McPherson Precinct Structure Plan

Aboriginal Cultural Heritage Assessment - Desktop and Standard

METROPOLITAN PLANNING AUTHORITY

May 2015

AHMS
ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

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Level 25, 35 Collins Street
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Dear Belinda

ABORIGINAL CULTURAL HERITAGE ASSESSMENT FOR CLYDE EAST PRECINCT STRUCTURE PLAN 1055 (MCPHERSON)

Thank you for your email of 9 June 2015, seeking my endorsement of the report entitled *McPherson Precinct Structure Plan, Aboriginal Cultural Heritage Assessment*, prepared by Archaeological and Heritage Management Solutions with a cover date of May 2015.

I endorse this report because the assessment undertaken and the recommendations provide appropriate guidance to ensure future planning considerations are inclusive of Aboriginal cultural heritage. Specifically, this report provides directives to ensure harm to Aboriginal cultural heritage is avoided or minimised where appropriate. It also promotes preserving of Aboriginal cultural heritage within relevant landscape contexts.

Please contact Liz Kilpatrick on 9208 3268 if you have any queries regarding this matter.

Yours sincerely

JANE SWEENEY
Director, Heritage Services
Office of Aboriginal Affairs Victoria

Date: 8 / 7 / 2015

ABORIGINAL CULTURAL HERITAGE ASSESSMENT - DESKTOP AND STANDARD

May 2015

SPONSOR: The METROPOLITAN PLANNING AUTHORITY

CULTURAL HERITAGE ADVISOR: SHANNON SUTTON

AUTHORS: Shannon Sutton, Simon Crocker, Jim Wheeler & John Tunn

DESKTOP & STANDARD ASSESSMENT

Prepared by Archaeological & Heritage Management Solutions (AHMS) Pty Ltd on behalf of the Metropolitan Planning Authority

PLEASE NOTE - THIS REPORT CONTAINS PICTURES OF AND INFORMATION ABOUT PEOPLE WHO MAY HAVE PASSED AWAY

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EXECUTIVE SUMMARY

The Metropolitan Planning Authority (MPA) engaged Archaeological and Heritage Management Solutions (AHMS) Pty Ltd to prepare an Aboriginal Cultural Heritage Assessment - Desktop and Standard for the proposed McPherson Precinct Structure Plan (PSP) 1055.

The study area is located in Clyde North and is approximately 1,025ha in area. It is bounded by Bells Road and Smiths Lane to the west and, McCormacks Road to the south-east and by Cardinia Creek to the north and east.

Given the nature of the report as a strategic planning and reference document, this assessment document was endorsed by OAAV as a well-researched and useful planning resource for urban planners and developers to appropriately and strategically manage Aboriginal cultural heritage values early in the PSP 1055 planning and design process.

Consultation with the Bunurong Land Council Aboriginal Corporation, the Boon Wurrung Foundation and the Wurundjeri Tribe Land and Compensation Cultural Heritage Council was undertaken as part of the project and all three traditional owner claimant groups participated in the fieldwork.

Desktop Assessment

A search of the Victorian Aboriginal Heritage Register (VAHR) was undertaken to identify previously recorded sites within the geographic region (Bunyip River Basin). One Aboriginal place (VAHR 7921-1039) has been previously recorded within the study area comprising an isolated silcrete artefact located during a previous salvage excavation.

Drawing on the desktop research and previous archaeological survey work, the following predictions were made:

- Stone artefact deposits are likely to be found at varying densities across most landforms;
- Higher density artefact scatters and sub-surface deposits may be found on crest landforms;
- Higher density artefact scatters and sub-surface deposits are likely to be found adjacent to creeks or wetlands. Artefact density and frequency is likely to increase with higher stream order (for creeks) and permanence (for wetlands);
- The density and complexity of artefact scatters and sub-surface deposits is likely to decrease with distance from water sources and wetlands;
- Higher density of artefact scatters and sub-surface deposits in close proximity to stone sources (either outcrops or river pebble sources);
- A particularly high density and complexity of archaeological deposits at major confluences and resource intersection zones;
- Stable Aeolian and alluvial landforms are likely to have deeper profiles and better preservation conditions. These landforms may contain greater archaeological integrity;
- Scarred trees may be present within areas containing mature remnant native trees of sufficient age and as isolated mature trees in agricultural settings; and
- Isolated finds may be found anywhere across the landscape.

Standard Assessment

A total of 18 properties were surveyed within the study area. Survey coverage aimed to balance sampling of areas of ground surface exposure on these properties with detailed coverage of areas of

high to very high sensitivity indicated in the predictive model developed during the Desktop Assessment. The survey also aimed to sample each of the landform types, providing coverage of crest, slope and floodplain landforms.

No Aboriginal places were identified during the survey, although as discussed below, effective survey visibility was extremely low due to thick coverage of pasture grasses across the study area. However, the survey did assist in identifying the extent of archaeologically sensitive landforms such as sandy rises and levees. The survey also assisted in ground truthing and mapping areas of prior disturbance that have a lower level of archaeological potential.

In general terms, the risk of impact on significant archaeological and Aboriginal cultural heritage values is likely to increase in accordance with sensitivity level. Therefore, areas that are in a very high sensitivity zone are likely to have the highest level of archaeological significance and as a result these areas are also likely to have the highest level of risk for development proponents. Likewise, areas of very low sensitivity or which are disturbed have a very low risk level.

The results of the desktop and standard assessment were used to map the predicted archaeological sensitivity of the study area. Due to the large extent of the McPherson PSP 1055, we used MapInfo GIS (Geographical Information System) to develop and map the predictions made regarding archaeological potential. The purpose of the predictive model was to:

- Provide with information about areas of Aboriginal archaeological sensitivity to feed into PSP constraints and opportunities analysis;
- Help inform early PSP planning and design work;
- To provide landowners with a clear understanding of risks and areas of higher sensitivity; and,
- To assist in developing a methodology for future Complex Assessments.

In developing the model, we drew on a number of environmental and disturbance variables that were used to identify areas of varying ‘archaeological sensitivity’. For the purposes of the model, the term ‘archaeological sensitivity’ is defined as a combination of likely density, integrity and research value of archaeological deposits within any given area.

The modelling and mapping is based on a probabilistic approach, where a combination of traits was used to determine the combined level of potential. The model traits are as follows:

- Alluvial levee = Very High Sensitivity
- Sandy Rise (stable dune crest) = Very High Sensitivity
- Low Crest = Moderate Sensitivity.
- Within 200m of Higher order stream – High Sensitivity.
- Low rise + Within 200m of Higher order stream = Very High Sensitivity
- Within 200m of spring / spring fed dam = High Sensitivity;
- Flat low-lying areas = Low Sensitivity;
- Market Gardening = Very Low Sensitivity;
- Cut and Fill Disturbance = Negligible or Disturbed Sensitivity; and
- All other areas low sensitivity.

