboriginal Corporation, Goodradigbee Cultural and Heritage Aboriginal Corporation, and Widescope Indigenous Group (Appendix A). All three responses were supportive of the findings and recommendations of the AHS. No further site specific cultural information was provided.

3 Existing environment

3.1 Key findings

- The study area is characterised by undulating Cumberland Plain topography that is widely documented to have been used by Aboriginal people in the past. There is no evidence of significant elevation, escarpments or exposed sandstone, which constrains a range of archaeological site types.
- The study area is bounded by Ropes, South and Kemp Creek, all major tributaries that would have been attractive to Aboriginal people in the past. Other lesser creeklines extend across the study area, but several of these may be the result of revegetation and landscape degradation from more recent activities.
- Soil landscapes across the study area are generally dominated by shallow duplex or fabric contrast soil profiles. As such, it is considered cultural material where present is likely to be found on deflated surfaces and/or found in the upper 1 m of the soil profile.
- High levels of historic land use and disturbance has occurred over the last 200 years. These are dominated by agricultural, pastoral and market garden activities, which have resulted in revegetation and modification of waterways (usually in the form of dams) across many parts of the study area.
- There is limited evidence of remnant vegetation present, with the possible exception of the established riparian corridors of Kemps, South and Ropes Creeks.

3.2 Rationale

Understanding environmental context assists with predictions of archaeological potential, such as the likelihood of archaeological material being present in the landscape, its spatial distribution and its preservation. Landscape features were an important factor for the choice of camping and transitory and ceremonial areas used by Aboriginal people. Similarly, these landscape features and historical land-use plays a role in the level of preservation and the integrity of archaeological sites.

A landscape consisting of suitable topography, hydrology, geology and soils has strong links with natural resources that would have been available to, and sought after, by Aboriginal people. Flora and fauna would have provided food, tools and ceremony (culturally modified trees); proximity to fresh water was necessary for life and growing crops, as well as gathering fish and eels. Landscape features, such as sandstone overhangs, were useful for shelter; stone artefacts were manufactured from raw stone material that was collected from quarry sites; and stone arrangements relied on the landscape.

3.3 Landform and topography

The study area is situated within the Sydney Basin bioregion and Cumberland subregion (Thackway and Cresswell 1995). The Cumberland subregion is characterised by low rolling hills and wide valleys in a rain shadow area below the Blue Mountains. Prominent landforms within the study area, as shown on Figure 3.1, include two prominent ridgelines in the north (<90 m) and south-east (<70 m). Ridgelines and crests are broad (<200 m) with gentle slopes (>5%) receding to the valley floor central to the study area which exhibits minimal topographic relief (<10 m) and is subject to flooding. Topography would not have dramatically impeded Aboriginal movements across the area, and elevated landforms would likely have been targeted for habitation (Section 5).

3.4 Hydrology

The study area is located within the South Creek sub-catchment of the Hawkesbury-Nepean River and is traversed by South Creek, Kemps Creek and Ropes Creek (as shown on Figure 3.1):

- South Creek (6th order) flows north to south along the western boundary of the study area;
- Kemps Creek (4th order) traverses the western side of the study area before joining South Creek. The course of Kemps Creek has been significantly altered by modern land use and the construction of dams;
- Ropes Creek (3rd order) forms a boundary of the easternmost extent of study area; and
- numerous ephemeral waterways and drainage lines run east to west across the study area feeding into Kemps Creek and South Creek. Multiple dams have been constructed to capture water runoff, though they may have been constructed in existing landform depressions prone to holding water.

Hydrological features are the most likely to indicator of archaeological potential within the study area. Access to water and the natural resources associated with it will have dominated the distribution of habitation throughout the area. This is corroborated by previous archaeological works in the area and ethnographic accounts of the area.

The confluence of Kemps Creek and South Creek is considered as being of high archaeological sensitivity, with previous archaeological studies and ethnographic evidence (as detailed in Section 4 and Section 5) demonstrating preference for Aboriginal occupation at the junctions of water courses. A number of Aboriginal sites have previously been recorded in association with South Creek and Ropes Creek (refer to Section 5.2).

3.5 Geology and soils

Soil landscapes and their boundaries provide pre-defined areas that are classified by several geographic features, and which are informative for the archaeological investigation. They provide localised information including landform patterns, soils, geology, rock outcrop percentage, land use and vegetation. This information provides another layer to categorise the landscape for the predictive model, additional to what a topographic description can provide. Soil landscape information builds on underlying geology and describes the depths of residual soils and colluvial soils and identifies areas that are characterised by erosion or skeletal soils and exposed bedrock versus those that may contain a deeper profile where cultural material may be buried.

The study area encompasses three soil landscapes (as shown on Figure 3.2), which are defined in the *Soil and Land Resources of the Hawkesbury-Nepean Catchment* (DECCW 2008), described below:

- **Blacktown soil landscape:** The majority of the project area comprises valley floor of the Blacktown soil landscape. Geology typically consists laminate shales and siltstone, with underlying sandstone of fine to medium grained quartz. Outcropping does not occur naturally on the surface however can become exposed as a result of extensive land use disturbances and accelerated erosion. Soils comprise up to 30 cm friable loam to clay loam (A1 Horizon), overlying 10–30cm of clay loam to silty clay loam hard-setting A2 Horizon. Subsoils are 40–100 cm of light to medium clay B2 Horizon subsoils with fine to coarse gravel size shale fragments. Silty clay to heavy clay usually occurs as deep subsoil above shale bedrock (B2 or C Horizon). Low relief and low slope areas would have originally presented as favourable for Aboriginal occupation, however for the same characteristics these areas have been targeted for agricultural land use and as such exhibit extensive levels of disturbance.

- **Luddenham soil landscape:** The Luddenham soil landscape follows the ridgelines and hillcrests which run north to south in centre of study area. As per the Blacktown soil landscape, geology typically consists laminate shales and siltstone, with underlying sandstone of fine to medium grained quartz. On ridgelines and crests, soils typically comprise <10 cm friable loam A1 Horizon, with <40 cm of sandy clay A2 Horizon overlying deeply weathered shale bedrock. Aboriginal activity is likely to have focused upon these elevated areas overlooking surrounding resources, however deposition sequences are likely to be shallow.
- **South Creek soil landscape:** The western margin of the study area features the South Creek soil landscape comprising undifferentiated quaternary alluvium along waterways. The soil landscape is highly active, comprising the present floodplain of the South Creek drainage network, valley flats and drainage depressions. Soils typically consist of very deep layered sediments over bedrock or relict soils, with 30–50 cm of sandy loam to sandy clay loam, or hard-setting clay loam A1 horizon, with up to 190 cm of light to medium clay B2 horizon. Exploitation of natural resources is likely to have focused on the riparian/waterway corridor, however flood and alluvial deposition is likely to have impacted retention of archaeological deposits.

In the case of Blacktown and Luddenham soil landscapes, the shallow nature of the topsoil or A1 horizon deposits has important implications for the potential for and survivability of Aboriginal objects, as even minor disturbance and/or devegetation will often result in the complete removal of the upper parts of the soil profile in which objects may occur. In contrast, South Creek alluvium have greater potential for deeper cultural material to be present.

3.6 Land use history and disturbance

The study area has a range of moderate and heavy ground disturbance as a result of modern activities in most locations.

Early land use consisted of forestry and grazing in the wood and scrubland of the Cumberland Plain. Settlement expansion and the search for suitable agricultural land soon led to the establishment of Parramatta and Liverpool townships, driving the development of Sydney's west as a key area for pastoral and agricultural exploitation. Land use and associated disturbance of the study area has accelerated from the early 19th century onwards, with the study area included in an initial land grant of 1,070 acres issued in 1815 to Nicholas Bayly, a member of the NSW Corps, a permanent ground force regiment formed to relieve the NSW Marine Corps who had accompanied the First Fleet to Australia.

Due to the fertility of the soil, proximity to water and accessibility to the centres of Parramatta and Sydney CBD the area has been kept in steady use for agriculture, grazing and market gardens since that time. The land has subsequently been heavily cleared and altered to suit these endeavours with the majority of native vegetation being cleared for grass or cropland. Aerial photographs dating from 1955 CE (Figure 3.3–Figure 3.5) show how extensively the land has been cleared, leaving only narrow riparian corridors along Kemps Creek, South Creek and Ropes Creek. Even in these locations, the creation of dams has occurred throughout the various creeklines, most evident by the large 'Tadpole' dam on Kemps Creek.

Areas not utilised for grazing have instead been heavily ploughed to facilitate cropping and market gardens up until the present day. Construction of residential and agricultural structures has also resulted in significant, albeit localised, areas of disturbance. Access roads, farm tracks and irrigation ditches also contribute to linear areas of high-level disturbance.

More recent disturbance has included the construction of major roadways (ie Mamre Road) and urban/industrial infrastructure as the area sees a dramatic shift in the predominant land use from rural to urban, with housing and industrial development encroaching into the area. Key amongst these is the development of a largescale industrial precinct to the immediate north east of the study area in Oakdale; and the installation of services including high voltage transmission lines on the western and eastern sides of Mamre Road.

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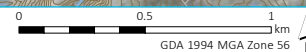


- KEY**
- Study area
 - Major road
 - Minor road
 - Contour (2 m)
 - Watercourse/drainage line
 - Waterbody

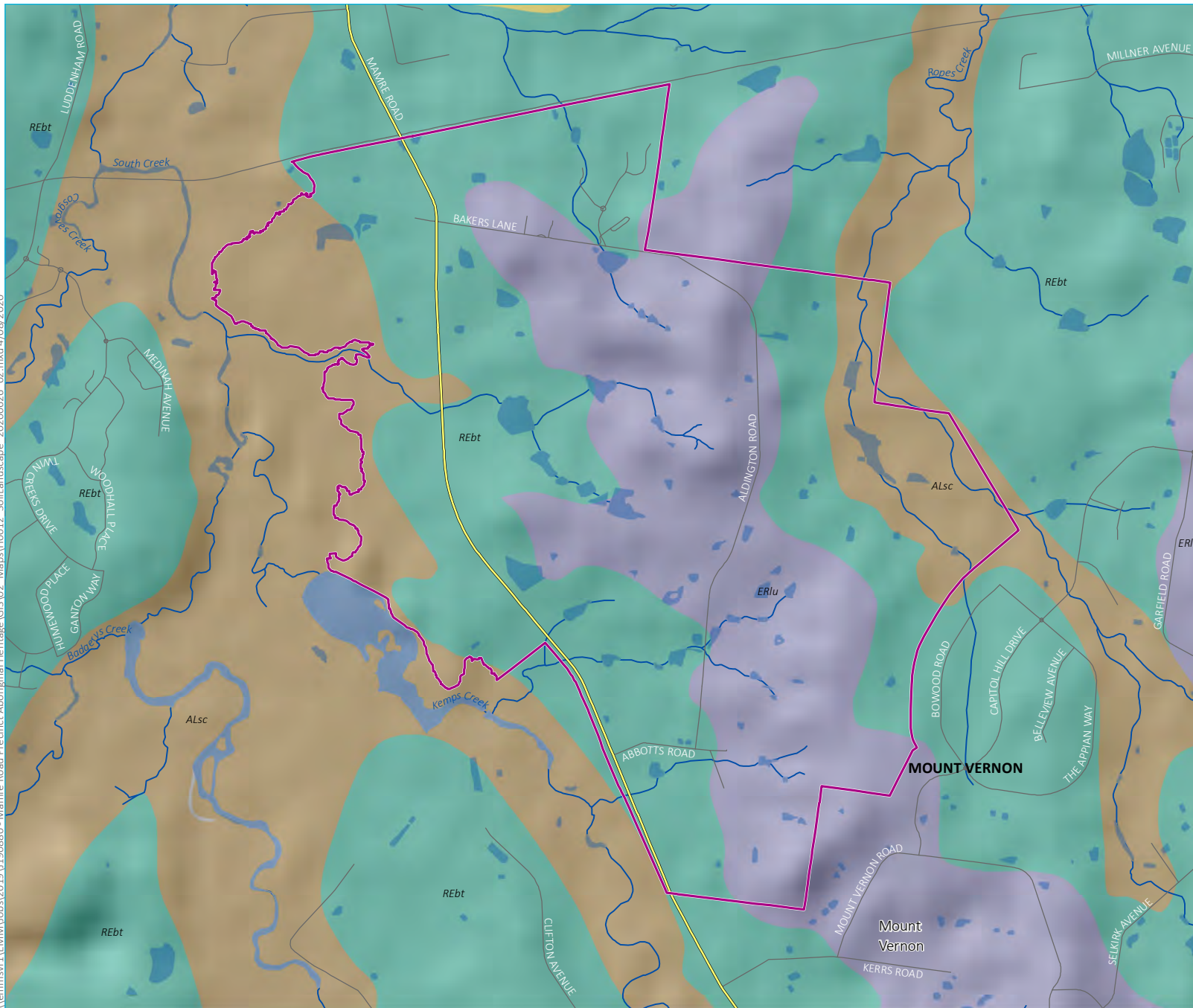
Elevation and hydrology of the study area

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Figure 3.1

Source: EMM (2020); DFSI (2017); DPE (2017); DECC (2012); GA (2011)



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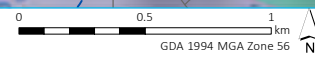


- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody
 - Soil landscapes
 - ALsc, South Creek
 - DTxx, Disturbed terrain
 - ERIu, Luddenham
 - REbt, Blacktown

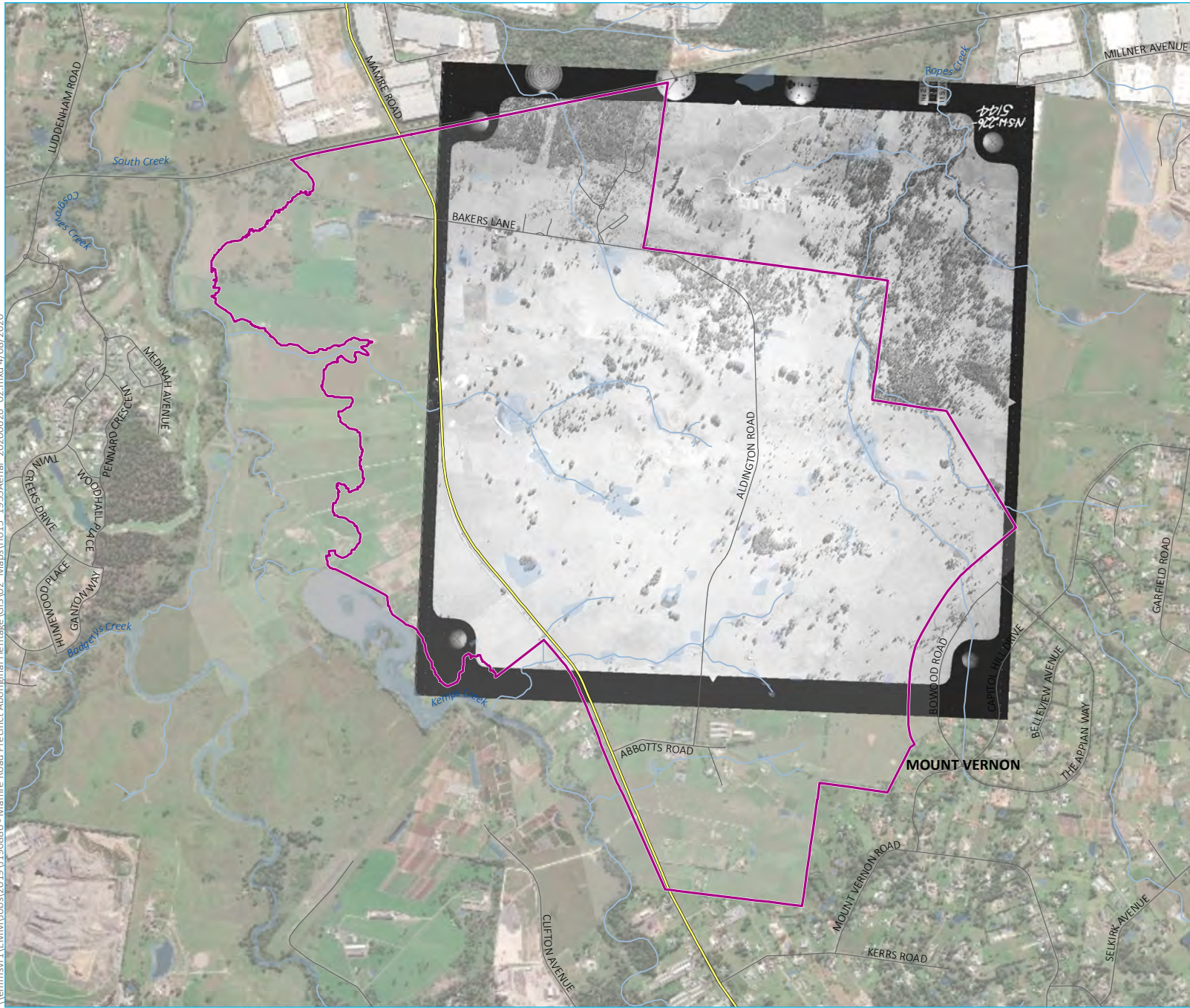
Soil landscapes of the study area

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Figure 3.2

Source: EMM (2020); DFSI (2017); DPE (2017); DECC (2012); GA (2011)



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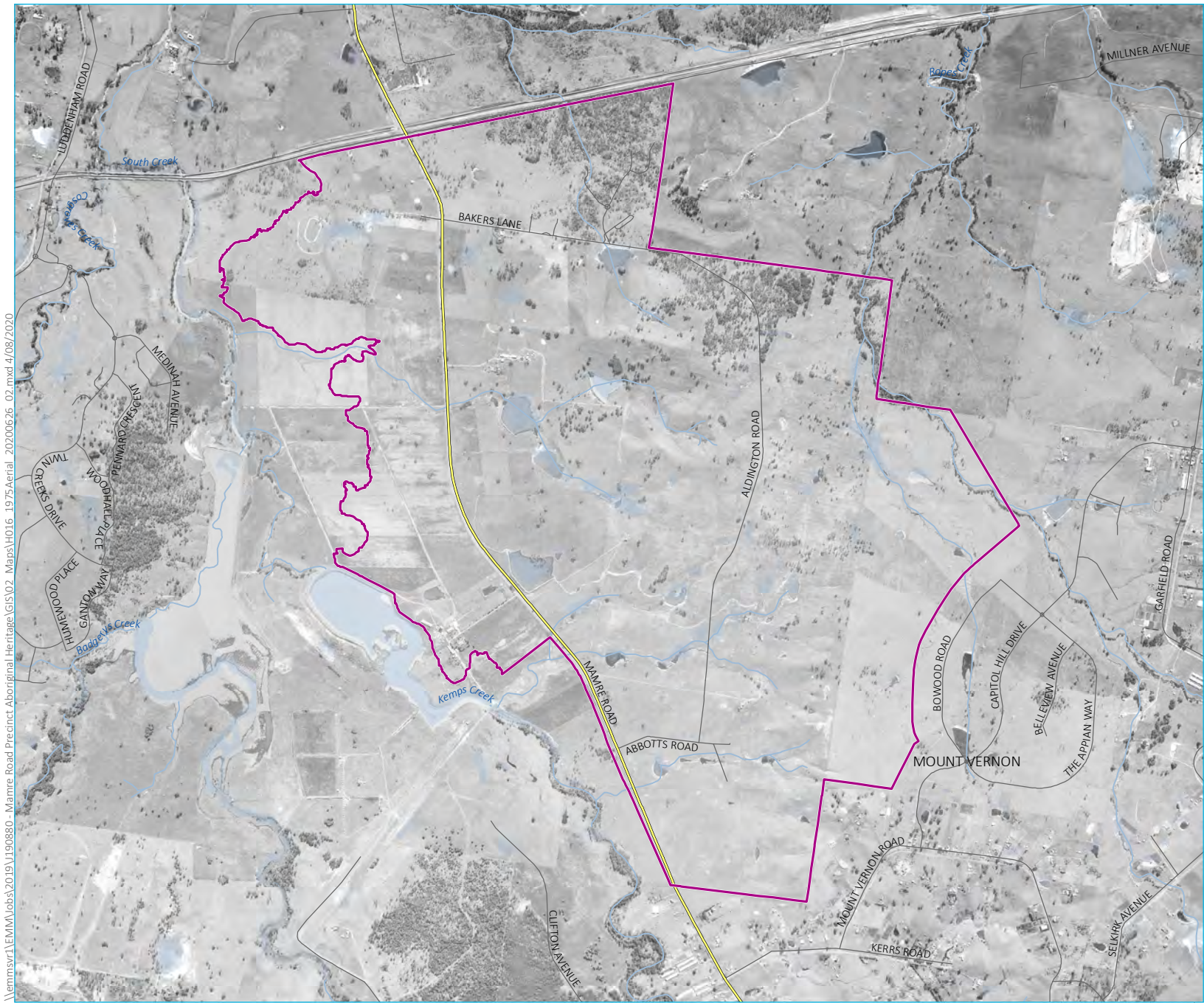


- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody

Aerial photograph (1955)

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Aboriginal heritage study
Figure 3.3





- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody

Aerial photograph (1975)

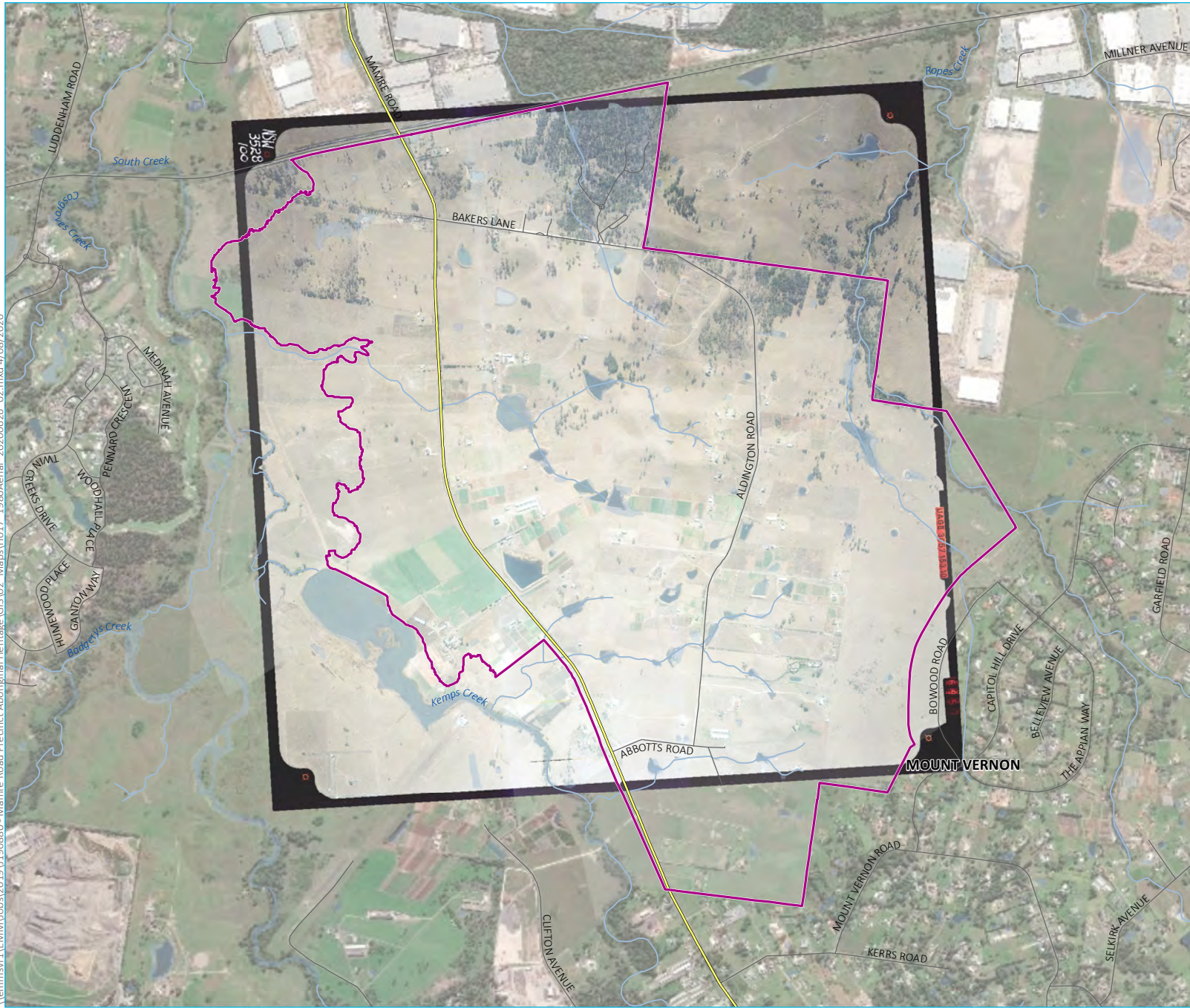
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 Figure 3.4

\\lemmsvr1\EMM\Jobs\2019\190880 - Mamre Road Precinct Aboriginal Heritage GIS\02 Maps\H016 1975 Aerial 20200626 02.mxd 4/08/2020

Source: EMM (2019); DFSI (2017)



\\lemmsvr1\EMM\Jobs\2019\190880 - Marmre Road Precinct Aboriginal Heritage GIS\02 - Maps\H017 - 1986Aerial - 20200626 02.mxd 4/08/2020



- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody

Aerial photograph (1986)

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Aboriginal heritage study
Figure 3.5



4 Ethnographic context

4.1 Key findings

- The study area was occupied by the people of the Darug language group. While there is debate over the exact territory of Aboriginal groups prior to contact, the lands of the Darug covered most of the western Sydney region (Tindale 1974).
- Historical information provides several observations in relation to the early nineteenth century Aboriginal society, but no site-specific areas of activity within the study area.
- The Cumberland plain is a key centre of contact history including the Cumberland Plain War and Appin Massacre, Prospect Hill expeditions and early peace and reconciliation activities.

4.2 Local Background

Regional studies indicate that Aboriginal people first visited and occupied the Sydney Basin between ~45-35,000 years ago (ka). Populations remained low in the late Pleistocene and were focussed along the banks of major river systems, such as the Hawkesbury-Nepean River. After ~18 ka, there is an increasing archaeologically observed presence across the basin, including the initiation of a number of sites, such as Burrill Lake and Bass Point. Increasing numbers and diversity of sites in the last 10 ka, and especially the last 5 ka, suggests a significant population established across most environments of the basin; and it is during this time that the socio-economic and religious systems observed at contact likely developed

Information about the socio-cultural structure of Aboriginal society prior to European contact largely comes from ethno-historical accounts made by colonial settlers. These accounts and observations were often made after significant social disruption due to disease and displacement. As a result, this information is often contentious, particularly in relation to language group boundaries. Therefore, it is likely that language group boundaries were far more diffuse and complex than the arbitrary demarcations drawn by colonial observers.

Over thirty separate Aboriginal groups populated the wider Sydney Basin in 1788 CE, each with their own country, practices, diets, dress, and dialects. We now know of these groups as 'clans' and each identified with broader cultural-linguistic groups known as 'tribes'. The study area sits within Darug clan country which extended from around Parramatta through to the Blue Mountains and from the Hawkesbury River in the north to Appin in the south. The many rivers acted as natural demarcation of this area and the flat terrain of the Cumberland Plain was favourable to the livelihood of the peoples.

"The inland clans fished for mullet and eels in rich lagoons, but much of their food came from yams dug out from the riverbanks and worms known as 'cah-bro' extracted from river driftwood. Colebee and Ballederry called these people the 'climbers of trees' after their practice of skilfully ascending gums in pursuit of animals, cutting footholds in the trunks with a stone axe." (Collins 1798)

The central location and ease of movement through this area thanks to suitable topography meant that Darug country was a frequented by travelling groups and used as a place of meeting. "Corroboree" the word for meeting and ceremony now associated with Aboriginal meetings in the modern era stems from the Darug language group (Troy 1994).

Environmental conditions in this region throughout the last 10,000 years were relatively stable and evidence suggests that population densities pre contact were high (Williams 2013). In the late eighteenth century smallpox and other European diseases are likely to have wiped out a significant percentage of Aboriginal peoples (>50%). In May 1789 William Bradley recorded the 'dreadful havoc' that smallpox had wrought amongst Aboriginal communities: 'we did not see a Canoe or a Native the whole way coming up the Harbour & were told that scarce any had been seen lately except laying dead in & about their miserable habitations' (Bradley 1969). Traditional burial practices broke down and clans merged as entire communities were taken by the virus (Hunter 1793). The impact of smallpox and other European diseases continued to ripple across the country, reducing communities in the Hunter 'from about 200, to 60' (Backhouse, 1843, p.401). This is large scale decrease in population accounts the discrepancies seen between the distribution of archaeological remains and the ethnographic accounts of Aboriginal populations.

The Cumberland Plain was a point of first contact between many Aboriginal peoples and the Europeans, the same environmental factors that supported Aboriginal peoples also made for favourable lands for settlement and agriculture. The expedition by Governor Phillip to Prospect Hill in 1788 found the lands to the west more agreeable to farming than those of the Sydney Cove area and the township of Rose Hill (renamed Parramatta the following year) was established and settler colonialism rapidly expanded the European footprint in the area. Competition for resources quickly flared tensions, with violence escalating throughout the region. On 1 May 1801 Governor King issued a public order requiring that Aboriginal people around Parramatta, Prospect Hill and Georges River should be 'driven back from the settlers' habitations by firing at them'. King's edicts appear to have encouraged a shoot-on-sight attitude whenever any Aboriginal men, women or children appeared (Flynn 1997).

The conflicts and subsequent reprisals by both sides spread across the region and would eventuate in the Appin Massacre, 1816; these actions would come to be known as the Cumberland Plain war. The area was not only a site of conflict but also served as an important reconciliation place even as early as 1805 during a meeting organised by the reverend Samuel Marsden and the local tribes in a bid to cease the hostilities between settlers and Aboriginals.

Hostilities between certain groups remained many Aboriginal peoples continued to live a semi-traditional lifestyle or moved into a European lifestyle. Darug clans lived at an encampment on the Mamre Farm estate at South Creek in Orchard Hills, adjacent to the study area (north west). The Reverend Marsden established the property in 1798 as a model farm for experimental crops and animal husbandry. The estate was over 1,300 acres and an Aboriginal camp was situated on the opposite side of the creek, a few hundred metres from the homestead.

"....the South Creek Natives live on Charles Marsden's property 'Mamre', often staying at the junction of South Creek and Eastern Creek. In comparison with some other tribes, the South Creek Natives may be considered as half-domesticated, and they often assist in the agricultural operations of the settlers"
(West 1835 in *A History of Aboriginal Sydney* website)

The first parcels of land granted to an Aboriginal person were to the north of the study area between Richmond Road and Plumpton Ridge along Bells Creek. Governor Macquarie granted this land to Colebee and Nurragingy in 1819. Colebee did not stay long but Nurragingy lived on the land and it remained in the family until 1920 when it was resumed by the Aboriginal Protection Board (Kohen 1986, p.27).

4.3 Information provided by Aboriginal stakeholder consultation

No site specific ethnographic information was provided during the Aboriginal consultation process.

5 Archaeological context

5.1 Key findings

- A large number of previous archaeological studies have been undertaken within, or in close proximity to the study area. Of note are extensive works for Mamre West Precinct encompassing much of the north-west of the study area, and the Oakdale Estate situated immediately outside the precinct to the north-east.
- These studies indicate that elevated areas – terraces, levee banks, low hills – adjacent third and fourth order creeklines formed a focus for past Aboriginal activity. Cultural material is found in a range of other environments, but will often reflect transient use.
- Some 115 Aboriginal sites have been documented within the general area, of which 24 are within the study area. Of these, nine are erroneously located and are actually situated in Erskine Park to the north, resulting in 15 sites remaining within the study area. With the exception of two culturally modified trees, west of the study area, all previously recorded sites can be characterised as low density or isolated surface and/or subsurface stone artefacts.
- A single glass artefact has been identified in the northwest of the study area and may suggest some evidence of post-contact activity within the precinct.

5.2 Regional background

The first peopling of Australia occurred ~50 ka, and likely consisted of reasonably large groups of technologically advanced hunter-gatherers (Bradshaw et al. 2019; O'Connell et al. 2018). The peopling of the continent was rapid, with sites such as Devil's Lair (WA), Warratyí (SA), and Lake Mungo (NSW) all occupied within a few thousand years of arrival (Bowler et al. 2003; Hamm et al. 2016; Turney et al. 2001). Genomic research has shown that following these initial explorations of the continent, regional populations or nomadic sedentism, was established by ~40 ka (Tobler et al. 2017). These small populations were highly mobile, but remained within a broad spatial geographic area, dictated in general by the nature of resources and water availability. In the case of some of the arid parts of the continent, mobility encompassed thousands of square kilometres (Gould 1977), while major riverine corridors such as the Murray River had near permanent settlements (Pardoe 1993).

In NSW, the earliest evidence of Aboriginal people are human remains recovered from the lunette in Lake Mungo and dating to ~42 ka (Bowler et al. 2003; O'Connell et al. 2018). The presence of red ochre covering the remains representing a society with significant cultural and symbolic complexity (Langley et al 2011). Near the coastal edge, the earliest populations were found at Cranebrook Terrace, near Penrith (Western Sydney). Here a handful of rudimentary stone tools were found in an alluvial unit, some 8m below the current surface, which were dated to ~40-45 ka (Williams et al. 2017). However, it is not until ~35 ka, that regional populations appear to have become established in the Sydney Basin, and which appeared to consist of small bands of people focussed mainly along major river systems, including the Hawkesbury-Nepean River, Georges River, and Hunter River (Hughes et al. 2014; Williams et al. 2012, 2014). These rivers formed key ecological refuges that hunter-gatherer groups used to survive major climatic events such as the Last Glacial Maximum (21±3 ka) – a cool and arid climatic period. Well-established archaeological models suggest populations experienced a major reduction in size (by as much as 60%), and settlement contraction and abandonment across much of the continent during this time (Veth 1993; Williams et al. 2013). Although recent research suggests that the story may be more complex than this (eg Tobler et al. 2017).

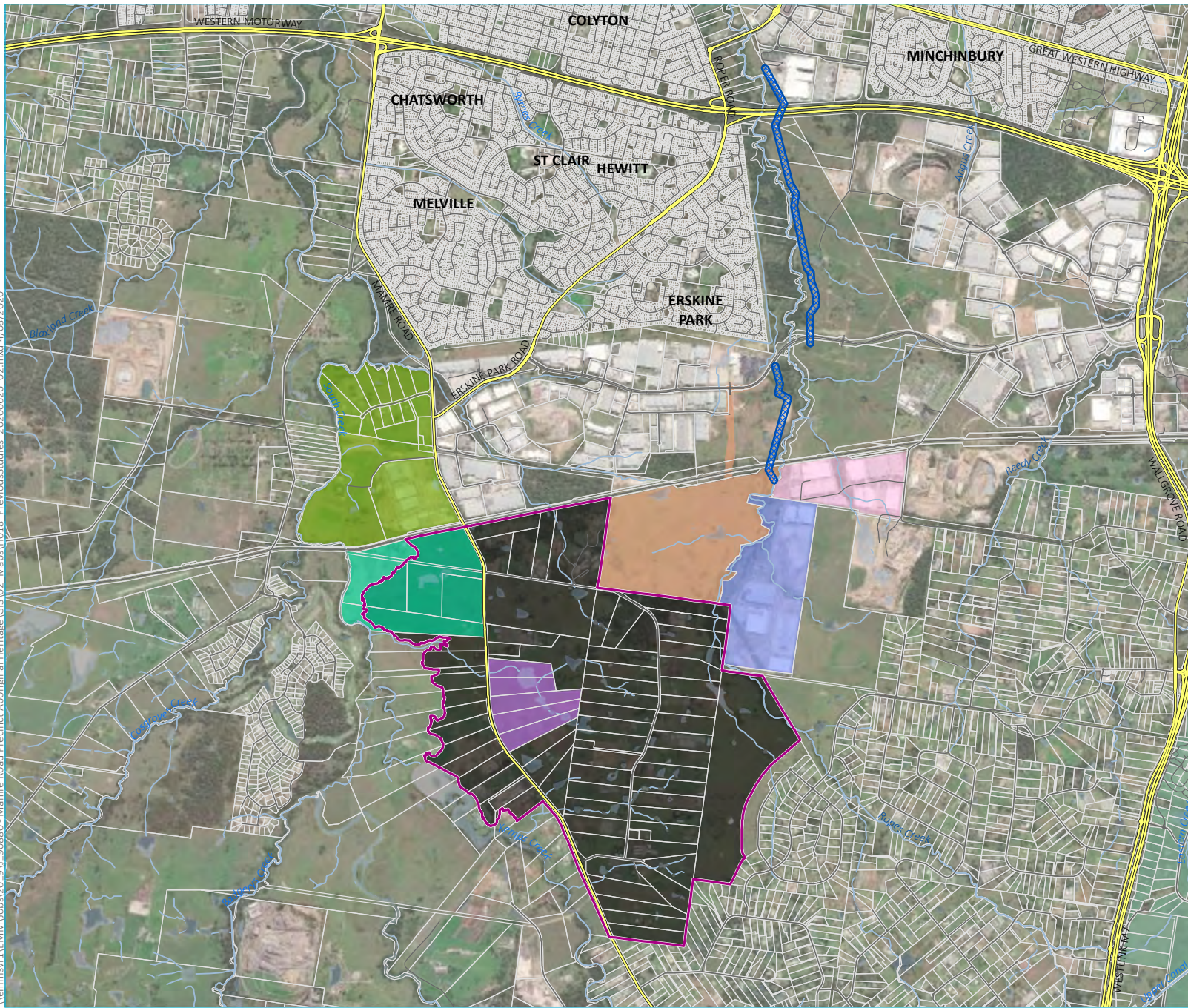
The terminal Pleistocene and early Holocene (~18-8 ka) was characterized by significant environmental change, notably the rapid inundation of much of the coastal shelf, resulting in the reduction of the continent by ~21% (~2 million km²) (Williams et al. 2018), in tandem with improving climatic conditions – the Holocene climatic optimum (Williams et al. 2015a, 2015b). More broadly, these conditions resulted in increasing population growth, expansion of ranging territories, increasing sedentism (longer patch residence time) and the beginnings of low-level food production (eg aquaculture), and ultimately the initiation of social and cultural groupings observed in the late Holocene (Williams et al., 2015b). Within the Sydney Basin, a large number of sites are first initiated during this time, including Burrill Lake (~20 ka), Bass Point (~17 ka), and Loggers Shelter in Mangrove Creek (~11 ka) (Bowdler 1970; Lampert 1971; Attenbrow 2004; AMBS 2006, p.87). More broadly, we see a much broader range of archaeological site types occurring, such as the Roonka Flat burial ground on the banks of the Murray River within which some 147 individuals were interred through the Holocene (Pate et al. 1998), and the increasing use of marine resources. Many of the previous refuges were subject to abandonment or a re-structuring of land use (Dortch 1979; Fitzsimmons et al., 2019). These activities suggest the ability to undertake large-scale movements to mitigate environmental distress was becoming increasingly difficult and was addressed through diversification of hunter-gathering behaviours and, at least in part, technological advances and investment (Williams et al. 2015b).