We recommend the following PSP design responses with reference to the sensitivity zones shown on Figure 16 in the report:

Very High & High Sensitivity: retain as much as possible in open space, riparian, bio-link, set-backs and asset protection zones. The aim of PSP design should be to minimise future development impact

on these areas (particularly the Very High sensitivity zone). This approach will protect areas with high potential for significant archaeological deposits and cultural values. The approach will also save time and money in reducing the scope of mitigation and salvage of sensitive areas;

Moderate Sensitivity: where there is an opportunity, development impact should be minimized where practicable. For instance, where there are opportunities to establish open space, these could be placed on areas of moderate sensitivity to protect Aboriginal heritage and reduce the scope of expensive and time consuming archaeological mitigation measures and salvage.

Low Sensitivity: no design and planning recommendations. These areas are essentially archaeologically 'neutral'.

Very Low Sensitivity and Disturbed: these areas could be the focus of development, particularly high impact features of a subdivision like a town centre, medium or high density residential, industrial or commercial.

Management Requirements

The predictive model and archaeological sensitivity map shown in Figures 16 are designed to inform future PSP design and planning work. The sensitivity map is also designed to provide landowners and development proponents with a guide to archaeological sensitivity within various parts of the PSP area to assist in assessing risk and making decisions about development design that are informed and appropriately consider Aboriginal heritage sensitivity and values.

In general terms, the risk of impact on significant archaeological and Aboriginal cultural heritage values is likely to increase in accordance with sensitivity level. Therefore, areas that are in the very high sensitivity zone are likely to have the highest level of archaeological significance and, as a result, these areas are also likely to have the highest level of risk for development proponents. Likewise, areas of very low sensitivity or which are disturbed have a very low risk level.

The following recommendations are made in the context of developing the McPhersons 1055 Precinct Structure Plan and to emphasise the intent of this study as a strategic planning document.

Recommendation 1: Impact Avoidance and Minimisation.

We recommend that this heritage assessment be used as a reference document for relevant planning staff and other proponents and be taken into consideration as early as possible during the initial PSP design stage. **With reference to Figure 16 of this report, and wherever possible, planning decisions should:**

- Ensure development impact is focused on areas of lower heritage sensitivity (i.e. Disturbed to Low), and across those areas that result in the least potential impact to Aboriginal heritage values.

- Ensure development impact is constrained in areas of higher heritage sensitivity (i.e. Moderate – Very High), and across those areas that result in the greatest potential impact to Aboriginal heritage values.

Recommendation 2: Aboriginal Heritage Sensitivity & PSP Planning and Design.

Specifically, we recommend the following PSP design responses with reference to the sensitivity zones shown on Figure 16:

Very High & High Sensitivity: retain as much as possible in open space, riparian, bio-link, set-backs and asset protection zones. The aim of PSP design should be to minimise future development impact on these areas (particularly the Very High sensitivity zone). This approach will protect areas with high potential for significant archaeological deposits and cultural values. The approach will also save time and money in reducing the scope of mitigation and salvage of sensitivity areas;

Moderate Sensitivity**:** where there is an opportunity, development impact should be minimized where practicable. For instance, where there are opportunities to establish open space, these could be placed on areas of moderate sensitivity to protect Aboriginal heritage and reduce the scope of expensive and time consuming archaeological mitigation measures and salvage.

Low Sensitivity**:** no design and planning recommendations. These areas are essentially archaeologically 'neutral'.

Very Low Sensitivity and Disturbed**:** these areas could be the focus of development, particularly high impact features of a subdivision like a town centre, medium or high density residential, industrial or commercial.

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ABBREVIATIONS

OAAV	Aboriginal Affairs Victoria
AHC	Australian Heritage Council
BP	Before Present
CHMP	Cultural Heritage Management Plan
EVC	Ecological Vegetation Communities
GAA	Growth Areas Authority
GSV	Ground surface visibility
LGA	Local Government Area
PSP	Precinct Structure Plan
RAP	Registered Aboriginal Party
SGD	Significant Ground Disturbance
VAHR	Victorian Aboriginal Heritage Register
VRO	Victorian Resources Online

DEFINITIONS

STUDY AREA	The area or areas to be used or developed for the activity

PART 1 – BACKGROUND ASSESSMENT

1 INTRODUCTION

1.1 Preamble

The Metropolitan Planning Authority (MPA) engaged Archaeological and Heritage Management Solutions (AHMS) Pty Ltd to prepare an Aboriginal Cultural Heritage Assessment - Desktop and Standard for the proposed McPherson Precinct Structure Plan (PSP) 1055.

The study area is located in Clyde North and is approximately 1,025ha in area. It is bounded by Bells Road to the west, Smiths Lane to the west, McCormacks Road to the south-east and by Cardinia Creek to the north and east.

1.2 Reason for the Current Study

An Aboriginal Cultural Heritage Assessment (ACHA) is a strategic planning document designed to identify the nature and extent of Aboriginal cultural heritage situated within a specified area. Specifically, the McPherson PSP area has several areas of legislated cultural heritage sensitivity:

a) previously recorded Aboriginal cultural heritage places;

b) land within 50 meters of a registered cultural heritage place;

c) land within 200m of a named waterway (Clyde Creek and Cardinia Creek);

d) sand sheet including the Cranbourne Sand identified as “Qpd” on the Geological Survey of Victoria 1:250 000 map series SJ55-9 “Queenscliff”, and;

e) Koo Wee Rup Plain identified as “Qrm” on the Geological Survey of Victoria 1:250 000 map series SJ55-9 “Queenscliff” (Aboriginal Heritage Regulations 2007, r22, r22(2), r23 & r31).

This ACHA - Desktop and Standard has been prepared with reference to the Aboriginal Heritage Act 2006 and is designed to identify and assess the nature, extent and significance of Aboriginal cultural heritage values within the subject land and to provide advice and recommendations that can be used in the early and initial planning stages of the McPherson PSP, to make design decisions that avoid or minimise further impact Aboriginal heritage values.

1.3 Cultural Heritage Advisor & Authorship

Shannon Sutton (B.A. Hons. – Monash University) is the Cultural Heritage Advisor and the principal author for this CHMP. Simon Crocker (B. Arch Hons. - ANU) also contributed to this report and it was further updated and amended by John Tunn (B. Arch Hons – La Trobe).

Jim Wheeler, General Manager AHMS (B.A. Hons. Archaeology - ANU, MAACAI) and Cathryn Barr, Manager AHMS – Victoria (M.A. Hons. - Auckland University; M. Cultural Heritage – Deakin University; ICOMOS – NZ) reviewed the report.

1.4 Acknowledgements

We especially acknowledge the assistance, input and support provided by the Aboriginal community representatives: Ngara Williams & Michael Williams (Boon Wurrung Foundation), Izzy Pepper & Dan Turnbull (Bunurong Land Council), Garry Galway, Trevor Downe & Shane Nicholson (Wurundjeri Tribe Land Compensation and Cultural Heritage Council), as well as, the staff of the Boon Wurrung Foundation, Bunurong Land Council and Wurundjeri Tribe Land Compensation and Cultural Heritage Council.

2 ACTIVITY DESCRIPTION

The land is currently zoned UGZ – Urban Growth Zone. This zone attempts to streamline planning controls within the PSP area. Therefore the current zoning of the land as UGZ will remain during the preparation of the PSP master plan.