The late Holocene saw significant population increase, with hunter-gatherers reaching their zenith of ~1.2million at 0.5 ka, a tenfold increase on Pleistocene levels (Williams, 2013). Data suggests that the highest populations during this time were in the southeast of Australia. Williams et al. (2015) suggest that this increase was likely a result of intensification of earlier technological advancements, including hafting-technology, plant and seed processing, and localized landscape management (using fire), allowing climatic downturns to be successfully weathered. These included strong arid El Nino Southern Oscillation (ENSO) conditions between 4-2 ka, and increasingly turbulent climatic conditions during the Medieval Climatic Anomaly (1.3-1 ka) (generally wetter) and Little Ice Age (0.3-0.5 ka) (generally drier) (Williams et al. 2010, 2015b). A result of these denser populations was decreasing freedom of movement and the formation of strong classificatory kinship systems, complex cultural and symbolic landscapes based on geographic totemism (the 'Dreaming'), distinctive graphic art systems, land rights in the form of ritual property, and formalized exchange networks (Williams et al. 2015b). For the Sydney Basin, these conditions resulted in a significant increase in the archaeological visibility of past Aboriginal populations, with sites occurring in a much wider range of locations; and generally indicative of a more intensive use of the landscape.

5.3 Previous archaeological studies

A summary of previous archaeological studies within, or in close proximity, to the study area is included in the following sections (see Figure 5.1 for locations).

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- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - NPWS reserve
 - Waterbody
 - Cadastral boundary
- Previous study areas
- St Mary's Wastewater System Augmentation (Jacobs, 2015)
 - Mamre Road, Kemps Creek - ACHA Report (Artefact, 2019)
 - Mamre South Precinct State Significant Development (Biosis, 2019a)
 - Mamre West Precinct, Orchard Hills (Biosis, 2019b)
 - Oakdale South Estate - Archaeological Test Excavation Report (Artefact, 2015)
 - Oakdale West Estate - Aboriginal Archaeological Survey Report (Artefact, 2017)
 - Oakdale Central (GML, 2013, 2015)
 - Mamre Road Precinct (Artefact, 2019)

Previous studies discussed in text

Department of Planning, Industry & Environment
Aboriginal heritage study
Figure 5.1

Source: EMM (2020); Artefact (2019); Biosis (2019); DFSI (2017); GML (2013, 2015); Jacobs (2015)

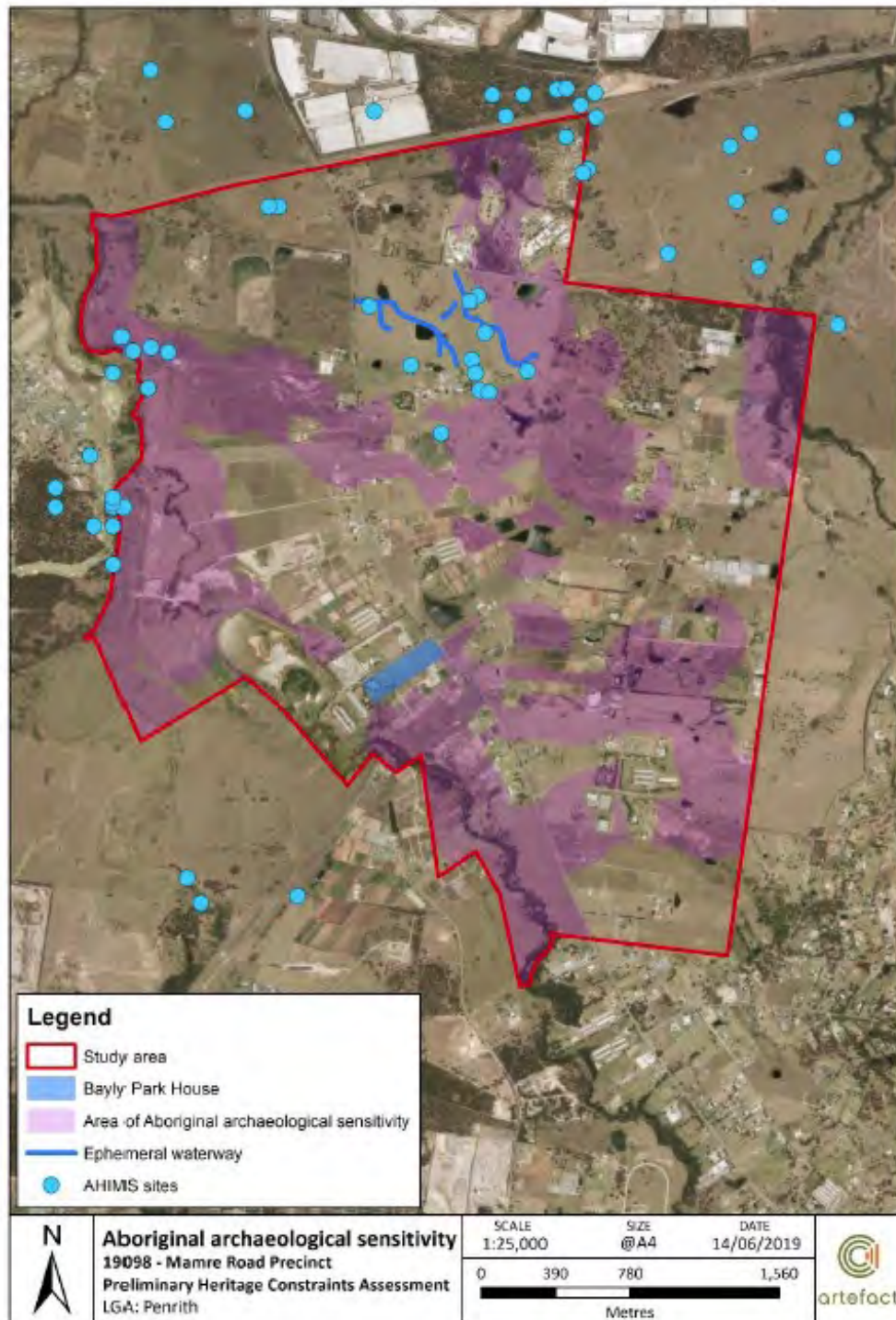


5.3.1 Mamre Road Precinct Aboriginal Constraints Assessment (Artefact 2019)

Artefact undertook a preliminary desktop constraints assessment for the Mamre Road Precinct for Mirvac in relation to one of their sites. Through this AHS, a number of similar tasks to those undertaken in this report were implemented. These included a search of the AHIMS database, which identified 21 sites within the study area – all identified as of various densities of stone artefacts. They highlighted #45-5-2552 and #45-2-2553 as two culturally modified trees present on the western edge of the study area, and comment on the general rarity of remnant vegetation in the study area.

In terms of sensitivity, they utilised the information from DPIE’s archaeological guidelines, and highlighted areas in close proximity to water, as well as areas where intact subsurface deposits were considered to survive (). In contrast, areas that had experienced extensive ground disturbance, such as market gardens were deemed less archaeologically sensitive, while creeks, including ephemeral first order streams were assessed as a sensitive landform. Where surface artefact sites were recorded on AHIMS, these locations were deemed to have the potential for additional artefacts either on the surface or in subsurface deposit.

In addition, Artefact predicted that Aboriginal objects could be associated with the archaeological remains of Bayley Park House (dating from the early 19th Century) (Plate 5.1). They based this assessment on a similar site in Oakdale where an axe head and Aboriginal objects were located in fill associated with an early nineteenth century homestead. However, there is currently no documentary evidence of Aboriginal people habiting in the vicinity of Bayley house in the 19th Century. In addition, site investigations of the house indicate it has been substantially modified, including concrete hard-stands across the front of the site, and earthworks to its rear.



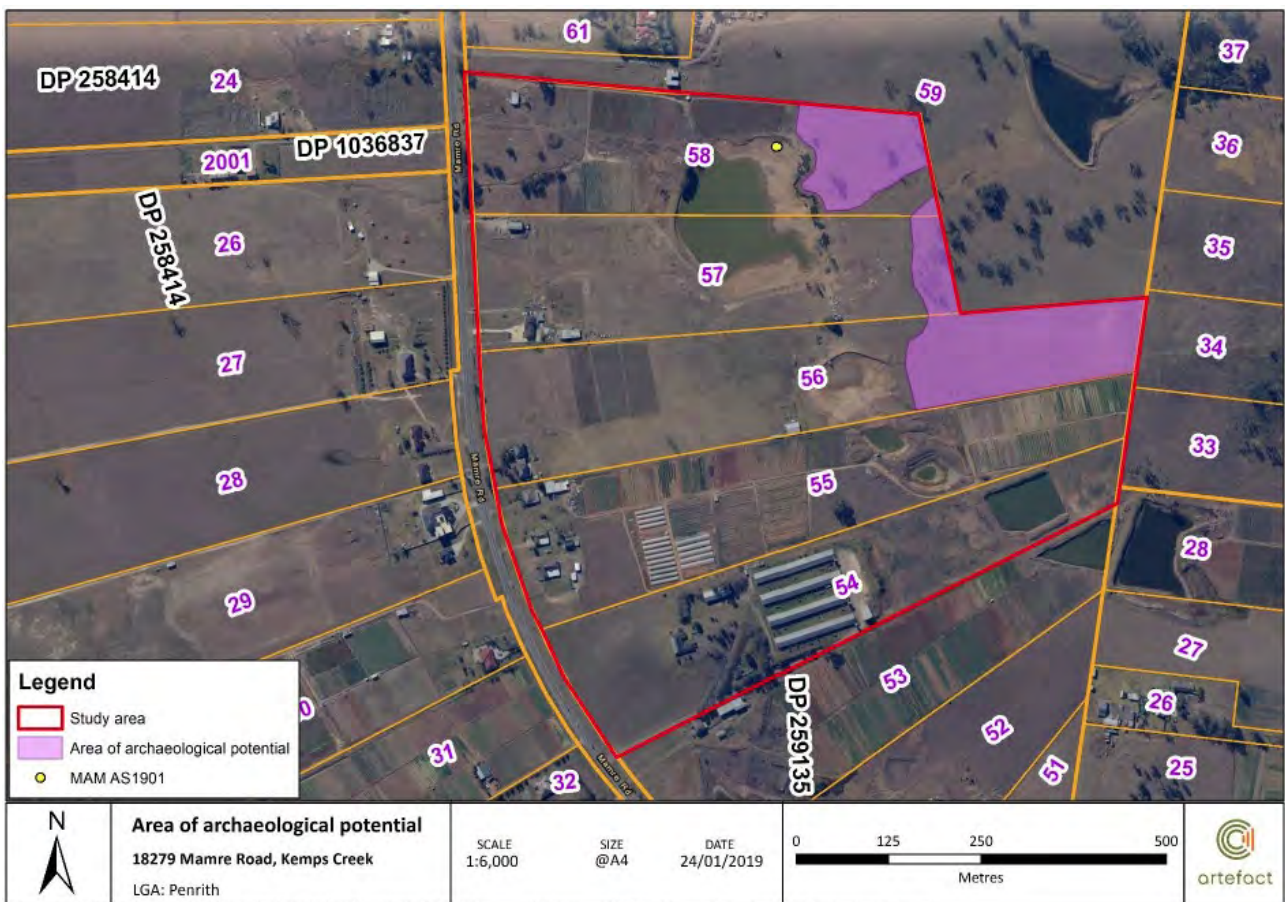
Source: Artefact (2019)

Plate 5.1 The results of a desktop review of the precinct by Artefact

5.3.2 Mamre Road, Kemps Creek (Artefact, 2019b)

Artefact undertook a due diligence investigation of Lots 54-58 DP 259135 Mamre Road, within the centre of the study area for Mirvac.

Investigations consisted of a background review and brief site inspection. These found a cleared and often moderately disturbed landscape, including creation of substantial rural dams. Soil profiles presented were generally shallow, with a topsoil often <20 cm in thickness. These investigations identified an artefact scatter (MAM AS1901) and an area of archaeological potential. The artefact scatter consisted of thirteen artefacts adjacent a tributary on the edge of an artificially created dam. Artefacts included a ground edge axe, nine silcrete flakes, two IMTC flakes and a quartzite flake. Based on these findings, and guided by low disturbance, a large area of archaeological potential was identified throughout the study area (Plate 5.2).



Source: Artefact (2019b)

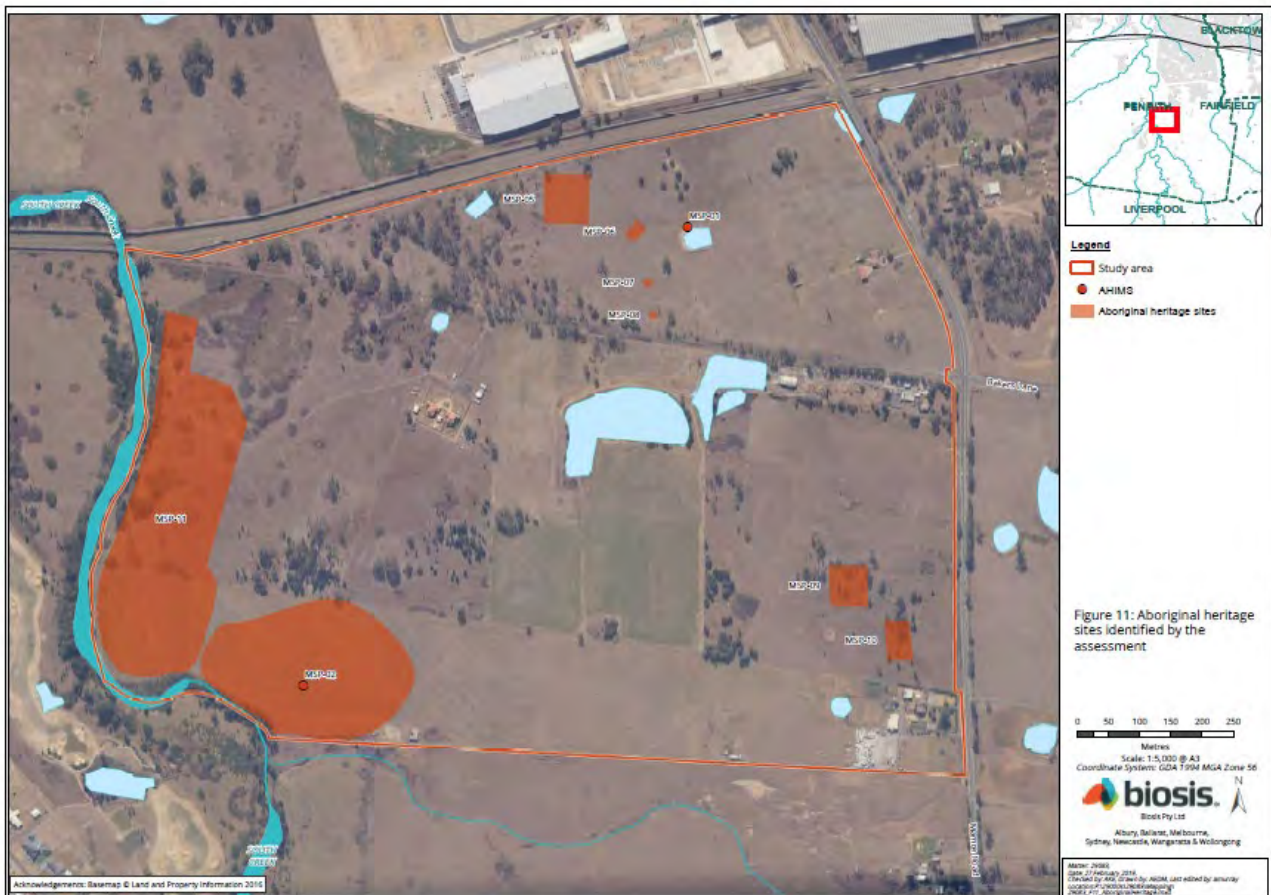
Plate 5.2 Map of archaeological finds based on a due diligence investigation of a portion of Mamre Road, Kemps Creek

5.3.3 Mamre South Precinct State Significant Development (Biosis 2019a)

Biosis (2019a) prepared an Aboriginal cultural heritage assessment (ACHA) for a State Significant Development (SSD) at 657-769 Mamre Road, Kemps Creek in the north-west of the study area. Their study included both surface and sub-surface investigations, and consultation with 19 Aboriginal organisations.

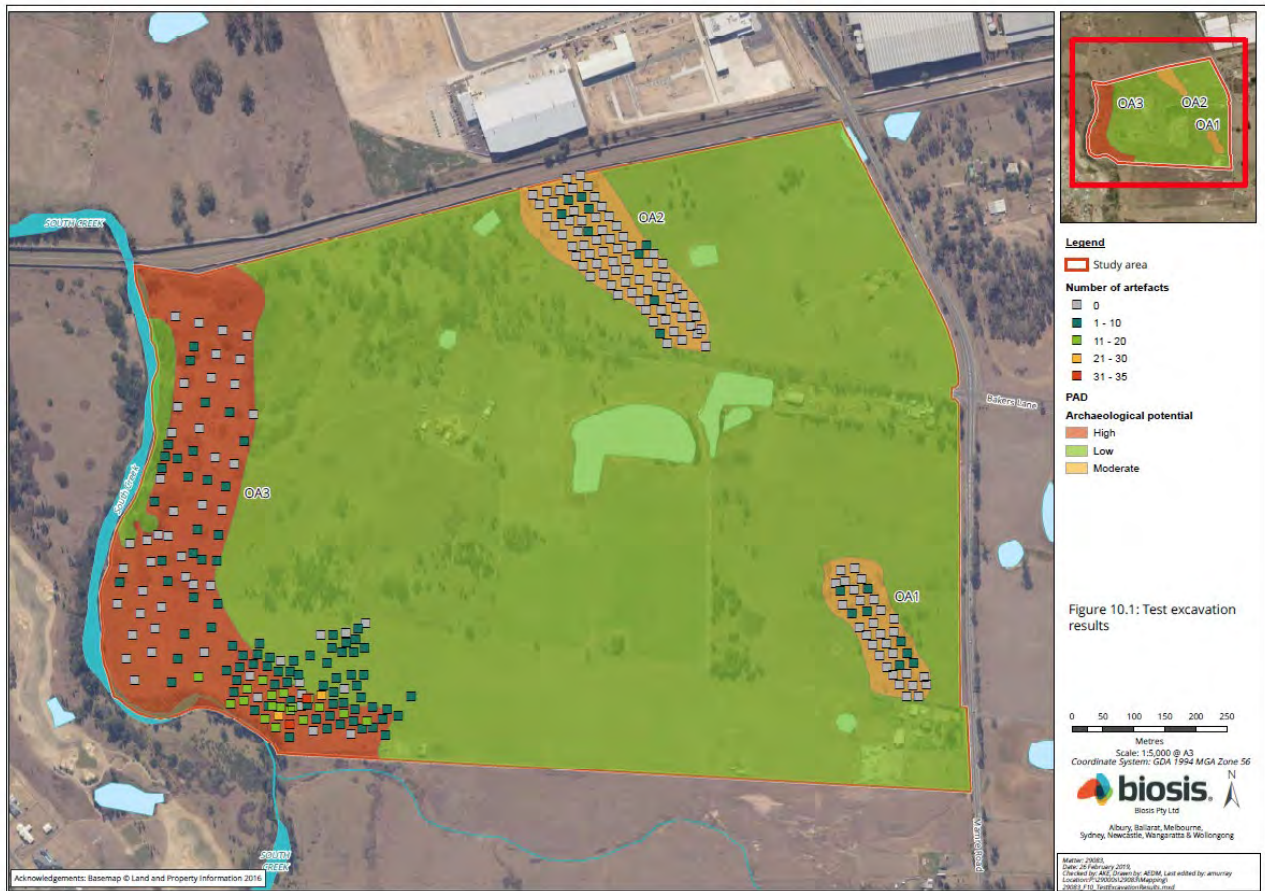
The assessment identified nine Aboriginal sites (MSP-01 to MSP-11 inclusive), all consisting of various densities of stone artefacts (Plate 5.3). Of note was their identification of MSP-02 (#45-5-5188), located in the southwest of the site, on a high point some 100m from South Creek. Excavations across the site recovered 691 artefacts, of which 666 were recovered from MSP-02 (Plate 5.4). These artefacts were characterised as of late Holocene age, dominated by silcrete raw materials and a higher than average proportion of formal tool types. While excavations demonstrated that much of the site exhibited a $\leq 30\text{cm}$ soil profile, occasional test pits in MSP-02 extended to 80 cm. Although even in these locations, artefacts were primarily found within the upper 40 cm (~98%).