The Sponsor (the MPA) do not intend to develop each individual allotment, nor would they undertake subdivision works. The role of the PSP is to facilitate master planning and design work that is streamlined and results in a high quality development within the precinct. Subdivision works and implementation of development projects within PSP 1055 would be undertaken by individual landowners and/or developers.

This ACHA comprises desktop and standard assessments designed to assist in PSP design and planning and to provide information that can be referenced by landowners and developers and appropriately consider Aboriginal heritage values when designing the urban structure within the PSP.

The study area will remain zoned 'UGZ – Urban Growth Zone' under the City of Casey Planning Scheme. The schedule to this zone is included in Appendix 3. Development within this area, in keeping with the PSP, will not require rezoning.

3 EXTENT OF STUDY AREA

The study area consists of 18 properties within PSP 1055 (Table 1; Figures 2).

Table 1 Participating Properties

Property ID #	Address
1	10 Smiths Lane, Clyde
2	20 Smiths Lane, Clyde
3	1665 Pound, Clyde
4	1715 Pound Road, Clyde
5	95 McCormacks Road, Clyde
6	125 McCormacks Road, Clyde
7	55 McCormacks Road, Clyde
8	225 Hardys Road, Clyde
9	270 Hardys Road, Clyde
10	375 Pattersons Road, Clyde
11	1720 Pound Road, Clyde
12	465-475 Pattersons Road, Clyde
13	370 Pattersons Road, Clyde
14	470 Pattersons Road, Clyde
15	60 Bells Road, Clyde
16	1895 Ballarto Road, Clyde
17	1965 Ballarto Road, Clyde
18	110 Smiths Lane

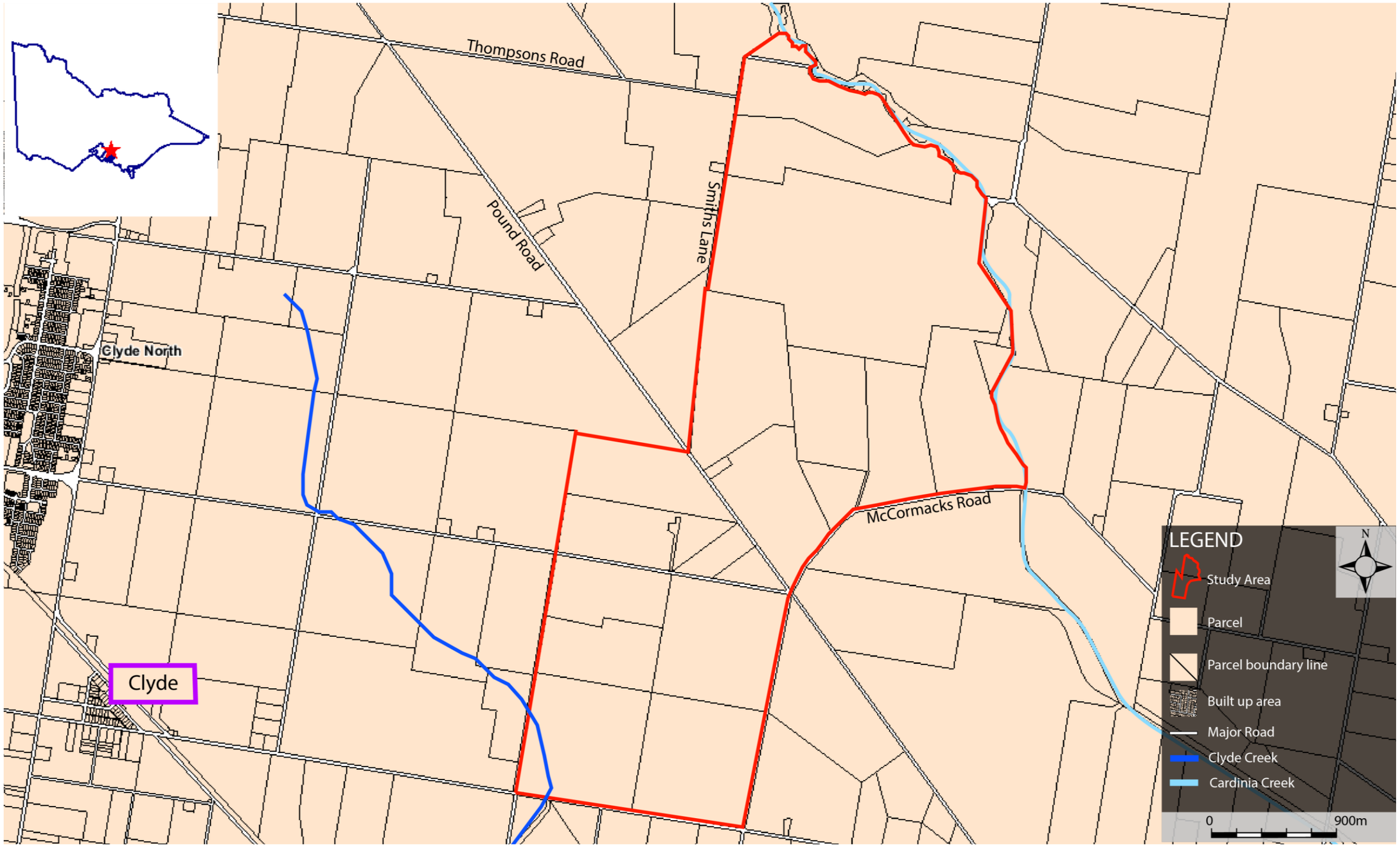

Figure 1 Location and Extent of McPhersons PSP 1055, with the nearest town centre (Clyde North) outlined in purple and the location of the study area in the state of Victoria present on the inset map (top left). Source: Landvic.

Figure 2 McPhersons PSP 1055 Property Map

4 DOCUMENTATION OF CONSULTATION

4.1 Development of Consultation

There was no Registered Aboriginal Party (RAP) appointed to the study area at the time the assessment was prepared. The Wurundjeri Tribe Land and Compensation Cultural Heritage Council (Wurundjeri) currently have a RAP application before the Aboriginal Heritage Council which includes the study area. Although the Boon Wurrung Foundation (Boon Wurrung) and Bunurong Land Council (Bunurong) do not have current RAP applications before the council, both groups are recognised by the Aboriginal Heritage Council as being Traditional Owners for the local area. On the advice of OOAAV a process of consultation was undertaken with the Boon Wurrung, Bunurong and Wurundjeri.

The AHMS approach to the Aboriginal community consultation was to undertake all components of the study in partnership with the Boon Wurrung, Bunurong, and Wurundjeri. In practice, we invited representatives of each group to participate in field work undertaken as part of the Standard Assessment. The representatives of the Aboriginal community stakeholders were consulted about key cultural and landscape values during the survey work.

Traditional Owner representatives who participated in the Aboriginal heritage assessment, including consultation and on-site attendance are shown in Table 2. The development of consultation with the Boon Wurrung, Bunurong, and Wurundjeri is set out in Table 3.

Table 2. Participants in Standard Assessment

Date	Wurundjeri	Boon Wurrung	Bunurong
19/11/12	Garry Galway	None Available	Dan Turnbull
20/11/12	Garry Galway	Ngara Williams	Izzy Pepper
21/11/12	Shane Nicholson	Michael Williams	Dan Turnbull
22/11/12	Trevor Downe	Michael Williams	Dan Turnbull

Table 3 Aboriginal Community Correspondence

Date	Action	Method
14/11/12	NOI Submitted to OOAAV	Email
14/11/12	Invited members of the Boon Wurrung Foundation to participate in the survey	Email
14/11/12	Invited members of the Bunurong Land Council to participate in the survey	Email
14/11/12	Invited members of the Wurundjeri Tribe Land and Compensation Cultural Heritage Council to participate in the survey	Email
19 – 22/11/12	Conducted survey of the PSP 1055 Study Area	Email

4.2 Outcomes of Consultation

The Aboriginal representative groups were closely consulted throughout the development of the Aboriginal heritage assessment and during the archaeological survey fieldwork. The issues discussed and raised by the groups were considered during preparation of and reflected in the final report.

During the survey, the Aboriginal community representatives were asked to comment on any cultural values, particularly in regards to the importance of remnant native vegetation, traditional food plants and landscape values. Key features in the landscape identified as archaeologically sensitive include areas near watercourses and elevated landforms (such as low rises) within the study area.

4.2.1 The Bunurong Land and Sea Association Inc (BLAS)

Since the completion of all fieldwork associated with this investigation, the Bunurong Land and Sea Association Inc (BLAS) - a fourth Traditional Owner group were established. The BLAS have not played an active role in the preparation of this report or in the development of appropriate cultural heritage management recommendations.

5 DESKTOP ASSESSMENT

5.1 Preamble

The information obtained during a Desktop Assessment assists in determining the archaeological potential of the study area in a number of ways. For example, by considering the types of natural resources which may have been available within the study area, or in the local region, can provide an indication of why Aboriginal people may have been attracted to the area and the potential resources which they may have exploited. Furthermore, by understanding the natural resources of the local region archaeologists can better identify the potential physical traces of past Aboriginal presence and resource exploitation.

Information about previously recorded archaeological sites in the region can provide an indication of the types and distribution of archaeological deposits and material that may be present, or may once have been present, within the study area. It also provides comparative information that is essential for the assessment of the archaeological significance of any previously unrecorded archaeological material or deposits.

Environmental and historical information (particularly regarding past and present land use) may indicate the potential for post-depositional processes to have altered or disturbed any archaeological deposits or materials that may have once, or may still, exist within the study area.

In short, knowledge of the environmental, cultural and historical contexts of the study area is crucial for understanding the archaeological potential and significance of that area.

5.2 Geographic Region

The Geographic Region for the purpose of this Aboriginal Heritage Assessment is the Bunyip River Basin (Figure 4). Although the Basin includes the Mornington Peninsula it has been excluded from the overall Geographic Region for this investigation because it has its own distinct characteristics which differ to those of the study area and immediate surrounds.

The Bunyip River Basin is situated within the greater geological feature of the Westernport sunkland or West Gippsland Plains. The West Gippsland Plains are situated between Drouin and Melbourne. The Plains mainly comprise uplifted marine sediments, fluviatile sands and extensive swamp deposits occurring at Koo-wee-rup and Carrum[1].

Many rivers and creeks within the Bunyip River Basin originate in the steep Dandenong hills to the north and drain out through extensive plains into Western Port Bay. The majority of the basin has been cleared for agriculture. Land use within the region is predominantly rural although small urban zones are also present on the northern outskirts of Melbourne.

Prior to European settlement the Koo Wee Rup swamp covered a large area near Koo Wee Rup, Bayles and Drouin South. The swamp system was drained out during the 19th and 20th centuries to

[1] *Hills, E. S.. Physiography of Victoria. Whitecombe & Tombs Pty Ltd, Melbourne and Sydney, 1940: 267*

open up land for agricultural uses. As a result, many of the rivers and creeks in the area were highly modified by the construction of drains[2].

Although the Geographic Region comprises the Bunyip River Basin, the Desktop Assessment summarised in the following sections of this report focuses on Clyde North and the surrounding landscape within a 3km radius of the study area. This provides a suitable region for study because it shares common and distinct topographic, drainage, geological and soil landscape characteristics.