All of the identified sites were within proposed impacts, and various management recommendations were outlined, including archaeological salvage of MSP-02 and surface collection of several other sites.



Source: Biosis (2019a)

Plate 5.3 Map of Aboriginal sites identified by Biosis at Mamre South Precinct



Source: Biosis (2019a)

Plate 5.4 Map of test excavations identified at Mamre South Precinct. Excavations suggest a generally low density artefact scatter with the exception of MSP-02

5.3.4 Mamre West Precinct, Orchard Hills (Biosis 2019b)

Biosis (2019b) prepared an ACHA primarily for a proposed channel re-alignment associated with a State Significant Development adjacent the Esrkin Park Business Park at 585-649 Mamre Road, Orchard Hills, immediately northwest of the study area. This report primarily included both survey and test excavations. Some 56 test pits were undertaken, and ultimately 13 Aboriginal sites were identified. These consisted of low density artefact scatters, isolated Aboriginal objects, and potential archaeological deposits.

The sites consisted of generally 10-40 artefact identified along the alignment often across large areas. Of note was the identification of a glass artefact observed at MWP-AD7, and which was considered to represent a post-contact find. The excavations recovered few artefacts, with most containing between 1-5 artefacts. These were dominated by silcrete and quartz raw materials.

Recommendations in the report indicate that the majority of the sites were destroyed as part of the project.

5.3.5 St Mary's Wastewater System Augmentation (Jacobs 2015)

Jacobs conducted salvage excavation at seven archaeological sites scheduled to be impacted by proposed wastewater works (Ophir Street and East St Clair carriers) at St Marys (Plate 5.5). These works were undertaken in accordance with Aboriginal Heritage Impact Permit C0000501. These sites, all stone artefact scatters, were located within the riparian corridor of Ropes Creek, between 1.3km and 5.5 km north of the study area.

Excavations, undertaken with participation of the Aboriginal community, included initial small test pits at each of the identified sites, followed by expansion of up to 10m² where thresholds were met. Ultimately, this amounted to some 106 m² of excavation. In general, the excavations found a shallow (~30 cm) duplex soil profile. These works recovered 2,128 artefacts, with average densities of 19.57/m², although these were skewed by the findings of 1,346 objects (53.85/m²) at #45-5-0559 (Plate 5.6), and values of <10/m² were more consistently observed along the alignment. #45-5-0559 was situated on a low to mid-level rise, which was in contrast to the low-lying topography across much of the study area. Findings at this site included a wide variety of artefact types, all indicative of a late Holocene age (5-0 ka), and was dominated by silcrete raw materials (88%) (Plate 5.7).

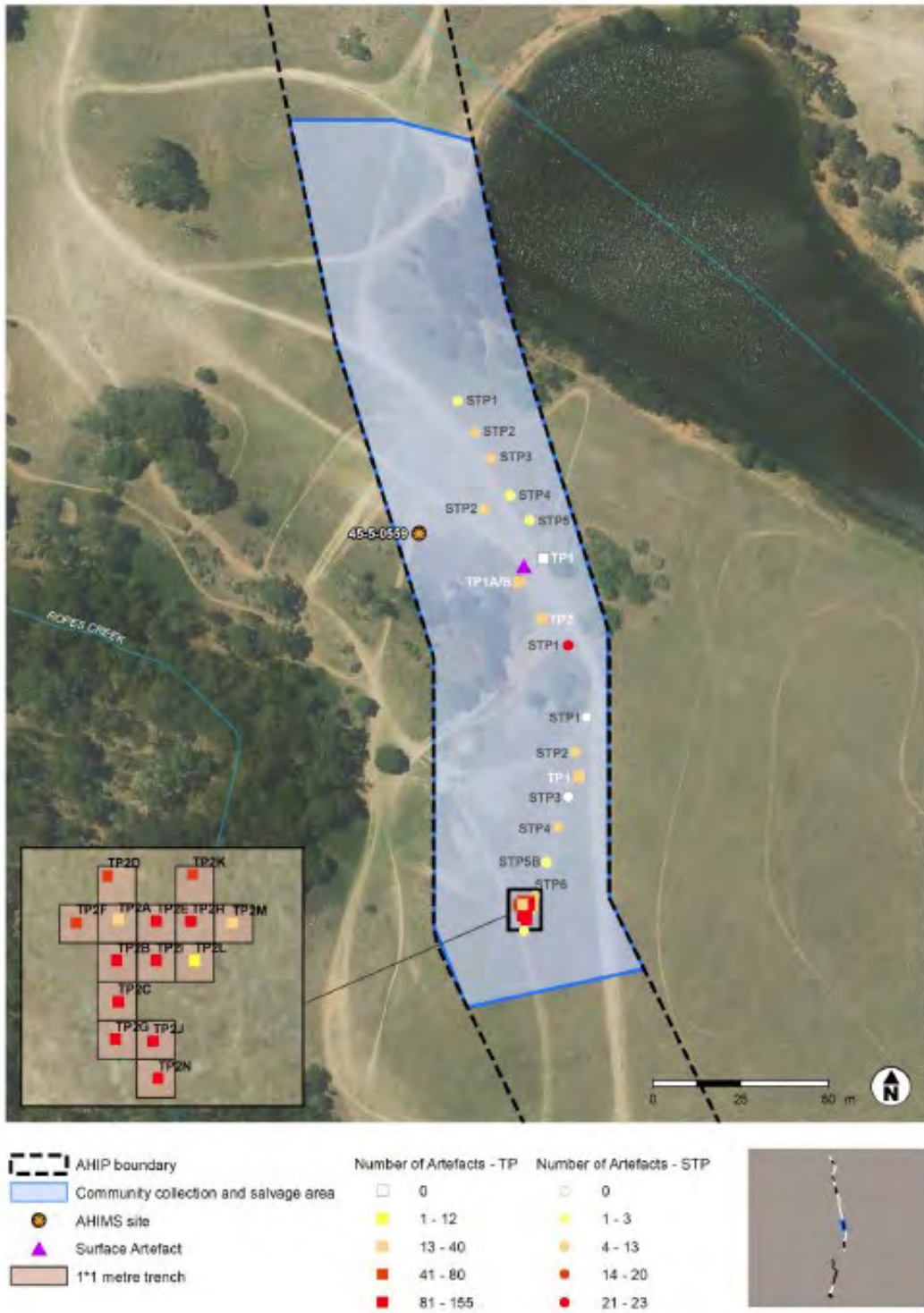
The study concluded (Jacobs 2015: 48):

- silcrete is the most common and apparently preferred raw material at all assemblages as evidenced by the sizeable distances material has travelled in some cases (for example, greater than 10 km from raw material source), the high quality nature of silcrete raw material for flaking purposes, the relative low incidence of cortex in the assemblage, and the high frequency of use of silcrete for stone tool curation in the region;
- low rise and low-high slope landforms are the more common and preferred landforms for flaking and stone tool curation;
- artefact densities in the context of the third order stream was dependant on the landscape to contain intact deposits on preferable (elevated) landforms;
- variation in the frequencies of modified artefacts could be related to the differing square metre excavations for each project i.e. the bigger the excavation the bigger the frequency variations; and
- artefact typology and mean weight at all assemblages is consistent with the Australian Small Tool Tradition and late Holocene assemblages.



Source: Jacobs (2015)

Plate 5.5 Map of salvage excavations identified at seven location at St Marys



Source: Jacobs (2015)

Plate 5.6 Excavations at #45-5-0559, a significant artefact scatter found as part of the study



Figure 3-13 AHIMS ID: 45-5-0559, T2 TP2A-N (Photograph by Joseph Brooke, 6 February 2015)



Source: Jacobs (2015)

Plate 5.7 Photographs of the excavations and artefact examples from #45-5-0559. Note the shallow soil profile, despite being in close proximity to Ropes Creek

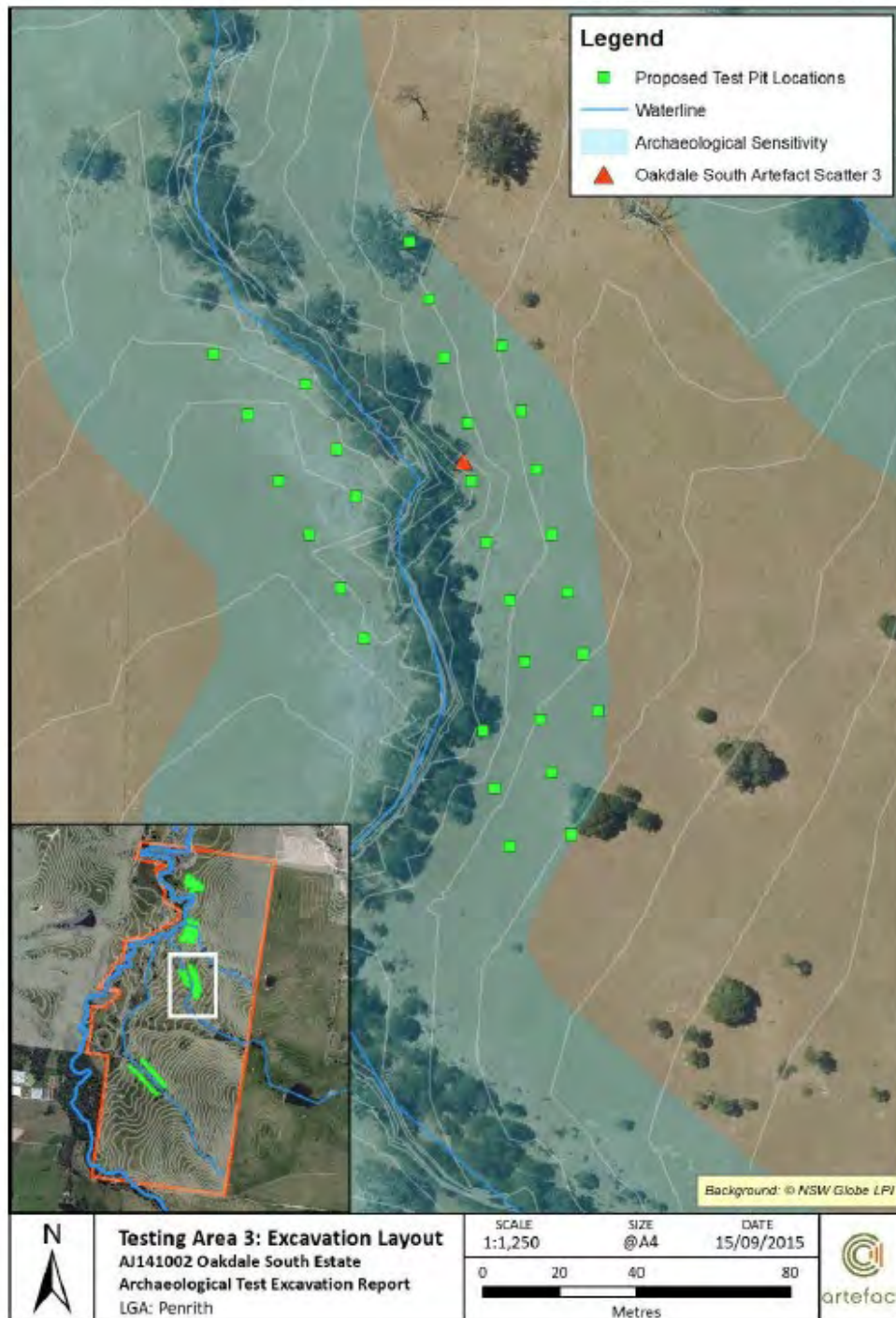
5.3.6 Oakdale South Estate (Artefact 2015) and Oakdale West Estate (Artefact 2017)

Oakdale precinct is a development of industrial properties on the north eastern border of the study area and within many of the same landforms. Oakdale West lies to the west of Ropes creek and Oakdale South lies to the south-east of the tributary. Findings by Artefact’s test excavation at Oakdale South in 2015 are applicable to the study area and offer a model of the archaeological potential within the precinct.

The Oakdale South investigations included a series of test excavations conducted within areas identified as of archaeological significance. These included tributaries to Ropes Creek and in proximity to previously identified sites. A total area of 27.5 m² was excavated, and identified a soil profile commonly about 60cm in depth. These soil profiles were consistent with a shallow duplex or fabric contrast soil, demonstrating a pale grey loam topsoil (A1 horizon) grading into a hard brown orange clay subsoil (B2 horizon). Some 341 artefacts were retrieved during test excavation primarily from the upper 20cm, and resulting in an overall artefact density of 12.29 artefacts/m².

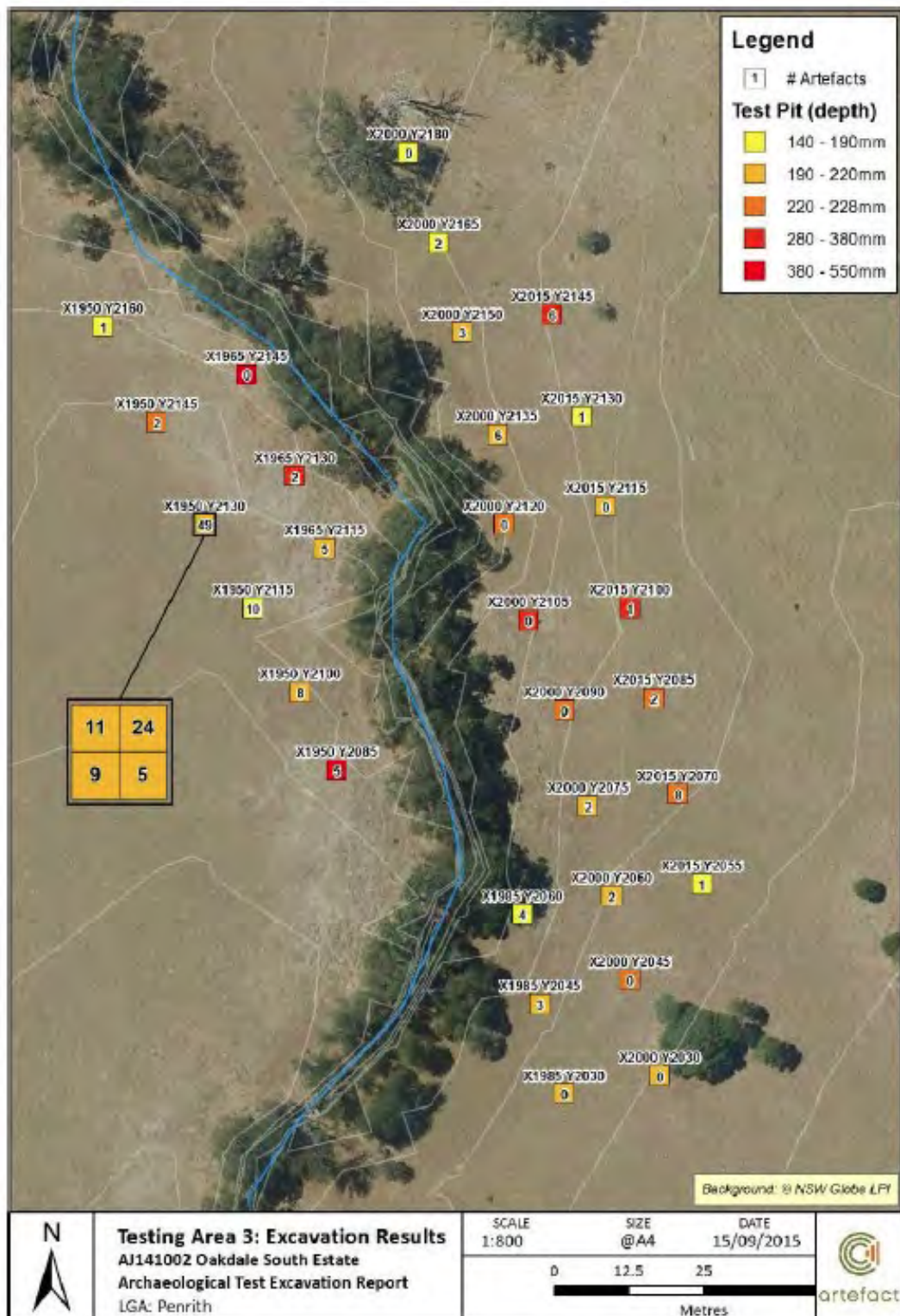
The report concluded that the results reflected a transient use of the region by Aboriginal people in the past, with only testing area 3 revealing higher densities (Plates Plate 5.8 and Plate 5.9). Specifically, some 49 artefacts were recovered from a single test pit, although other densities were generally <10/m².

A subsequent stage of work was undertaken for Oakdale West Estate. This consisted of a desktop review and field survey of the site, and documented eight sites all consisting of artefact scatters and/or isolated Aboriginal objects. In general, descriptions suggest none of these sites exceeded 5 artefacts in a single locale, and most were in disturbed locations. However, the sites were primarily adjacent Ropes Creek, and the report ultimately identified a large area of archaeological sensitivity along this tributary (Plate 5.10).



Source: Artefact (2015)

Plate 5.8 Testing area 3 undertaken along a tributary of Ropes Creek



Source: Artefact (2015)

Plate 5.9 Archaeological results of testing area 3 undertaken along a tributary of Ropes Creek



Source: Artefact (2017)

Plate 5.10 Archaeological results of at Oakdale West Estate

5.3.7 Oakdale Central (GML 2013, 2015)

GML conducted test excavations along Ropes Creek within the Oakdale Central precinct situated north-east of the study area. Following earlier stages identifying archaeological targets, their work consisted of 109 test pits primarily adjacent the Ropes Creek.

Some 285 stone artefacts were recovered from 54 test pits. The artefacts were dominated by silcrete raw material (88%) and were indicative of late Holocene activity in the region. A subsequent salvage program was undertaken at two locales, Oakdale Central 2 and 3 (#45-5-4328, #45-5-4329), at which a further 589 lithics were recovered. These consisted of 370 stone artefacts and some 228 of non-diagnostic fragments. In addition to the stone artefacts, four burnt features were identified. One of these was considered to reflect a hearth or cooking feature, and which was dated to the last thousand or so years (1161 ± 21 and 909 ± 29 ^{14}C BP). Further radiocarbon samples from scattered charcoal within the soil profile further suggested occupation may have extended to at least 4,000 years ago.