[2] Melbourne Water, Healthy Waterways Waterwatch Program: accessed 5/09/2011

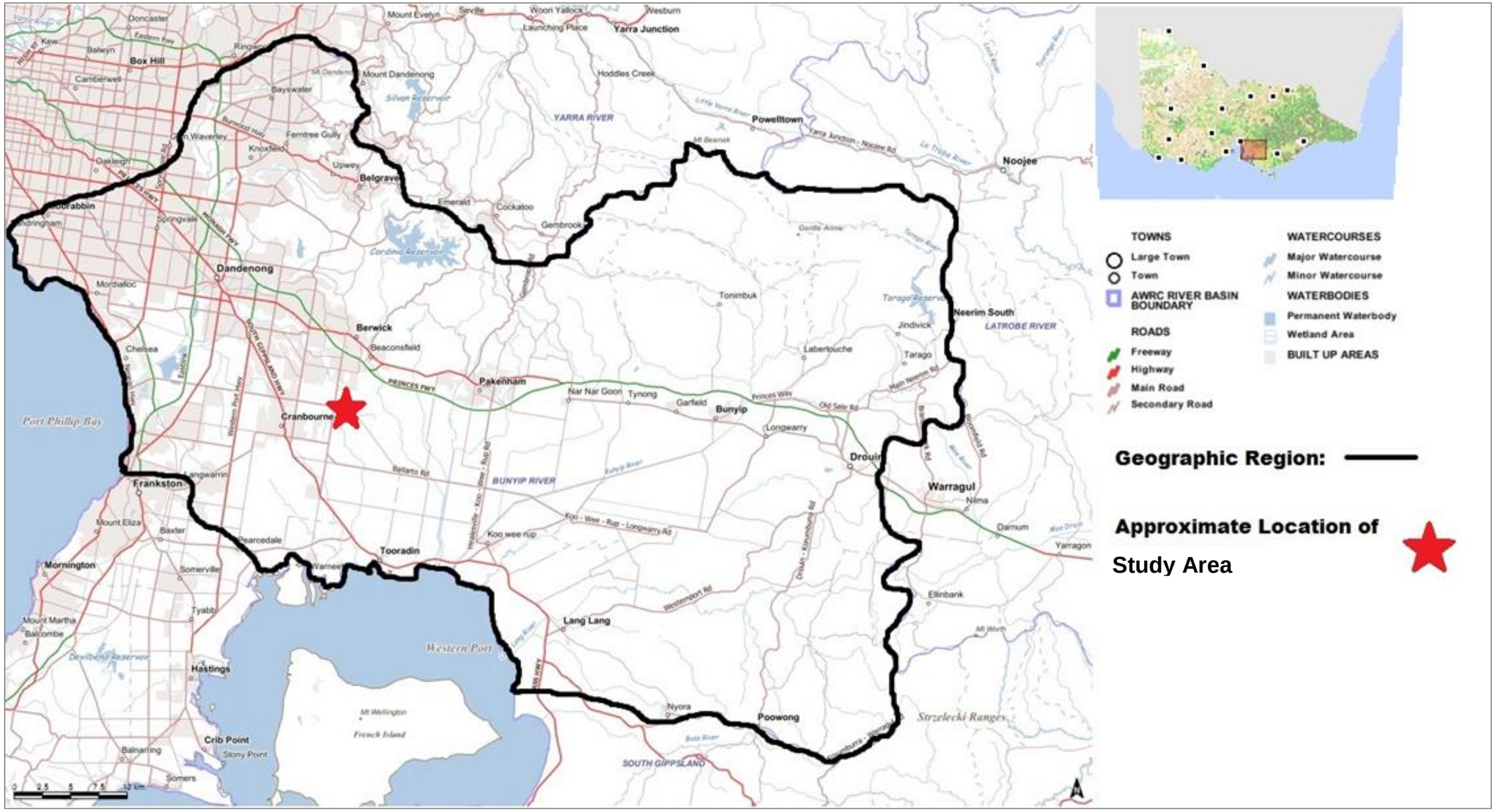

Figure 3 Bunyip River Basin: Geographic Region. Source: GeoVic.

5.3 Review of Aboriginal Places within the Geographic Region

A search of the Victorian Aboriginal Heritage Register (VAHR) was undertaken on the 14th November 2012. Approximately 1,837 Aboriginal cultural heritage places have been recorded within the Bunyip River Basin geographic region, with many situated within close proximity to major local drainage lines; particularly Cardinia and Clyde Creek.

Given that the project was subsequently on hold from this time until late 2014, a further VAHR search of the Bunyip River Basin geographic region was undertaken, on 13th February 2015 which identified 2,208 Aboriginal heritage places registered in the VAHR.

The majority of these places are situated within close proximity to major rivers and creeks; particularly Cardinia and Clyde Creek. Artefact scatters are the dominant site type within the geographic region (83%), followed by scarred trees (8%) and object collections (7%). Other site types less commonly represented within the geographic region include low density artefact distributions, shell middens, Aboriginal historical places, earth features, stone features and a quarry.

Table 4. VAHR Recorded Places within the geographic region.

Site Type	Number
Artefact Scatter	1,242
Scarred Tree	179
Object Collection	144
Low Density Artefact Distribution	601
Shell Midden	17
Aboriginal Historical Place	10
Earth Feature	10
Stone Feature	4
Quarry	1
TOTAL	**2,208**

Three Aboriginal places are registered within the study area (Table 5), and a further 9 places are situated within 200m of the study area (Table 6). These Aboriginal places comprise artefact scatters and LDAD's of quartz and silcrete, with chert present in smaller quantities. The majority of these places have been recorded along Cardinia Creek and other minor drainage channels.

Table 5 VAHR Recorded Places within the Study Area

VAHR #	Site Type	Site Name	Landform's
7921-1039	LDAD	Pound Road 2	Road
7921-1536	LDAD	Smiths Lane, Clyde North LDAD 2	Stable raised dunes and low lying plain
7921-1547	Artefact Scatter	Smiths Lane, Clyde North Artefact Scatter	Stable raised dunes

Pound Road 2 LDAD (VAHR 7921-1039) comprises an isolated surface artefact found on the Pound Road northern road reserve, immediately south west of property ID# 4. The artefact is a red silcrete distal flake located during a survey for CHMP 10620 (Wonthaggi – Cranbourne desalination pipeline).

Smiths Lane, Clyde North LDAD 1 (VAHR 7921-1536) is a low density sub-surface artefact distribution comprising 25 artefacts. The artefacts were identified within eleven separate 1x1m and 1 x 1.2m trenches during a complex assessment for CHMP 12430 (in prep) at110 Smiths Lane (property #18). Only one artefact was identified on the ground surface – all others were recovered during sub-surface testing.

Smiths Lane, Clyde North Artefact Scatter (VAHR 7921-1547) is a sub-surface artefact scatter comprising 31 artefacts. The artefacts were identified within 3 separate 1x1m and 1 x 1.2m trenches during a complex assessment for CHMP 12430 (in prep) at110 Smiths Lane (property #18).

Table 6. VAHR Recorded Places within 200m of the Study Area.

VAHR #	Site Type	Site Name	Landform	Reference
7921-0195	Isolated Stone Artefact	Cardinia Creek 7	Artificial Water body	Smith 1989
7921-0229	Aretfact Scatter	Cardinia Creek 17	Artificial Lagoon	Smith 1989
7921-0230	Stone Artefact	Cardinia Creek 18	Creek bank	Smith 1989
7921-0231-1	Artefact Scatter	Cardinia Creek 19	Creek bank	Smith 1989
7921-0232-1	Artefact Scatter	Cardinia Creek 20	Creek bank	Smith 1989
7921-1118	Artefact Scatter	Pound Road 3	Slope	Murphy et al 2011
7921-1439-1	LDAD Stone Artefact Recording	Smiths Lane LDAD1	Plain	N/A
7921-1439-2	LDAD Stone Artefact Recording	Smiths Lane LDAD1	Plain	N/A
7921-1537-2	LDAD Stone Artefact Recording	Pound Road LDAD	Plain	CHMP 11744

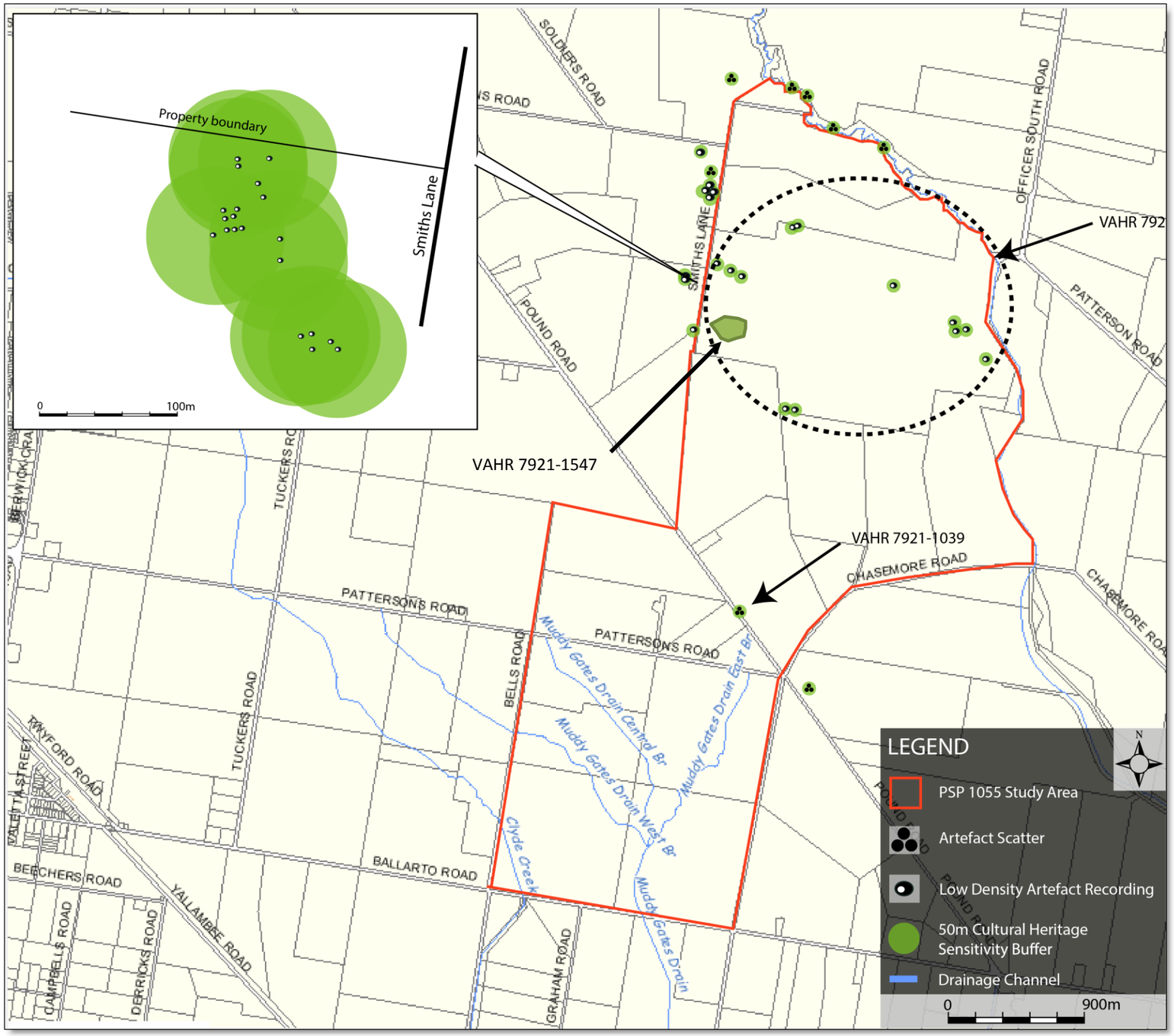

Figure 4 Registered Aboriginal Places inside and within 200m of McPhersons PSP 1055 study area. Source: VAHR and Interactive maps.

5.4 Review of Regional Archaeological Context (including reports and published works)

5.4.1 Early Occupation

Early occupation of south eastern Victoria has been subject to debate over recent decades[3][4][5][6][7]. Recent analysis by Munroe places Aboriginal occupation at 40,000 BP, based on the re-analysis of an artefact assemblage excavated in the late 1970s[8]. Mulvaney and Kamminga note the presence of archaeological materials in the region that are dated to 'at least 30,000 years'[9]. Archaeological sites within the Melbourne Metropolitan region such as the hearth remains recently re-dated by Tunn, show Aboriginal occupation of the Maribyrnong River Valley approximately 15,800 BP. The Green Gully burials are dated to approximately 6,500 BP[10].

Closer to the study area, excavations at Bend Road on the Eastlink Freeway at South Dandenong by Jim Allen and a team from La Trobe University yielded a cultural sequence dated to 30 – 35,000 years BP[11], around the commencement of the Last Glacial Maximum (LGM). The Bend Road site was located on a stable dune crest on the northern fringe of the former Carrum Swamp system. The Bend Road results have been questioned and the subject of criticism in some quarters, however, the potential for Cranbourne Sands and other Pleistocene stable sand formations to contain deep cultural sequences of considerable antiquity is clear.

Bend Road 1 (VAHR 7921-0735) consists of a high density scatter of 515 artefacts and an extension of a previously registered Aboriginal place located within the Eastlink Reserve. The artefact scatter contains stratification relating to both Holocene and Pleistocene occupation. The component of the Aboriginal place located within Long et. al.'s study area has been dated (OSL) to the early-mid Holocene (~7,500 – 11,780 years ago).

Perry Road 1 (VAHR 7921-1181) was registered within the south unit of Long et al study area consisting of 176 artefacts recovered from surface and sub-surface contexts on a sandy rise.

Long et al argued that Perry Road 1 (VAHR 7921-1181) may date to the Last Glacial Maximum (c. 30,000 years ago). Furthermore, Long et al argued that artefacts associated with the Australian Small Tool Tradition (ASTT) were identified within a stratigraphic layer older than 9.0±0.4 ka (as determined through Optically Stimulated Luminescence [OSL] dating). Long et al also argued, however, that the

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[3] *Burke, C. Analysis of the Lithic Assemblage from the Keilor Archaeological Site, Victoria Archaeological Survey Occasional Report No. 30, Department of Conservation and Environment, Melbourne, 1990.*

[4] *Gallus, A. 1976. The Middle and early Upper Pleistocene stone industries at the Dry Creek archaeological sites near Keilor, Australia.* The Artefact *2:75-108*

[5] *Munroe, M. 1998 'The stone artefact assemblage from Keilor' The Artefact 2 1: 19-34.*

[6] *Tunn, J. 1998. Pleistocene Landscapes of Brimbank Park, Keilor, Victoria. In The Artefact, Vol. 21, pp.35-47, pp 46*

[7] *Tunn, J. 2006. An Aboriginal Campsite on the Maribyrnong River – New Dates for Keilor. In The Artefact, Vol. 29, pp.14-21*

[8] *Munroe op cit, pp. 33.*

[9] *Mulvaney, J and Kamminga, J, 'Prehistory of Australia', Smithsonian Institution Press, Washington D.C. 1999, pp. 230-255*

[10] *Tunn 2006, op cit.*

[11] *Allen, J., Hewitt, G. de Lange, J. with a contribution by Long, A. 'Report on Bend Rd archaeological investigations: Bend Rd 1 phases 1 to 3', unpublished report to Thiess John Holland, 2008*

downward movement of artefacts through the sediment may have affected the results. Furthermore, the formation of the Aeolian sands (within which the Aboriginal Place is located) may have affected the validity of the OSL dating.

More recently, AHMS undertook test excavations at First Avenue, Chelsea Heights as part of a Cultural Heritage Management Plan in support of residential subdivision[12]. During test excavation buried sand dune deposits were identified underneath a thick swamp gley deposit. A small number of stone artefacts were found within the buried and capped sand dune deposits that pre-date development of the Carrum swamp system. OSL dating of the sand deposits indicated the stone artefacts may have been deposited in the period 23,000 to c.32,000 years before present. This may indicate LGM or pre-LGM occupation of the local landscape. The results of the First Avenue investigations also support the findings made at Bend Road and corroborate the potential for Pleistocene cultural deposits within former stable sand dune deposits.

The vast majority of dated sites in south-eastern Australia are less than 5,000 years old. It has been argued that this is a result of increased populations and 'intensification' of cultural activity during this period. The prevalence of sites dating to the last 5,000 years may also be a result of the last significant rise in sea level, approximately 6,000 years ago. The sea level rise would have submerged many of the older sites along the coastal fringe and forced Aboriginal groups westward to the current coastline.