5.4 AHIMS data

The Aboriginal Heritage Information Management System (AHIMS) database is managed by DPIE and includes the location and description of Aboriginal objects and sites previously recorded through academic research and cultural resource management. EMM conducted a search of the AHIMS register on 2 January 2020. The search covered an area of approximately 8 km² centred on the study area; but also extended beyond the study area boundary.

The aim of the search was to identify if any Aboriginal sites or places are registered within the study area; and to aid the predictions for the study area from the frequency and distribution of Aboriginal site types in the broader landscape. The results of the AHIMS data is presented in Figure 5.2, and provided in full in Appendix B.

The AHIMS search identified 115 registered Aboriginal sites in the search area (Table 5.1). These sites are predominantly located along the major creeklines of the region, including Kemps, South and Ropes Creek, and are typically associated studies. Of note are the extensive studies undertaken for the Oakdale developments north-east of the study area, and from the Orchard Hills developments to the north of Bakers Lane. Of these 20 are located within the study area (Table 5.2). Nine of these are erroneously located in the AHIMS database, and are actually situated within Erskine Park (Figure 5.3) These are predominantly documented from the previous archaeological studies outlined in Section 5.3, and include the Mamre South precinct works by Biosis (2019a) and due diligence investigations along Mamre Road by Artefact (2019b). A cluster of sites situated just south of Bakers Lane relate to due diligence and/or assessment investigations by Urbis and Dominic Steele Consulting Archaeologist, but neither report was available at the time of this AHS. Several of these also relate to studies in Erskine Park by Navin Officer Heritage Consultants in 2005 and may be erroneously located.

Overwhelmingly, these sites are dominated by surface and/or sub-surface stone artefact sites. Descriptions of the size and density of these sites are limited, but were provided generally appear to indicate isolated objects or very small numbers (<10). They are often found occurring on deflated and/or disturbed surfaces, which is in part the result of better visibility in these environments. In addition, two culturally modified trees are reported in a densely wooded area around South Creek, and just west of the study area.

Table 5.1 Aboriginal site types in the search area

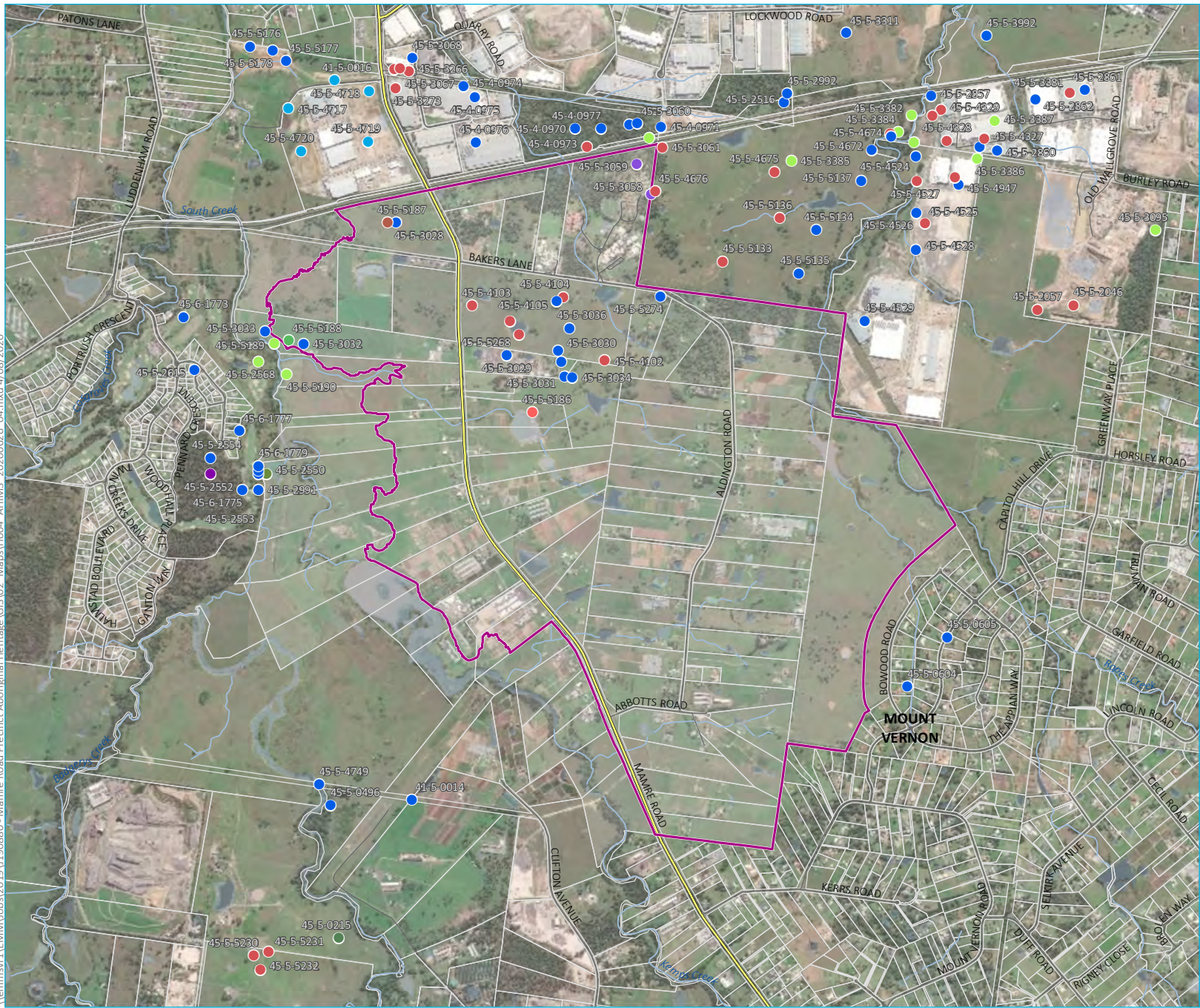
Site feature	Number	Percentage
Artefact site	107	93
<i>Isolated find</i>	28	24.4
<i>Small artefact scatter (<10)</i>	8	7
<i>Undefined artefactual site</i>	68	59.2
<i>Undefined artefactual site with PAD</i>	3	2.7
Culturally modified tree	2	1.8
<i>Culturally modified tree</i>	1	0.9
<i>Culturally modified tree and undefined artefact site</i>	1	0.9
Axe grinding groove	1	0.9
Potential archaeological deposit (PAD)	5	4.4
TOTAL	115	100

Table 5.2 Summary of sites within the study area

AHIMS #	Site name	Location	Site type	Description
45-5-3028	EPTA3	Lot 34 DP1118173	Artefact scatter	This site has been erroneously positioned within AHIMS. Located ~1.5-2 km north of the registered AHIMS location, on land near Lenore Land at Erskine Park, outside the current project area (Navin Officer 2005).
45-5-3029	EPTA4	Lot 60 DP 259135	Artefact scatter	This site has been erroneously positioned within AHIMS. Located ~1.5-2 km north of the registered AHIMS location, on land near Lenore Land at Erskine Park, outside the current project area (Navin Officer 2005).
45-5-3030	EPTA5	Lot 1 DP 104958	Artefact scatter	This site has been erroneously positioned within AHIMS. Located ~1.5-2 km north of the registered AHIMS location, on land near Lenore Land at Erskine Park, outside the current project area (Navin Officer 2005).
45-5-3031	EPTA6	Lot 60 DP 259135	Artefact scatter	This site has been erroneously positioned within AHIMS. Located ~1.5-2 km north of the registered AHIMS location, on land near Lenore Land at Erskine Park, outside the current project area (Navin Officer 2005).
45-5-3032	EPTA10	Lot 22 DP 258414	Artefact scatter	This site has been erroneously positioned within AHIMS. Located ~1.5-2 km north of the registered AHIMS location, on land near Lenore Land at Erskine Park, outside the current project area (Navin Officer 2005).
45-5-3033	EPTA11	Lot 22 DP 258414	Artefact scatter	This site has been erroneously positioned within AHIMS. Located ~1.5-2 km north of the registered AHIMS location, on land near Lenore Land at Erskine Park, outside the current project area (Navin Officer 2005).

AHIMS #	Site name	Location	Site type	Description
45-5-3034	EP-I 1	Lot 59 DP259135	Artefact site (undefined)	There is little data available in relation to this site. However, it is listed as an isolated object on an Aboriginal Heritage Impact Permit associated with 45-5-3028 to 45-5-3033 inclusive. As such, it is considered likely to be erroneously positioned and is situated on land within the Erskine Park region and/or destroyed.
45-5-3035	EP-I 2	Lot 60 DP259135	Artefact site (undefined)	There is little data available in relation to this site. However, it is listed as an isolated object on an Aboriginal Heritage Impact Permit associated with 45-5-3028 to 45-5-3033 inclusive. As such, it is considered likely to be erroneously positioned and is situated on land within the Erskine Park region and/or destroyed.
45-5-3036	EP-I 3	Lot 1 DP104958	Artefact site (undefined)	There is little data available in relation to this site. However, it is listed as an isolated object on an Aboriginal Heritage Impact Permit associated with 45-5-3028 to 45-5-3033 inclusive. As such, it is considered likely to be erroneously positioned and is situated on land within the Erskine Park region and/or destroyed.
45-5-3059	EV1	Lot 2 DP556036	Artefact scatter and PAD	Three silcrete artefacts on creek flat in area of high disturbance – near playing fields of Emmaus Village. Entire area considered to have been disturbed. References in the site card suggest that the site has been destroyed.
45-5-4102	Kemps Creek IF1	Lot 1 DP104958	Isolated find	Grey quartzite flaked piece on the banks of a small agricultural dam.
45-5-4103	Kemps Creek IF2	Lot 1 DP104958	Isolated find	Red silcrete flaked piece on the banks of a small agricultural dam.
45-5-4104	Kemps Creek (logosoc 1)	Lot 1 DP104958	Artefact scatter	Red silcrete artefacts on the banks of a series of agricultural dams.
45-5-4105	Kemps Creek (logosoc 2)	Lot 1 DP104958	Artefact scatter	Red silcrete artefacts within a small patch of remnant woodland.
45-5-5186	Mamre Road Artefact Scatter 1901	Lot 58 DP259135	Artefact scatter and PAD	Thirteen artefacts identified in a disturbed context on a gentle slope on the edge of an agricultural dam. Predominantly silcrete flakes, though mudstone, quartzite and chert were also identified. One ground edge axe also identified. PAD recorded as associated with the artefact scatter, noted as a 150 x 150m area adjacent to a first order drainage line of South Creek.
45-5-5187	MSP-01	Lot 34 DP1118173	Isolated find	A silcrete flake located 900m from South Creek on the bank of an agricultural dam.
45-5-5188	MSP-02	Lot 22 DP258414	Artefact scatter	Two silcrete flakes located within a disturbed context 75m from South Creek and 90m from a 2 nd order tributary to South Creek. Cleared flat. Subsequent excavations of this site recovered some 600 artefacts from a 40cm deep soil profile and identified as of high significance (see Section 5.3.3).
45-5-5268	Kemps Creek IF-02	Lot 1 DP104958	Isolated find	Indurated mudstone flaked piece, located within a disturbed context on the southern bank of an agricultural dam.
45-5-5269	Kemps Creek IF-01	Lot 1 DP104958	Isolated find	Indurated mudstone flake, located within a disturbed context on the western bank of an agricultural dam.
45-5-5274	Bakers Lane SLR AFT 1	Lot 40 DP708347	Artefact scatter	Low density surface scatter of silcrete artefacts. Located on a large (480 x 80m) sheet erosion exposure on the eastern bank of an agricultural dam.

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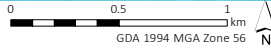


- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody
 - Cadastral boundary
- AHIMS site type**
- Axe grinding groove
 - Culturally modified tree
 - Isolated Aboriginal object
 - Isolated find
 - Large artefact scatter (>500)
 - Large artefact scatter (<50)
 - Potential archaeological deposit
 - Small artefact scatter (10-20); potential archaeological deposit
 - Small artefact scatter (<10)
 - Small artefact scatter (<10); potential archaeological deposit
 - Undefined artefactual site

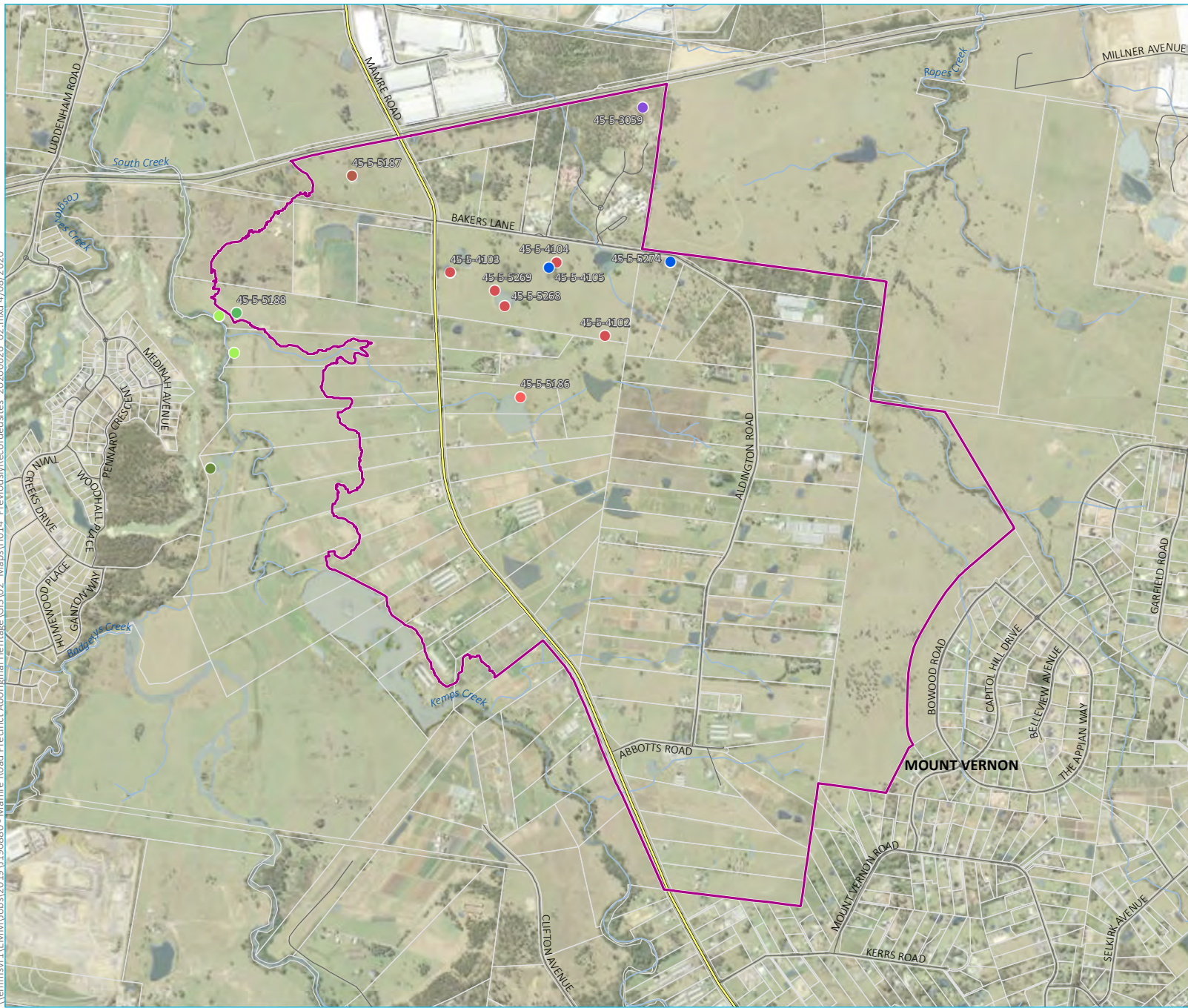
AHIMS sites

Department of Planning, Industry & Environment
Aboriginal heritage study
Figure 5.2

Source: EMM (2020); OEH (2019); DFSI (2017); DPE (2017)



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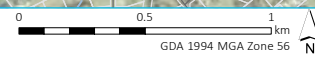


- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody
 - Cadastral boundary
- AHIMS site type**
- Isolated Aboriginal object
 - Isolated find
 - Large artefact scatter (>500)
 - Small artefact scatter (10-20); potential archaeological deposit
 - Small artefact scatter (<10)
 - Small artefact scatter (<10); potential archaeological deposit
 - Undefined artefactual site

Previously recorded sites removing those erroneously positioned

Department of Planning, Industry & Environment
Aboriginal heritage study
Figure 5.3

Source: EMM (2020); OEH (2019); DFSI (2017); DPE (2017)



5.5 Site predictions

Based on the distribution of sites and finds by previous investigations and the AHIMS data, a number of predictions in relation to cultural material within the study area can be developed.

At a generic level, the criteria as outlined in DPIE's *The Due Diligence Code of Practice* (DECCW 2010) can be utilised, which includes:

- within 200 m of waters;
- located within a sand dune system;
- located on a ridge top, ridgeline or headland;
- located within 200 m below or above a cliff face; or
- within 20m of or in a cave rockshelter or cave mouth; and
- is on land that is not disturbed land.

The data presented in sections 5.3 and 5.4 are not significantly different from these criteria. However, they can be further refined. Of note is that while cultural material is often found in the vicinity of water, it is more commonly located on third and fourth order creeks, and less so on smaller tributaries. As such, cultural material would be more likely found on the edges of the study area adjacent Kemps, South and Ropes Creek, rather than the lesser waterways within the study area. It is worth highlighting that several of the internal waterways may be the result of land clearance in the nineteenth century, and may not reflect a pre-contact tributary. Further, significant cultural material along these tributaries appears to be found on elevated areas – terraces, levee banks, low hills – with much less evidence of people on flats or floodplains associated with the creek. In addition, AHIMS sites have been registered along the ridgeline in the north of the study area. This ridgeline continues north to south through the study area and evidence suggest it has high potential for further cultural material.

Cultural material is likely to be dominated by various densities of surface and/or sub-surface stone artefacts. These will generally be found in numbers of <10 and often as isolated objects. Overwhelmingly, these stone artefacts are dominated by silcrete raw materials (usually >80%) which are likely being sourced from known raw material outcrops in the Blacktown, Riverstone and Plumpton Ridge areas. In most cases, the artefact typologies, and occasional chronological dating, suggests these material are primarily dating to the last few thousand years.

Land clearance and development have had a significant impact on the potential for archaeological deposits to occur within the study area. Aerial photographs dating to the mid twentieth century demonstrate the extent to which this land has been cleared for farming, pastoralism and other activities. The intensity of activity has increased in recent years with market gardens and establishment of some industry. Due to extensive vegetation clearance for pastoral use and the low frequency of culturally modified trees in the vicinity of the study area, it is unlikely for this site type to survive in the study area.

6 Field investigation

6.1 Key findings

- A sub-sample of the study area was archaeologically surveyed to validate the desktop analysis results. Survey was dictated by landowner access permission, but ultimately encompassed a wide range of landforms and environments across the study area.
- The locations of previously recorded Aboriginal sites were ground-truthed, including the relocation of surface artefacts within Lot 1 DP104958. Where registered AHIMS sites occur, the survey effort confirmed the archaeological potential of the area has been retained since their original recording.
- Two previously unrecorded Aboriginal sites (MRP-OS1 and MRP-OS2), both low density artefact scatters, were also identified and documented.
- Levels of disturbance varied significantly throughout the study area, but few areas were identified where historical activities have not had an impact. Market gardens have resulted in significant ground surface disturbance to any culturally bearing soil profile, whereas pastoral activities demonstrate lesser impacts. Significant modification of waterways was observed throughout the study area, and this will have likely affected many of the more significant deposits potentially present within the study area.

6.2 Methods

The main aims of field investigation were to:

- verify the desktop review outlined in preceding sections;
- identify any extant Aboriginal objects or sites present within the study area through visual observation;
- identify any potential deposits or landforms of archaeological interest within the study area;
- identify evidence of previous and existing disturbance that may have had a detrimental impact to any Aboriginal objects that may have been present; and
- discuss and identify firsthand any cultural values of the study area with the Aboriginal stakeholders.

Due to time and access constraints the field investigation was undertaken via pedestrian survey or visual inspection from the nearest publicly accessible vantage point (refer to Figure 6.1).

The survey team comprised two EMM archaeologists, and up to six RAP representatives (refer to Table 2.2). Where access was permitted, the field team completed pedestrian survey of targeted areas of sensitivity as identified by predictive modelling and areas of ground surface visibility or exposure, and/or mature vegetation where present.

Data from the field investigation was recorded with digital tablets using recording forms created by EMM on the Survey123 application for ArcGIS (Esri© software). The digital tablets had a location accuracy of up to ± 3 m which is similar to hand-held non-differential GPS units (~ 5 m). The Survey123 forms allowed for site location, details and representative photographs to be linked together, preventing post-fieldwork issues around data integrity.

6.3 Results

A total of 31 properties were included in the field investigations, including pedestrian survey of 11 properties and visual inspection of 20 others (Figure 6.1). Survey and landform coverage results for pedestrian survey are shown in Table 6.1 and Table 6.2. As per Requirement 5 of the Code (DECCW 2010b, p. 12), calculations of survey effectiveness have been omitted for areas where field investigation was limited to visual inspection. Table 6.3 provides a description of the archaeologist's observations. Overview photographs of the field investigations are provided in Appendix C.

The survey confirmed that the landscape of the study area was visually dominated by prominent ridgelines in the north and south-east which recede to South Creek and Kemps Creek in the west, and Ropes Creek in the north-east. In accordance, with the soil landscape mapping, upper slopes and ridgelines within the study area consistently demonstrated some depth of deposits, with exposures revealing topsoil (A1 horizon) averaging ~25-40 cm. Surface material observed on these landforms was generally limited to shales unsuitable for stone tool production. Quartz and silcrete was noted to occur within the study area, but of poor quality and in very low density; and as other studies indicate more likely comes from northwest Sydney (Section 5.3). Where previous investigations have been undertaken, Aboriginal sites with surface and subsurface elements have consistently been identified in association with the northern ridgeline. As such any ridgelines within the study area should be considered as having archaeological sensitivity.

Soil profiles within the margins of South Creek and Kemps Creek appear deep and consistent with Quaternary alluvium, although several areas appear flood-prone and swampy. In comparison to the low-lying, heavily disturbed margins of Kemps Creek in the south-western portion of the study area, landforms bordering the confluence of South Creek and Kemps Creek to the north include slightly more elevated and have the potential to contain significant cultural materials. Other areas along the northern banks of South Creek, as well as Ropes Creek in the northeast, whilst not containing any obviously elevated landforms, revealed minimal and/or superficial evidence of disturbance and must be considered to also have potential for subsurface cultural material.

The majority of the study area comprises the extensive plains of the valley floor. These low lying areas exhibit the highest levels of disturbance within the study area. Large-scale impacts include junkyards, building supply yards, road infrastructure, services easements, housing and extensive market gardens. In these areas the potential for intact archaeological deposits is considered to have been reduced as a result of the removal or significant disturbance of the upper soil profile. However, the identification of MRP-OS1 demonstrates that Aboriginal objects can occur even within heavily disturbed contexts, albeit in low densities.

Ropes Creek is bounded by a riparian corridor of woodland approximately 100 m wide either side of the creek. This is in contrast to South Creek and Kemps Creek where the remaining vegetation is only a few metres wide in places, and the adjoining land is highly disturbed.

Overall, the field investigation indicated that the study area has a range of moderate and heavy ground disturbance as a result of modern activities in most locations. This is especially the case throughout the central part of the study area, with considerable housing development, road infrastructure and waste/recycling blocks present. Areas of significant archaeological potential include the ridgelines which run through the northern and south-eastern portions of the study area; the confluence of South Creek and Kemps Creek; and the northern portion of South Creek and Ropes Creek. It must be cautioned, however, that much of the study area was not accessible for investigation, and most of the survey units had extremely low visibility at the time of survey (typically 5%; Table 6.1); and as such other areas may exhibit cultural materials when future assessment is undertaken.

Table 6.1 Effective survey coverage (pedestrian survey only)

Survey Unit	Landform	Area (m ²) ¹	Exposure (%)	Visibility (%)	Coverage (m ²)	Coverage (%)
Lot 1 DP1018318	Stream Bank	130,400	5	2	130.4	0.1
Lot 26 DP258414	Stream Bank	24,800	10	2	49.6	0.2
Lot 27 DP258414	Stream Bank	156,000	20	10	3,120	2
Lot 32 DP258414	Stream Bank (heavily modified)	81,600	30	5	1,224	1.5
Lot 39 DP258414	Stream Bank (heavily modified)	14,400	30	2	86.4	0.6
Lot 6 DP250002	Plain	88,000	2	1	17.6	0.02
Lot 56 DP259135	Plain	74,400	5	1	37.2	0.05
Lot 1 DP104958	Ridgeline	202,400	15	5	1518	0.75
Lot 44 DP708347	Stream Bank	138,400	10	2	276.8	0.2
Lot 30 DP258949	Plain	66,400	15	5	498	0.75
Lot 12 DP100269	Ridgeline	52,800	5	1	26.4	0.05
Average		93,600	13	3	635	1
Total		1,029,600			6,984	

Table 6.2 Landform summary

Landform	Area (m ²)	Area effectively surveyed (m ²)	Area effectively surveyed (%)	Number of sites (including AHIMS)	Site Names
Stream Bank	449,600	3,576.8	2.5	3	MRP-OS2 45-5-2550 45-6-1779
Stream Bank (heavily modified)	96,000	1,310	2.1	1	MRP-OS1
Plain	228,800	552.8	0.82	0	

¹ Survey area has been calculated on the basis of a survey coverage width of 10 m per survey participant (8 x 10 m = 80 m) multiplied by the length of the transect.

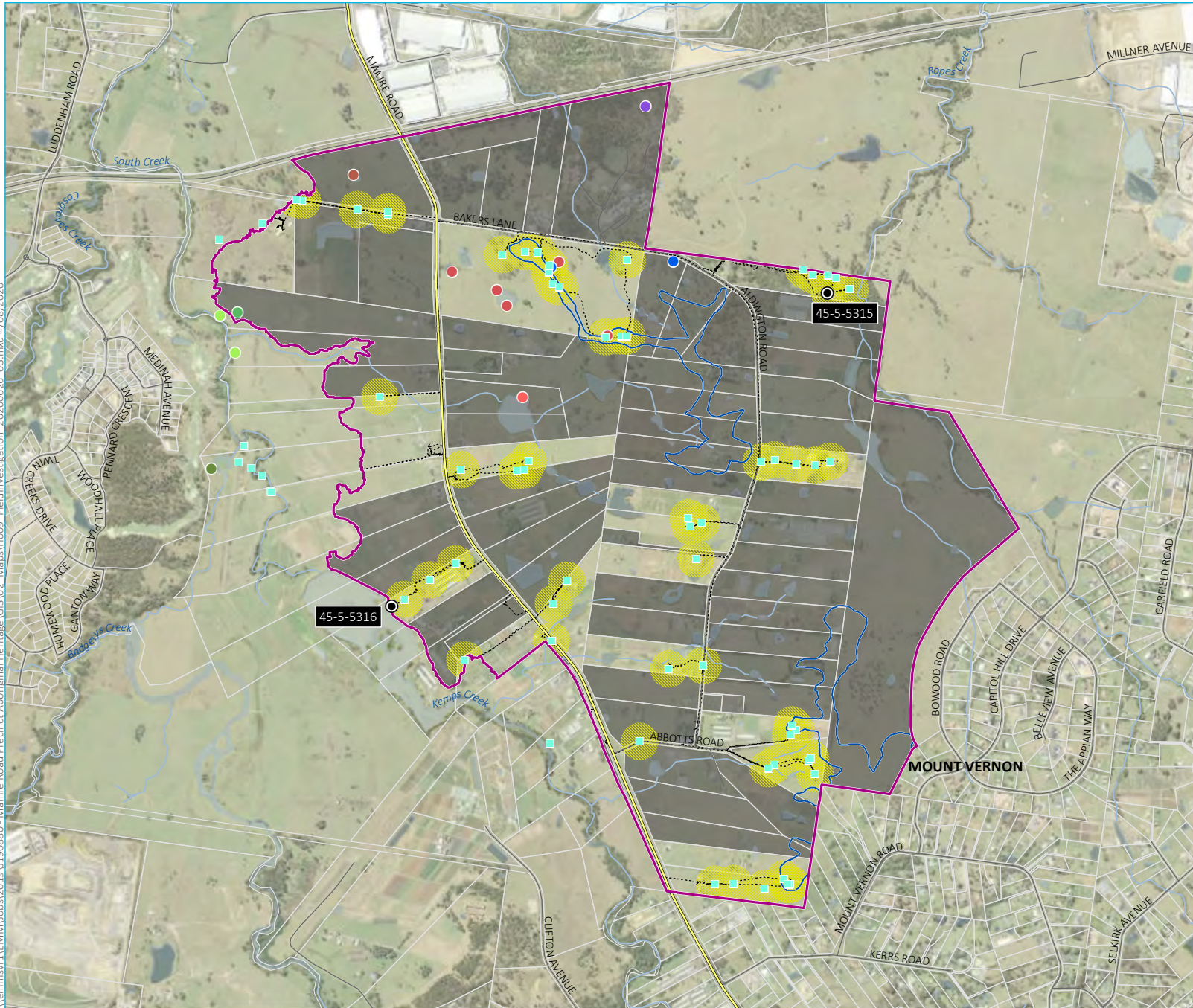
Landform	Area (m ²)	Area effectively surveyed (m ²)	Area effectively surveyed (%)	Number of sites (including AHIMS)	Site Names
Ridgeline	255,200	1,544.4	0.8	8	45-5-4102
					45-5-3030
					45-5-3036
					45-5-4104
					45-5-4105
					45-5-5268
					45-5-5269
					45-5-4103
TOTAL	1,029,600	6,984	6	12	

Table 6.3 Visual inspection coverage

Landform	Lot/DP(s)	AHIMS sites	Description
Plain (heavily modified)	X/DP421633	45-5-5186	Market gardens and greenhouses on many of the properties had resulted in higher levels of disturbance and erosion. The AHIMS site is located beside an agricultural dam on land cleared for pastoral use.
	25/DP255560		
	28/DP255560		
	36/258414		
	53/DP259135		
	55/DP259135		
	58/DP259135		
Plain	22/DP258414	45-5-3032	This landform has been extensively cleared for pastoral use, with dense exotic grasses and earthworks undertaken for water management and for site levelling. Market gardens and greenhouses on many of the properties had resulted in higher levels of disturbance and erosion.
	23/DP258414	45-5-3033	
	35/DP258414	45-5-5188	
	1/DP250002	45-5-5189	
	3/DP250002	45-5-5190	
	9/DP253503		No Aboriginal sites have been identified on this landform.
	27/DP255560		
	37/DP258949		
	51/DP259135		
52/DP259135			
Ridgeline (heavily modified)	1/DP104958	45-5-4103	This landform has been extensively cleared for pastoral use with dense exotic grasses and limited surface visibility. AHIMS sites that were inspected (isolated finds) were located on the edges of agricultural dams on the footslopes of the ridge where there had been high previous disturbance from earthworks and water management.
	4/DP587334	45-5-5268	
	16/DP253503	45-5-5269	

Landform	Lot/DP(s)	AHIMS sites	Description
Ridgeline	1/DP104958	45-5-3030	Dense grass coverage and limited surface visibility on ridgeline in the north of the study area.
	3/DP250002	45-5-3036	
	11/DP253503	45-5-4102	Some outcropping on the crests, particularly on the ridgeline in the south of the study area.
	12/DP253503	45-5-4104	
	13/DP253503	45-5-4105	Naturally occurring silcrete was present in low concentrations, visible in the exposed soils beside the dams.
	44/DP708347	MRP-OS2	The north eastern corner of study area was wooded and sloped down to Ropes Creek. An artefact scatter (MRP-OS2) was identified beside one of several ephemeral drainage lines. AHIMS sites (mostly isolated finds), apart from one small flake, were not relocated due to low surface visibility. Trees were inspected for cultural modifications. One eucalypt tree had an even, oval shaped scar, but the tree was quite young, and the scar is unlikely to be cultural.
Stream Bank	22/DP258414		The elevated landform beside the confluence of Kemps Creek and South Creek were considered to have archaeological potential.
	23/DP258414		
	26/DP258414		The west bank of South Creek to the south of the confluence has been heavily modified by construction of a levee bank and the remnants of a former dam. However, the elevated banks beside the serpentine bends of Kemps Creek have archaeological potential as possible camp sites. The presence of freshwater mussel shells on the banks indicate some of the resources Aboriginal people in the past may have used.
	27/DP258414		
	1/DP1018318		
	2001/DP1036837		AHIMS sites within 22/DP258414 and 23/DP258414 were recorded during test excavations. The sites were all within 150m of South Creek on land that had been cleared and disturbed. No additional artefacts were identified during the field inspection.
Stream Bank (heavily modified)	32/DP258414	MRP-OS1	Kemps Creek in the southern part of the study area has been highly disturbed with the riparian corridor of trees less than a meter wide in some places. Land has been extensively cleared and used for market gardens.
	36/DP258414		Tadpole dam was constructed in Kemps Creek over forty years ago and has changed the course of the river.
	44/DP708347		Nevertheless, the presence of artefacts indicates that there is potential for some archaeological resource to have survived. Artefacts were identified on an eroded track beside Tadpole dam.

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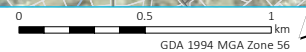


- KEY**
- Study area
 - Newly identified Aboriginal site
 - Visual inspection
 - Visual inspection buffer (100 m)
 - Survey track
 - Ridge line
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody
 - Access not permitted
 - Cadastral boundary
- AHIMS site type**
- Isolated Aboriginal
 - Isolated find
 - Large artefact scatter
 - Small artefact scatter (10-20); potential archaeological deposit
 - Small artefact scatter (<10)
 - Small artefact scatter (<10); potential archaeological deposit
 - Undefined artefactual

Field investigation of the study area

Department of Planning, Industry & Environment
Aboriginal heritage study
Figure 6.1

Source: EMM (2020); OEH (2019); DFSI (2017); DPE (2017)



6.3.1 Sites identified

The field investigation identified two previously unrecorded Aboriginal sites (Figure 6.1; Table 6.4; Plate C.16, Plate C.18 and Plate C.19), and ground-truthed the locations of eleven previously recorded sites (Table 6.5). Due to dense grass and low surface visibility, surface artefacts were only able to be re-located at AHIMS sites 45-5-4105, 45-5-4104 and 45-5-5274. The majority (n = 14) of AHIMS registered sites were not re-visited due to access issues.

Table 6.4 Summary of previously unrecorded Aboriginal sites identified during the survey

AHIMS #	Site name	Easting/Northing	Survey Unit	Site Feature	Artefact count	Site Area (m ²)	Landform
45-5-5316	MRP-OS1	294413E/6252254N	Lot 32 DP258414	Artefact scatter	2	~50	Stream Bank (heavily modified)
45-5-5315	MRP-OS2	296737E/6253925N	Lot 44 DP708347	Artefact scatter	3	~10	Stream Bank

Table 6.5 Summary of previously recorded Aboriginal sites ground-truthed within the study area

AHIMS #	Site name	Location	Site type	Artefact Count	Landform	Description
45-5-2550	CGD1	Lot 27 DP258414	Artefact scatter	55	Steam Bank	Located in the golf course on the west bank of South Creek, not accessible during the field investigation. However, this elevated landform beside the creek in proximity to the confluence with Kemps Creek indicates an area of moderately high archaeological sensitivity (Plate C.11).
45-5-3030	EPTA5	Lot 1 DP104958	Artefact scatter	Unknown	Ridgeline	This site is erroneously located and is actually within Erskine Park (Section 5.4). Cleared pastoral lands with moderately deep soils (Plate C.3).
45-5-3036	EP-I 3	Lot 1 DP104958	Artefact site (undefined)	Unknown	Ridgeline	Ridgeline walked. Dense grass coverage resulted in no surface visibility (Plate C.2). Site is part of a pattern of low-density artefact scatter across this elevated landform.
45-5-4102	Kemps Creek IF1	Lot 1 DP104958	Isolated find	1	Ridgeline	Isolated find on the ridgeline where the surface exposure was negligible due to dense grass coverage. The artefact was not re-located during the field inspection. Site is part of a pattern of low-density artefact scatter across this elevated landform (Plate C.4).

AHIMS #	Site name	Location	Site type	Artefact Count	Landform	Description
45-5-4103	Kemps Creek IF2	Lot 1 DP104958	Isolated find	1	Ridgeline	Isolated find on the lower slopes of the ridgeline where the surface exposure was negligible due to dense grass coverage. The artefact was not re-located during the field inspection. Site is part of a pattern of low-density artefact scatter across this elevated landform
45-5-4104	Kemps Creek (logosoc 1)	Lot 1 DP104958	Isolated find	1	Ridgeline	Site is described as "red silcrete items on a small patch of remnant woodland". Non-artefactual silcrete was identified during field inspection, along with a small flake in the exposed soil beside a dam.
45-5-4105	Kemps Creek (logosoc 2)	Lot 1 DP104958	Artefact scatter	Unknown	Ridgeline	Site is described as "red silcrete items on a small patch of remnant woodland" Non-artefactual silcrete was identified during field inspection (Plate C.2).
45-5-5268	Kemps Creek IF-02	Lot 1 DP104958	Isolated find	1	Ridgeline	Artefact was originally identified in an area of exposure on the banks of a dam. It was not re-located during the field inspection. The dam is located on the lower slopes of the ridgeline. Site is part of a pattern of low-density artefact scatter across this elevated landform
45-5-5269	Kemps Creek IF-01	Lot 1 DP104958	Isolated find	1	Ridgeline	Artefact was originally identified in an area of exposure on the banks of a dam. It was not re-located during the field inspection. The dam is located on the lower slopes of the ridgeline. Site is part of a pattern of low-density artefact scatter across this elevated landform
45-5-5274	Bakers Lane SLR AFT1	Lot 1 DP104958 Lot 40 DP708347 and Lot 11 DP1178389	Artefact scatter	Unspecified	Lower hillslope	The site extends across three lot boundaries but only the area within Lot 1 DP104958 was inspected, where a silcrete flake on the eroded soil around the eastern margin of the dam was located.
45-6-1779	Lec 12	Lot 27 DP258414	Artefact scatter (undefined)	7	Stream Bank	Located in the golf course on the west bank of South Creek, not accessible during the field investigation. However, this elevated landform beside the creek in proximity to the confluence with Kemps Creek indicates an area of moderately high archaeological sensitivity (Plate C.11).