5.4.2 Stone Artefacts and Raw Materials

Aboriginal stone artefacts are an important source of archaeological information because stone is preserved for long periods of time whereas organic materials such as bone, shell, wood and plant fibres decay. Stone artefacts provide valuable information about technology, economy, cultural change through time and settlement patterning. Stone has also been used for 'relative' dating of sites where direct methods such as carbon dating cannot be applied.

There is considerable ongoing debate about the timing and nature of technological change in stone tool technologies in south-eastern Australia[13][14][15]. In general, however, there is evidence of a shift from large core tools, horsehoof cores and scrapers during the Pleistocene and early Holocene towards the use of ground edged implements and small tools during the mid to late Holocene. In particular, small points, blades and scrapers characterised by a distinctive form of re-touch known as 'backing'[16] dominate many mid Holocene assemblages. There is some evidence of a shift in the last 1,500 years towards bipolar reduction technology, increased use of ground-edged artefacts and an increase in the use of bone and shell for making tools. Particular forms such as Eloueras have been cited as characteristic of this recent period.

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[12] *Kennedy, S., J. Wheeler & E. Foley, 44 First Avenue, Chelsea Heights: Residential Subdivision. Cultural Heritage Management Plan (11958), 2012*

[13] *Hiscock, P. and V. Attenbrow, V. 'Morphological and Reduction Continuums in Eastern Australia: Measurement and Implications at Capertee 3' Tempus 7, Anthropology Museum, University of Queensland , 2002.*

[14] *Hiscock, P. and V. Attenbrow 'Early Holocene Backed Artefacts from Australia' Archaeology in Oceania 33(2), 1998.*

[15] *Hiscock, P.. 'Sizing up Prehistory: Sample Size and Composition of Archaeological Assemblages' Australian Aboriginal Studies 2001(1)*

[16] *This is known as Bondaian technology and includes formal types such as Bondi Points and Backed Blades*

Dominant raw material types in the Geographic Region include silcrete, quartz, quartzite and chert, with other materials such as basalt, greenstone, granite, indurated mudstone, sandstone and glass also present[17] .

5.5 Relevant Regional Studies

This section reviews key regional archaeological investigations to assist in understanding likely archaeological patterning within and near the study area. The regional studies previously undertaken within the Geographic Region and therefore most relevant to this investigation are summarized below.

5.5.1 Smith 1989 & 1991

A regional study of the Berwick to Bunyip residential growth corridor was undertaken by Smith in 1989. The study area encompassed the Berwick-Pakenham corridor stretching from Dandenong to Bunyip. The aims of the study were to:

- Identify areas of high archaeological potential/significance;
- Determine whether corridor development poses any threat to archaeologically sensitive areas and to make management recommendations for those areas; and
- Consult with local Aboriginal communities to identify and document their views on cultural heritage with regards to the corridor.

Smith also developed a prediction model for site location based on ethnographic data and ground surface survey. The ground surface survey was undertaken over six weeks and identified 62 previously unrecorded sites of which 32 comprised stone artefact scatters, 13 were isolated artefacts, 15 scarred trees and 2 were collections made by local landowners. Smith divided her study area into landscape units comprising: the undulating hills along the northern boundary of the corridor (Landscape Unit 1), the lowland plains within the western port catchment (Landscape Unit 2), the floodplains of the Port Phillip catchment (Landscape Unit 3) and the Cranbourne Sands (Landscape Unit 4). The study area is situated within Landscape Units 2, 3 and 4. Chert and quartz were identified as being the dominant raw material types for surface stone artefact scatters discovered by Smith within the Berwick-Pakenham corridor. Artefact types present within these scatters consisted of flaked pieces and flakes with less than 2% of the assemblages comprising formal tools[18].

Smith assessed the following landforms as having archaeological potential within Landscape Unit 2, 3 and 4:

- "The banks, flats and terraces of all permanent creek lines. In addition the temporary tributaries of the following major water courses are also considered to have high potential: Cardinia, Toomuc, Ararat, and Black creeks and the Bunyip River;
- Swamp margins;
- Hill slopes and hill tops overlooking Bunyip River; and
- In particular Cardinia Creek has been identified as the area within Landscape Units 1 & 2 most likely to contain sites"[19].
- All areas still retaining remnants of the river red gum forests[20] (Landscape Unit 3);

[17] *Smith, I. The Berwick-Pakenham Corridor. The Archaeological Survey of Aboriginal Sites. Report to Victoria Archaeological Survey, Ministry for Planning and Development, 1989.*
[18] *Smith op cit: 47*
[19] *Smith op cit: 73*
[20] *Smith op cit: 74*

- Cardinia and Toomuc Creek. These areas contain a high number of known sites and a high number of archaeologically significant sites. The sites in this area have the potential to answer research questions about the movement of people between the coast and corridor through the Koo-wee-rup Swamp;
- The Cranbourne Sands. Sites located in this area are different to sites in the remainder of the corridor. The sites appear to be larger and all contain unusually high proportions of quartz;
- The Garfield/Bunyip Area. This area also contains sites that are quite different to the remainder of the corridor and discrete manufacturing sites have been identified in this area. Due to limitations only a limited amount of survey work was undertaken in this area and it is considered that this area warrants further archaeological investigation[21].

Smith undertook another review of the Berwick-Pakenham corridor in 1991. Although the additional review did not identify any new sites, Smith identified permanent water courses and swamp margins as having higher potential for archaeological sites in accordance with her initial investigation[22].

5.5.2 du Cros & Rhodes 1998

du Cros and Rhodes[23] produced a report for Melbourne Water Corporation in 1998 which mapped the sensitivity of waterways within and surrounding Melbourne, thus encompassing the Geographic Region. A GIS database was constructed with waterways and floodplains graded into different levels of sensitivity and associated recommendations. The predictive models indicated that many waterways in and around Melbourne should be considered archaeologically sensitive. Sensitive areas identified within the report include high ground near waterways, well drained floodplains and areas containing mature eucalypts.

5.5.3 Feldman & Long 2004

An Aboriginal archaeological desktop review was undertaken by Feldman & Long 2004 for the Casey-Cardinia Growth Area. The overarching aim of the study was to identify, review and analyse the existing information for Aboriginal cultural heritage within the growth area and to provide technical advice to inform development. The key findings of the study were divided into six landscape zones each with discrete archaeological characteristics. Relevant aspects of these findings are provided below:

- **Zone 1: Major Drainage Corridors** – "the foothills and intermediate plains are drained by four major creek complexes (Cardinia, Toomuc, Deep/Pakenham and Ararat/Back Creeks), which have clearly acted as a focus for Aboriginal occupation in the recent past. The creek margins are associated with a range of comparatively dense artefact scatters and scarred trees, within both the surrounding foothills and plains"[24] .
- **Zone 2: Intermediate Plains** – "a slightly elevated band of flat or undulating land bordering the northern foothills (Zone 5) and Koo-Wee-Rup Swamp (Zone 4) to the

[21] Smith op cit: 74
[22] Smith, L. Berwick-Pakenham Corridor: Aboriginal Archaeology. Report produced by the Victoria Archaeological Survey and the Ministry for Planning and Environment, 1991.
[23] du Cros, H., & D. Rhodes. Aboriginal Archaeological sensitivities study of the waterways and floodplains of Greater Melbourne. Sponsored by Melbourne Water - Waterways Alliance Corporation, 1998.
[24] Feldman, R., & A. Long.. Melbourne 2030 Casey – Cardinia Growth Area: Aboriginal Archaeological Desktop Report. A Report to The Built Environment Group – Department of Sustainability & Environment, 2004: 3

south, dominated by agriculture and urban development. The archaeological record is dominated by stone artefact occurrences on alluvial flats and outwash fans associated with creek draining the foothills. These occur as comparatively dense, localized scatters and a broader backdrop of diffuse isolated finds. Recent research has demonstrated the potential for buried deposits to occur to a depth of 800mm, possibly in association with a complex of Paleo-landforms (prior and former stream channels), which are obscured below the current alluvial land surface. Scarred trees…may also occur within stands of native remnant vegetation in this zone"[25].