7 The archaeological resource

The desktop and field survey investigations for this AHS demonstrate that the precinct is comparable with the wider cultural landscape of the Cumberland Plain. As outlined in Section 5, the Cumberland Plain is one of the most intensely archaeologically studied regions in Australia, and as such we have a good understanding of past Aboriginal activity. Specifically, while there is evidence of people in the Sydney Basin by at least 36 ka, much of the

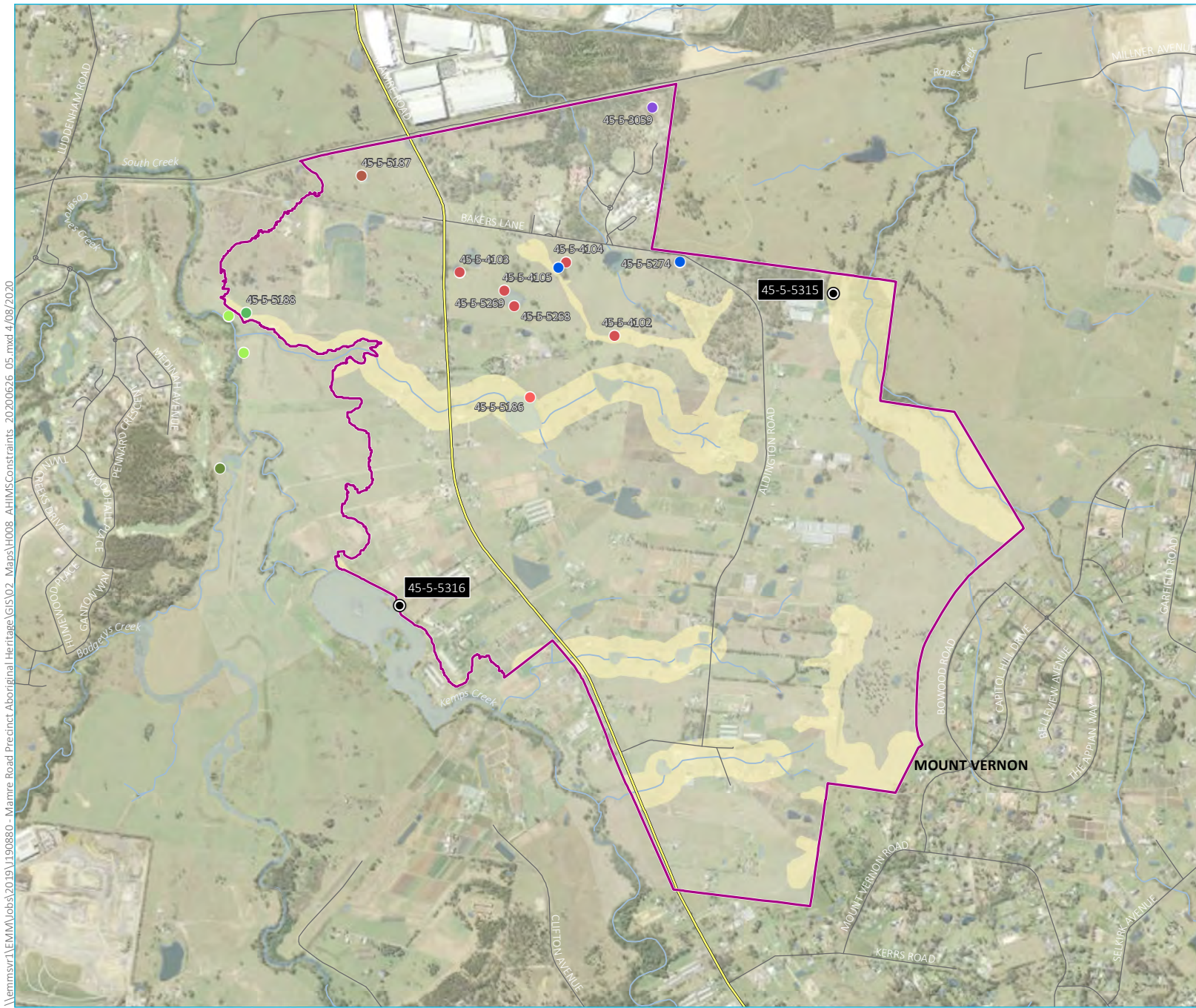
Cumberland Plain appears to have become established only in the late Holocene (5-0 ka). This was likely in response to increasing population pressures and improving climatic conditions driving more permanent occupation of this region, and away from the major river systems, such as the Hawkesbury-Nepean River. Archaeological evidence suggests that people utilised a wide range of resources across the region, and especially the silcrete raw materials from the Blacktown, Riverstone and Plumpton Ridge areas. These materials were moved along the major river systems across much of the Sydney Basin. Foci of occupation also appears to be primarily associated with the major river systems, although a transient use of all environments was known to occur. While a range of archaeological sites types are found across the Cumberland Plain reflecting these activities, much of the landscape constrains cultural material to stone artefacts located on the surface and/or in the upper soil profile.

With specific reference to the study area, it is situated between two of the major river systems connecting the northern and southern parts of the Cumberland Plain, including Ropes Creek, Kemps Creek and South Creek. The latter joining with Eastern Creek in the vicinity of the silcrete raw material sources mentioned above, and around which some of the highest concentrations of cultural material has been documented in the region. Previous investigations both within and near the study area confirm these wider models, which demonstrate a focus of past occupation along these waterways; and especially on elevated land near these resources. This can be demonstrated through the findings of the excavations as part of Mamre South Precinct, in which several hundred artefacts were recovered on an elevation overlooking South Creek (#45-5-5188) (Biosis 2019a), and salvage excavations along Ropes Creek as part of a wastewater carrier that recovered over a 1,000 artefacts from a single locale (Jacobs 2015). Importantly, these excavations, as well as several others in Section 5.3, undertook larger spatial grids of test pits across a range of landforms, and all appear to demonstrate that foci of activity exhibit artefact densities of $>20/m^2$ and often considerably higher. Values less than this are considered in most cases to be more reflective of transient use of the region. With few exceptions, the previous archaeological finds across the study area align more closely with this transient use than more permanent occupation - acknowledging that little investigation has occurred on the main creek lines themselves.

A review of previously recorded sites in the region, show that 20 are documented within the study area. Of these, nine are erroneously located and situated in Erskine Park to the north, leaving 11 remaining in the study area. These are all primarily situated along the edges of the main creek systems and/or on a ridgeline in the north of the study area. With one exception, #45-5-5188, the sites are all characterised as isolated objects and/or low-density artefact scatters (usually consisting of <10 artefacts). Excavations of several of these suggest that they are primarily found in shallow duplex and/or fabric contrast soil profiles commonly <30 cm deep, with rare examples extending to 60-80 cm (although in these cases, cultural material appears to still be predominantly constrained to the upper 40 cm).

A field investigation of the study area confirmed the findings of the desktop assessment. This included the validation of several of the previously documented Aboriginal sites, and the identification of two previously unidentified sites, MPR-01 (#45-5-0316) and MPR-02 (#45-5-0315). These new sites both consisted of a small number of artefacts in the vicinity of Kemps Creek and Ropes Creek, respectively. The investigations, however, revealed that much of the study area has been subject to significant impacts from pastoral, agricultural and market gardening activities. The latter activity, as well as the establishment of a range of large dams along various waterways, has significantly affected the survivability of intact cultural materials in many areas, although disturbed objects still occur. The site investigations further suggest that significant parts of the major river systems have been affected by these activities, and as such areas of potential around these resources are considered likely to be less than the 200 m usually assigned (see below).

Overall, the findings therefore demonstrate 13 Aboriginal sites within the study area (Figure 7.1). These were all characterised as various densities of stone artefacts present on the surface and/or within shallow soil profiles. While DPIE guidelines identify a range of criteria for determining areas of archaeological potential (see Section 5.5), the previous investigations and findings, and the site inspection allows refinement of these. Specifically, it is considered that an archaeological buffer of 200 m on either side of Ropes Creek is considered appropriate given the previous findings along this waterway – and including MPR-02. In contrast, for Kemps and South Creek, the surrounding landforms in several parts are un conducive to retaining cultural deposits, and disturbance is much greater, most notably Tadpole dam. As such, along these waterways, an archaeological buffer of 100 m is considered more suitable for these creeks (Figure 7.1). As a conservative measure, second order river corridors are also highlighted in this AHS with a 100 m buffer. In all cases, it is considered that elevations, such as levees, terraces, etc, have a greater potential within these buffers for significant cultural material to be present. However, the results do not support significant deposits being present on first order or ephemeral creeklines, and as such these are not highlighted here. In addition, a number of sites, as well as input from the Aboriginal community (Section 2), all indicate that the ridgelines have potential for cultural material to be present. A focus appears to be on the ridgeline to the north in the vicinity of Bakers Lane, but other ridgeline landforms are also highlighted for the purpose of this AHS (Figure 7.1).



- KEY**
- Study area
 - Newly identified Aboriginal site
 - Area of archaeological potential
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody
- AHIMS site type**
- Isolated Aboriginal object
 - Isolated find
 - Large artefact scatter (>500)
 - Small artefact scatter (10-20); potential archaeological deposit
 - Small artefact scatter (<10)
 - Small artefact scatter (<10); potential archaeological deposit
 - Undefined artefactual site

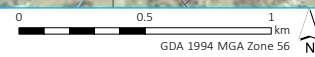
Summary of the archaeological resource of the study area

Department of Planning, Industry & Environment
Aboriginal heritage study
Figure 7.1



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Source: EMM (2020); OEH (2019); DFSI (2017); DPE (2017)



8 Significance assessment

8.1 Overview

Aboriginal sites, objects and places hold value in many different ways. The nature of those values is an important consideration on the management of the site, object or place. The statement of significance for each site was assessed based on a framework and range of criteria presented in Table 8.1.

Table 8.1 A summary of criteria and rankings used to determine significance

Criterion	High	Moderate	Low
Aesthetic	<p>The site or object elicits a strong emotional response and is part of a state or national narrative.</p> <p>Is set within a landscape that inspires awe.</p>	<p>The site is known or suspected of eliciting strong responses from the local community.</p> <p>While similar sites may exist elsewhere, they are rare in the local area.</p>	<p>The site or object does not elicit a relevant sensori-emotional response; or</p> <p>The site has been disturbed to the extent that it can no longer elicit a relevant sensori-emotional response.</p>
Historic	<p>The site or object is important in representing an aspect of history important to the State or National as reflected in the Australian (and State) Historical Thematic Framework.</p>	<p>The site or object is rare in the local area; and</p> <p>Would provide strong opportunities for interpretation to the public.</p> <p>The site illustrates elements of the history of the local area.</p>	<p>The site is common in the local area, does not provide opportunities for interpretation to the public and does not contribute substantially to an understanding the historic themes relevant to the local area and/or the State.</p> <p>(Note – individuals may still feel attachment for sites below threshold)</p>
Cultural and/or Spiritual	<p>The site or object is important to an understanding of pre or post contact Aboriginal cultural life in NSW.</p> <p>The site or object is part of a Dreaming story or track.</p> <p>The site or object is part of ongoing ceremony or ritual.</p> <p>Substantial cultural knowledge about this site exists within the relevant Aboriginal community or custodians for this site or has been previously documented.</p>	<p>The site is important to local Aboriginal community, or subset of the community, and this importance can be articulated.</p>	<p>There is little or no knowledge in the Aboriginal community about this site or object.</p> <p>The knowledge that does exist falls into the category of family history and is not generally relevant to the broader Aboriginal community, and/or Aboriginal historical narrative.</p> <p>(Note – individuals may still feel attachment for sites below threshold).</p>

Criterion	High	Moderate	Low
Scientific (archaeological)	<p>The site or object has potential to answer key questions about Aboriginal culture and society in NSW or Australia as a whole pre or post contact.</p> <p>The site or object is unique and/or rare and intact; or</p> <p>The site is the best representative (and intact) example of a type of site that may be common, but not conserved elsewhere.</p>	<p>The site or object is rare in the local area; and</p> <p>It provides potential to learn more about a little understood aspect of Aboriginal cultural or society in the local area.</p> <p>The site has a high artefact density and is large enough in size to be used to interpret larger scale questions about technology and occupation in the local area.</p>	<p>The site or object is common in the local area and/or the state.</p> <p>The site does not have excavation /research potential, or the site is common but has some potential information to be salvaged.</p>

8.2 Statement of significance

There are 13 known Aboriginal sites within the study area including 11 previously recorded AHIMS sites and two Aboriginal sites recorded as a result of the current assessment. Aboriginal sites within the study area consist of artefact scatters, isolated objects and potential archaeological deposits. The assessment also highlighted the banks and elevations of South Creek, Kemps Creek and Ropes Creek, and the northern and south-eastern extensions of Mamre ridgeline as having archaeological potential for cultural materials to be present.

The significance of each of these sites/locations according to the criteria of rarity, representativeness, research potential and integrity are discussed here, and presented in Table 8.2. Where previously recorded sites could not be inspected, the relevant information is taken from the original report or site card descriptions. Where aesthetic, historic and social/spiritual values were not outlined by the investigators, a judgement was made based on the information provided in the report.

All of the identified Aboriginal sites are considered to have low historical significance, as no evidence has been found to indicate that they are associated with a particular historic figure, event, phase or activity of importance to the local area. While reference is made in previous studies to potential contact interactions at the Bayley Park house in the southwest of the study area, this could not be validated; and the site has been heavily modified in recent times. It should be noted that further investigation, in particular archaeological excavation, may result in the recovery of evidence that indicates a higher level of historical significance. South Creek, Ropes Creek, and the northern extension of the Mamre ridgeline are considered to have moderate historical significance, as these locations are key landform elements which have influenced the history of the local area, and the prominence of these features provide strong opportunities for interpretation to the public.

For the most part, the discrete open Aboriginal sites, which comprise the majority of sites within the study area, consist of low density artefact scatters or isolated objects in contexts which have been subject to moderate to heavy disturbance as a result of historical land-use. Such sites have limited aesthetic appeal or significance. Further these sites are considered to have limited ability to inform our understanding of past Aboriginal activity and are therefore assessed as having low research potential/scientific significance. In most instances, these sites simply reflect the prolonged ephemeral use of the region by Aboriginal people for several thousand years if not much longer. #45-5-5188 and its immediate environs form the exception to this assessment, with the site containing a larger cultural assemblage in a deeper (potentially stratigraphic context) soil profile. Biosis' (2019a) report on this site considered it to be of high significance, and recommended further conservation ex situ prior to future activities.

As a cultural assemblage, the Aboriginal archaeological sites within the Mamre Road Precinct are of greater significance than they are individually. They represent the material remains of past Aboriginal occupation within a particular local landscape and are a component of a body of evidence that is rapidly being removed as a result of the substantial development of the WSEA and the broader landscape of western Sydney.

In the case of the archaeological buffer zones around the major creeks and waterways and ridgelines, these cannot be robustly assessed at this time, since the extent of cultural material (if any) is unknown. They are currently identified as of moderate significance based on their aesthetic values – representing significant landform features of the local and regional area – and research potential with significant cultural sites found elsewhere along their lengths. These areas have also been highlighted as of cultural value by the Aboriginal community (see Section 2).

Table 8.2 Summary of significance of sites located within the study area

Site name	AHIMS #	Site feature	Scientific significance	Aesthetic significance	Historic significance	Social/spiritual significance	Overall significance
MRP-OS1	45-5-5316	Artefact scatter	Low	Low	Low	To be determined	Low
MRP-OS2	45-5-5315	Artefact scatter	Low	Low	Low	To be determined	Low
EV1	45-5-3059	Artefact scatter and PAD	Low	Low	Low	To be determined	Low
Kemps Creek IF1	45-5-4102	Isolated find	Low	Low	Low	To be determined	Low
Kemps Creek IF2	45-5-4103	Isolated find	Low	Low	Low	To be determined	Low
Kemps Creek (logosoc 1)	45-5-4104	Artefact scatter	Low	Low	Low	To be determined	Low
Kemps Creek (logosoc 2)	45-5-4105	Artefact scatter	Low	Low	Low	To be determined	Low
Mamre Road Artefact Scatter 1901	45-5-5186	Artefact scatter and PAD	Low	Low	Low	To be determined	Low
MSP-01	45-5-5187	Isolated find	Low	Moderate	Low	To be determined	Low
MSP-02	45-5-5188	Artefact scatter	High	Moderate	Low	To be determined	High
Kemps Creek IF-02	45-5-5268	Isolated find	Low	Low	Low	To be determined	Low
Kemps Creek IF-01	45-5-5269	Isolated find	Low	Low	Low	To be determined	Low
Bakers Lane SLR AFT 1	45-5-5274	Artefact site (undefined)	Low	Low	Low	To be determined	Low

Site name	AHIMS #	Site feature	Scientific significance	Aesthetic significance	Historic significance	Social/spiritual significance	Overall significance
Archaeological buffer (100-200m around 2 nd order and above creeklines, and ridgelines)	-	Landform/s of archaeological interest	Moderate	Moderate	Low	To be determined	Moderate

9 Structure plan proposal

9.1 Structure plan layout

A structure plan has been developed for the study area (Plate 1.1). The structure plan identifies that much of the study area will be re-zoned to industrial activities (IN1), with four main employment hubs situated across the precinct. A potential intermodal hub in the north of the study area as well as road upgrades of Mamre Road and Bakers Lane (SP2) are also proposed.

In addition to the urbanisation of the precinct, a number of environmental conservation (E2) and open space areas (RE1/RE2) are identified. These are primarily situated in the vicinity of established creeklines, including much of Ropes Creek to the east, South Creek in the northwest and a riparian corridor along a tributary to South Creek. An environmental conservation zone for a portion of the ridgeline to the north of the precinct is also outlined.

9.2 Potential Aboriginal heritage impacts

Rezoning of the study area will not in itself result in Aboriginal heritage impact. However, the potential impacts as the result of the development that will ensue from the re-zoning may result in harm/destruction of cultural materials.

In general, development in accordance with the structure plan will require ground disturbance. As outlined in previous sections, the cultural resource is primarily found on the surface and/or within the upper one metre of the soil profile. Given the industrial nature of any development, significant ground works extending below these depths are likely to be required, and as such these areas are likely to be affected by any activities. An overlay of the findings of this AHS with the structure plan is presented in Figure 9.1. Based on this overlay, potential harm to the identified cultural resource (Section 7) has been described in accordance with DPIE categories (Table 9.1) and summarised in Table 9.2.

This data shows that nine of the identified Aboriginal sites and objects are likely to be harmed and/or destroyed through the structure plan. All of the sites consist of low-density artefact scatters and/or isolated objects, and all are identified as of low archaeological significance. In addition to the identified sites, a number of the areas of archaeological potential, primarily associated with second order creeks, are encompassed within the structure plan; and as such likely prone to harm.

However, a number of sites are within zones where ground disturbance may not be required, and where conservation may be possible. This would depend on the specific activities proposed for these zones, but include:

- E2 environmental conservation;
- RE1 public recreation; and
- RE2 private recreation.

Four sites are within these zones, and depending on how they are managed may be conserved following the implementation of the structure plan. This includes #45-5-5188, the only site identified as of high significance as part of this AHS. In addition, the archaeological buffer zones encompassing the major creeklines, Kemps Creek, South Creek and Ropes Creek, and within which significant cultural materials are predicted to be present, are also primarily found in these zones, and may similarly be conserved. In addition, a number of sites, and significant parts of the Kemps and South Creek corridor are currently outside of the proposed structure plan footprint. As such, these sites would be unaffected by the proposed re-zoning.

Table 9.1 DPIE categories of harm

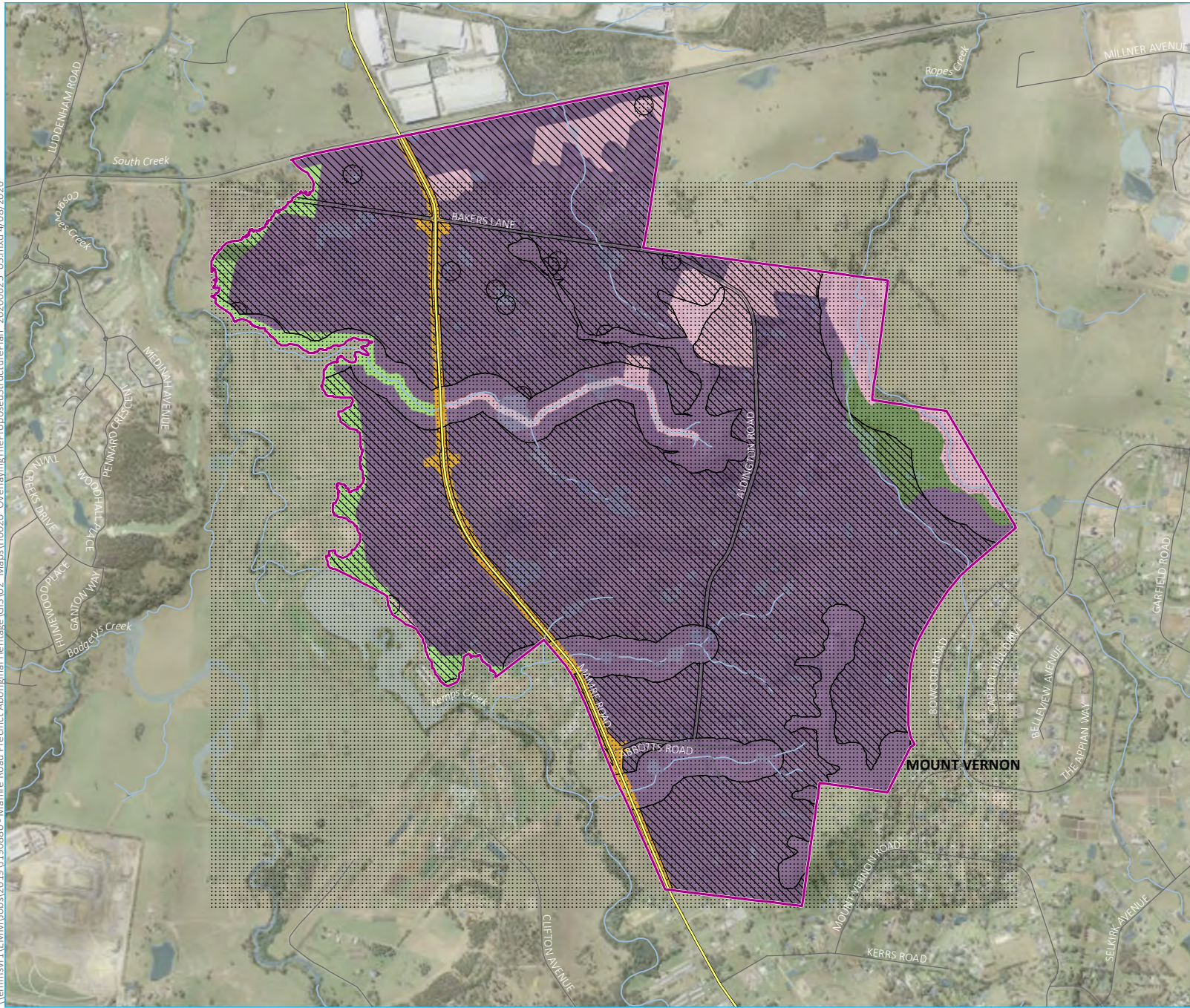
Type of harm	Degree of harm	Consequence of harm
Will not be harmed	Whole	Total loss of value
Movement (collection) only	Partial	Partial loss of value
Excavation	None	No loss of value
Community collection		
Directly harmed		

Table 9.2 Potential impact on identified cultural resource within the study area

Site name	AHIMS #	Site feature	Significance	Proposed rezoning	Potential harm
MRP-OS1	45-5-5316	Artefact scatter	Low	RE1 Public recreation	Conservation potential
MRP-OS2	45-5-5315	Artefact scatter	Low	E2 environmental conservation	Conservation potential
EV1	45-5-3059	Artefact scatter and PAD	Low	E2 environmental conservation	Conservation potential
Kemps Creek IF1	45-5-4102	Isolated find	Low	IN1 industrial	Directly harmed Whole Total loss of value
Kemps Creek IF2	45-5-4103	Isolated find	Low	IN1 industrial	Directly harmed Whole Total loss of value
Kemps Creek (logosoc 1)	45-5-4104	Artefact scatter	Low	IN1 industrial	Directly harmed Whole Total loss of value
Kemps Creek (logosoc 2)	45-5-4105	Artefact scatter	Low	IN1 industrial	Directly harmed Whole Total loss of value
Mamre Road Artefact Scatter 1901	45-5-5186	Artefact scatter and PAD	Low	IN1 industrial	Directly harmed Whole Total loss of value
MSP-01	45-5-5187	Isolated find	Low	IN1 industrial	Directly harmed Whole Total loss of value
MSP-02	45-5-5188	Artefact scatter	High	RE1 Public recreation	Conservation potential

Site name	AHIMS #	Site feature	Significance	Proposed rezoning	Potential harm
Kemps Creek IF-02	45-5-5268	Isolated find	Low	IN1 industrial	Directly harmed Whole Total loss of value
Kemps Creek IF-01	45-5-5269	Isolated find	Low	IN1 industrial	Directly harmed Whole Total loss of value
Bakers Lane SLR AFT 1	45-5-5274	Artefact site (undefined)	Low	IN1 industrial	Directly harmed Whole Total loss of value
Archaeological buffer (100-200m around 2 nd order and above creeklines, and ridgelines)	-	Landform/s of archaeological interest	Moderate	Various, but primarily within E2 conservation, RE1 public recreation, RE2 private recreation and/or outside the structure plan	Partially harmed Part Unknown

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- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Waterbody
 - DCP input**
 - Due diligence required
 - Formal assessment required
 - Land zoning**
 - E2 Environmental Conservation
 - IN1 General Industrial
 - RE1 Public Recreation
 - RE2 Private Recreation
 - SP2 Infrastructure

The archaeological resource overlaying the proposed structure plan

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Figure 9.1

Source: EMM (2020); OEH (2019); DFSI (2017)



10 Conclusions and recommendations

10.1 Key findings

- This AHS identified 13 Aboriginal sites and/or objects within the study area. With one exception (#45-5-5188), these all consisted of low density artefact scatters (<10) and/or isolated Aboriginal objects. Areas of archaeological potential, ranging between 100-200 m, are also applied along major creeklines (2nd order and above). The majority of these sites are considered of low archaeological significance, with moderate values (due to research potential) for the archaeological potential areas.
- Nine of the identified Aboriginal sites, and the majority of the areas of archaeological potential for second order creeks are within proposed zonings that would result in ground disturbance and likely harm to cultural materials. Four sites, including #45-5-5188, and the majority of areas of archaeological potential along the major tributaries of Kemps Creek, South Creek and Ropes Creek, are within zones where limited, if any, ground disturbance is considered likely (ie E2 environmental conservation).
- A strategy and recommendations are presented to manage Aboriginal heritage through subsequent stages of the project.

10.2 Management strategy

As outlined in Section 7, the cultural resource of the study area is reasonably well understood both from regional models and the works carried out as part of this AHS. It demonstrates that cultural material is primarily composed of surface and/or buried stone artefacts, and focussed on major waterways. To date, significant archaeological sites – usually dense artefact scatters suggesting a more extensive or permanent occupation – have been found primarily on elevated areas adjacent Kemps Creek, South Creek and Ropes Creek, and which aligns well with the broader patterns across the Cumberland Plain. Ridgelines both in the study area and more broadly, are also frequently identified as of significance by the Aboriginal community as lookouts and travel routes that would have been used in the past. Elsewhere, the presence of low densities of Aboriginal objects, usually $\leq 5/m^2$, are commonplace. Such sites are generally considered of low significance, reflecting a background scatter of thousands of years of transient use by Aboriginal people.

The proposed structure plan avoids many of the key areas where significant cultural material would be expected. The vast majority of key waterways are either entirely outside the structure plan or within zones of proposed low ground disturbance, such as E2 environmental conservation. Parts of the northern ridgeline – a landform that was highlighted during Aboriginal consultation (Section 2) - will similarly be encompassed within these zones. Seven of the identified sites, including the one of highest significance (#45-5-5188), are also within such areas. In addition, of the nine sites that are likely to be harmed through the rezoning, several could not be validated as part of the field survey (Section 6). Given in some instances these sites were identified several years ago, and in disturbed contexts, it is likely that they no longer survive. The proposed structure plan will, however, likely have greater impact to lesser order creeklines and their zones of archaeological potential, since several of these run across the study area. However, in most instances, field observations suggest that significant impact, mainly through dam construction, has already compromised extensive portions of these waterways; and a number of them cannot be verified as existing prior to European contact (when de-vegetation resulted in the formation of numerous erosion scours that developed into minor tributaries).

Given these findings, it is concluded that no modifications to the structure plan are required based on the cultural materials documented within the study area. However, the presence of cultural material does require consideration in the Development Control Plan (DCP) and other environmental assessment requirements that are likely to stem from the structure plan. Specifically, the assessment of Aboriginal heritage is managed in accordance with a number of DPIE guidelines, including the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, *Due Diligence Code of Practise for the Protection of Aboriginal Objects in NSW*, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. These guidelines provide a framework for the detailed investigation of cultural materials and liaison with the Aboriginal community, as well as providing the necessary documentation to apply for Aboriginal Heritage Impact Permits (AHIPs) from DPIE. Under the *National Parks and Wildlife Act 1974*, an AHIP must be obtained to allow harm or destruction of cultural material. In the case of projects being assessed under Division 4.7 and 5.2 of the *Environmental Planning and Assessment Act 1979*, while AHIPs are not required, investigation and assessment of cultural material still usually adopts significant elements of the guidelines above. Post-approval management in these types of projects will also typically adopt the intent of an AHIP in the form of a management plan that outlines how cultural heritage is to be managed during an activity.

Below, we provide recommendations that should be integrated into the DCP resulting from the structure plan (Figure 10.1). These include the application of due diligence to all future activities resulting from the structure plan, since cultural material is found across the study area, albeit in very low densities and of low significance. They further include the development of an assessment in accordance with the guidelines above (typically an Aboriginal cultural heritage assessment (ACHA)) in areas where identified cultural material and/or areas of potential are identified (Figure 7.1). This is because in these areas either archaeological sub-surface investigations will be required to verify the presence/absence of cultural material, and these can only be implemented as part of an ACHA under the guidelines; and/or an AHIP will be required to allow their harm/destruction for an activity to proceed, and as outlined above, this requires an ACHA as supporting documentation. Further recommendations exploring the interpretive and recognition opportunities for cultural heritage in the precinct are also proposed, as a key focus and outcome of consultation with the Aboriginal community.

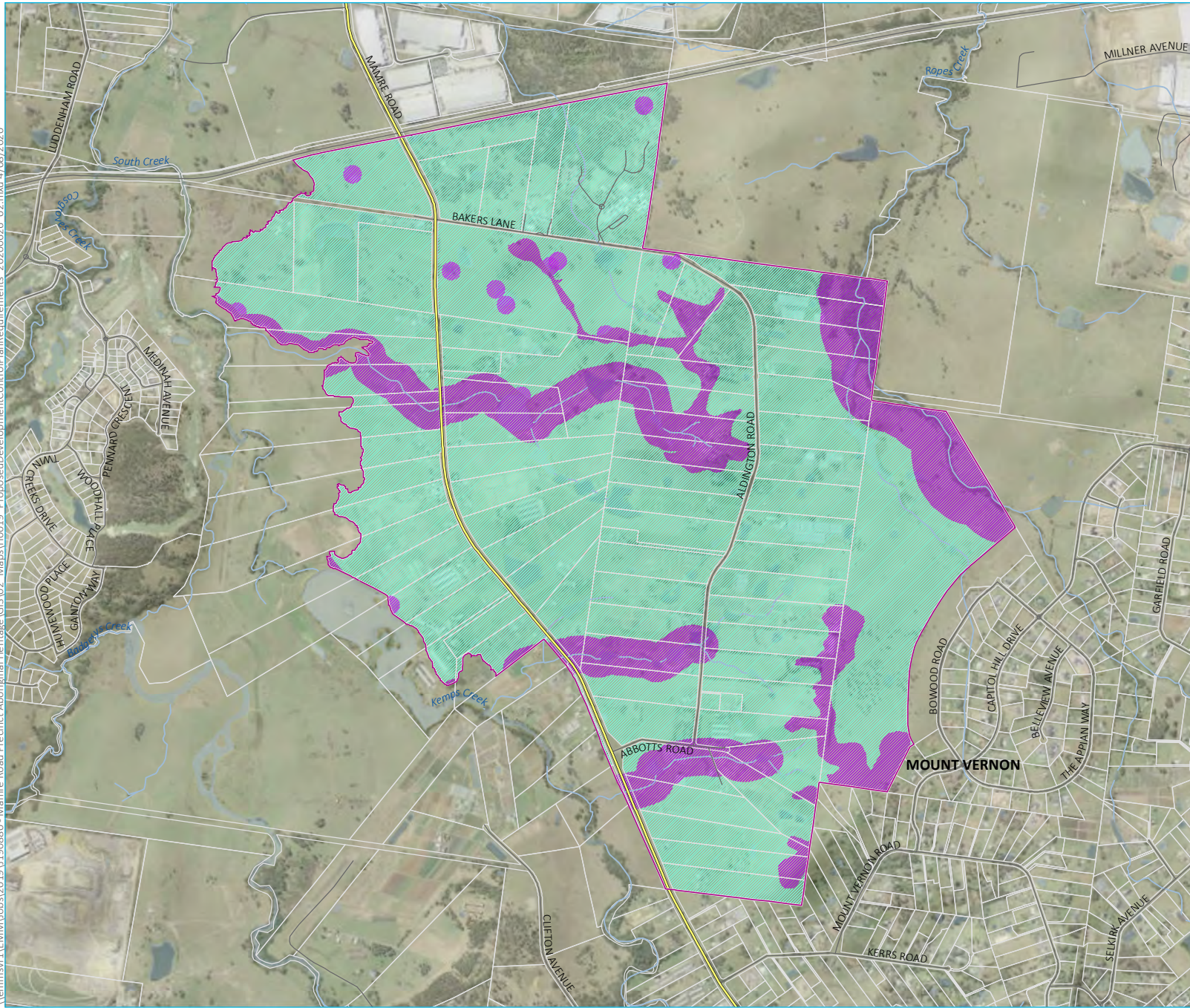
10.3 Recommendations

Based on the findings of this AHS, the following recommendations should be adopted:

- The structure plan does not require amendment based on the findings of this AHS. While cultural materials are identified within the study area and may be harmed as a result of the rezoning, areas identified as containing significant archaeological and cultural value would be largely unaffected.
- The Development Control Plan developed from the structure plan should include appropriate management requirements for Aboriginal heritage based on the findings of this study. These should include:
 - Any ground disturbance proposed in areas where cultural material has not been identified and/or is considered of low potential to occur (see Figure 10.1) should be subject to a due diligence investigation in accordance with DPIE and/or best practice guidelines (eg *Due Diligence Code of Practise for the Protection of Aboriginal Objects in NSW*). The findings of the due diligence should guide future assessment and approval requirements for the activity (if any).
 - Any ground disturbance proposed in areas where cultural material has been identified and/or is considered to have potential for them to occur (see Figure 10.1) should be subject to an Aboriginal cultural heritage assessment or equivalent in accordance with DPIE and/or best practice guidelines (eg *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*). The findings of the assessment should guide future assessment and approval requirements for the activity (if any).

- Any activity should undertake interpretive, educational and/or recognition opportunities to promote local Aboriginal culture, society and people.
- This AHS has identified several Aboriginal objects and sites that are erroneously positioned within the study area in the DPIE Aboriginal Heritage Information Management System (AHIMS) database (45-5-3028 – 45-5-3036 inclusive; Table 5.2). The AHIMS database should be notified and these sites correctly positioned to avoid future management issues for the precinct.
- If re-location of any element of the re-zoning, land release and/or development are proposed outside the area assessed in this AHS, further assessment of the additional area(s) should be undertaken to identify and appropriately manage Aboriginal objects/sites/places that may be in this additional area(s).
- A copy of the report should be lodged with DPIE’s AHIMS database, and each of the RAPs.
- Consultation should be maintained with the Aboriginal community (Section 2) during the finalisation of the assessment and subsequent stages of the re-zoning/land release process. This should focus on conservation options, the development control plan inputs, any future investigations of the key archaeological sites and areas of potential, and exploration of interpretative opportunities for the study area.

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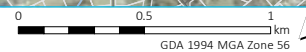


- KEY**
- Study area
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Cadastral boundary
 - Waterbody
 - DCP input**
 - Due diligence required
 - Formal assessment required

Proposed development control plan requirements for the study area

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Aboriginal heritage study
Figure 10.1

Source: EMM (2020); OEH (2019); DFSI (2017)



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Abbreviations

ACHA	Aboriginal cultural heritage assessment
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal heritage impact permit
AHS	Aboriginal Heritage Study
BP	Before present (1950 CE)
CRM	Cultural resource management
DCP	Department of Environment, Climate Change and Water
DECCW (now DPIE)	Department of Environment, Climate Change and Water
DPIE	Department of Planning, Industry and Environment
ka	Abbreviation for thousands of years ago (eg 1 ka equals 1,000 years ago)
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
NPW Act	National Parks and Wildlife Act 1974
OEH (now DPIE)	Office of Environment and Heritage
LGA	Local government area
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal party

Glossary

Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010	Guidelines developed by DPIE to provide a framework formal Aboriginal community consultation undertaken as part of an assessment.
Aboriginal Heritage Impact Permit (AHIP)	The statutory instrument that the Secretary of DPIE issues under Section 90 of the <i>National Parks and Wildlife Act 1974</i> to allow the investigation, impact and/or destruction of Aboriginal objects. AHIPs are not required where project approval under the state-significant provisions of Division 4.7 and 5.2 of the <i>Environmental Planning and Assessment Act 1979</i> .
Aboriginal object	A statutory term defined under the <i>National Parks and Wildlife Act 1974</i> as ‘any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains’.
Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales	Guidelines developed by DPIE to provide a framework for the assessment, investigation and management of Aboriginal heritage. Typically, the outputs of these guidelines is a formal assessment defined as an Aboriginal cultural heritage assessment (ACHA)
Department of Planning & Environment (DPE)	The regulatory body that oversees management of various Acts that provide the framework for the assessment, investigation and management of Aboriginal objects, including AHIPs under the <i>National Parks and Wildlife Act 1979</i> .
Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales	Guidelines developed by DPIE providing an initial consideration of Aboriginal heritage requirements for a project quickly and efficiently prior to the implementation of more extensive assessment.
Environmental Planning and Assessment Act 1979	Statutory instrument that provides planning controls and requirements for environmental assessment in the development approval process. The Act is administered by the DPIE.
Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW	Guidelines developed by DPIE to provide the overall framework for assessing and managing Aboriginal heritage, and information on applying for AHIPs.
National Parks and Wildlife Act 1974	The primary piece of legislation for the protection of Aboriginal cultural heritage in NSW. Part 6 of this Act outlines the protection afforded to and offences relating to disturbance of Aboriginal objects. The Act is administered by DPIE.
Potential Archaeological Deposit (PAD)	An area assessed as having the potential to contain Aboriginal objects. PADs are commonly identified on the basis of landform types, surface expressions of Aboriginal objects, surrounding archaeological material, disturbance, and a range of other factors. While not defined in the <i>National Parks and Wildlife Act 1974</i> , PADs are generally considered to retain Aboriginal objects and are therefore protected and managed in accordance with that Act.