- **Zone 3: Urban Areas** – "Archaeological sites may still occur in open spaces within these areas, but the scope for identifying high integrity sites is limited"[26] .
- **Zone 4: Koo-Wee-Rup Swamp** – "reclaimed low lying swamp land in the south of the study area, characterized by irrigated agriculture. This zone has not been assessed in previous studies coverage. On the basis of comparative research we can conclude that archaeological sites, notably surface scatters may occur on ridgelines, terraces and in the minor creek valleys which drain the zone. Scarred trees may occur in areas of remnant native vegetation, though much of this zone has been subject to land clearance and logging"[27].
- **Zone 5: Northern Foothills** – "steep, dissected foothills to the Great Dividing Range immediately north of the Princes Highway, characterized by agricultural land and regrowth forest. Due to the paucity of data, the archaeological values of this area are uncertain. On the basis of comparative research we can conclude that archaeological sites, notably surface scatters may occur on ridgelines, terraces and in the minor creek valleys which drain the zone. Scarred trees may occur in areas of remnant native vegetation. Much of this zone has been subject to land clearance and logging"[28] .
- **Zone 6: Cranbourne Massif and Surrounding plains** – "an area of undulating plains centered on an elevated ridge of volcanic and sedimentary rock (the Cranbourne Massif), characterised by widespread sand drifts (the Cranbourne Sands). Today the area is dominated by irrigated agriculture and urban development. The archaeology is dominated by localized dense scatters of stone artefact associated with sand drifts, ridgelines and drainage lines, within a broader diffuse scatter of isolated artefacts occurring widely in the landscape. Burials may occur in sand deposits"[29].

5.6 Review of Local Studies (Pre Aboriginal Heritage Act 2006)

Prior to the commencement of the Aboriginal Heritage Act 2006, archaeological studies were often carried out to satisfy Aboriginal cultural heritage assessment of proposed development and varied significantly in methodology and content in comparison to CHMPs. These assessments generally do not provide as much detailed information as CHMPs, therefore a brief summary of key findings of the investigations undertaken within 3km of the study area, is provided below.

[25] Feldman & Long op. cit: 3
[26] Ibid
[27] Ibid
[28] Ibid
[29] Feldman & Long, op cit.

A total of fourteen small scale archaeological assessments have been previously undertaken within 5km of and including the study area (du Cros & Associates[30] , Bell[31] , Bell[32] , Muir[33] , Thomson and Muir[34] , Long[35] , Debney [36], Marshall & Schell[37] , Sciuso[38] , Marshall[39] and Marshall & Webb[40] . These studies are summarised overleaf in Table 7.

[30] du Cros & Associates, a sub-surface investigation of terraces affected by Cardinia Creek by-pass, Officer, Victoria, unpublished report to VicRoads, 1992

[31] Bell, J. L. An Archaeological Survey of Proposed Realignment of Clyde-Five Ways Road. Report Prepared for VicRoads, 2001.

[32] Bell, J. L.An Archaeological Survey: Clyde Five-Five Ways, Cranbourne. Final report for VicRoads, 2002.

[33] Muir, S. Stage 1 and 2 cultural heritage survey of Clyde Five Ways Road, Pound Road to Ballarto Road, Victoria. Report for VicRoads, 2003a.

[34] Thomson, M. & Muir, S. stage 2: Aboriginal archaeological sub-surface investigations for the proposed Officer development project, Officer, Victoria, unpublished report to VicUrban.

[35] Long, A., P. Schell & J. Howell-Meurs. Eastern Irrigation Scheme: Archaeological Assessment. A Report to Earth Tech Engineering Pty Ltd, 2004.

[36] *Debney, T, J. Fiddian, H. Cekalovic, A. Orr, M. Lawler, T. Meara, R. Regal and K. Houghton. Desalination Project Transfer Pipeline and Power Utilities Corridor, Wonthaggi to Cranbourne, Victoria: Cultural Heritage Management Plan (10620). Sponsor: Department of Sustainability and Environment, 2009.*

[37] Marshall, B. & Schell, P. Coast action/coast care 1998/99 Aboriginal archaeological desktop study, unpublished report to DNRE Coasts Division, 1998.

[38] Sciusco, L. An archaeolgoical survey of a pipeline easement between Dandenong and Hastings road and Knowles road Cranbourne, unpublished report to Melbourne Water, 1995

[39] *Marshall, A. An overview of the Aboriginal archaeology within the non-urban foreshore, Victoria, unpublished report to the City of Casey, 1997.*

[40] Marshall, B. & C. Webb. A Cultural Heritage Assessment of Proposed Realignments of Clyde-Five Ways Road. Prepared for Hyder (Australia) Pty Ltd, 2001.

Table 7. Local Studies (Pre Aboriginal Heritage Act 2006)

Report	Assessment Type	Aboriginal Heritage	Assessment Conclusions
Du Cros & Associates 1992 (485)	Excavation	One subsurface Aboriginal place located comprising 6 artefacts VAS 7921-245	Excavation of an archaeologically sensitivity area along Cardinia Creek (alluvial terraces). Aboriginal place assessed as having moderate archaeological significance. Recommendation made to avoid.
Bell 2002 (2326)	Resurvey	Could not locate artefact identified by Cekalovic (VAHR 7921-1416)	Resurvey of Berwick- Cranbourne Road. Sandy slopes and rises in this region were identified as archaeologically sensitive landforms with sub-surface cultural heritage potential
Bell 2002 (2217)	Excavation	One surface artefact located (Bath'mun 1) one subsurface artefact located (Bath'mun 2)	Subsurface artefact located within the Cranbourne Sands geological unit. Both sites assessed as having low archaeological significance
Muir 2003 (2674)	Desktop & Survey	Four Aboriginal cultural heritage places, including: three isolated artefacts (VAHR 7921-499, 7921-0501 & 7921-0569) and an artefact scatter (VAHR 7921-0500).	Survey of Berwick-Cranbourne Road. As part of this investigation, Muir identified all places were associated with sandy rise landforms.
Thomson & Muir 2005 (3375)	Excavation	Ten Aboriginal places located including nine isolated finds Mya-long IA1 to Mya-long IA10 (VAHR: 7921-0630, 7921-0631, 7921-0632, 7921-0633, 7921-0634, 7921-0635, 7921-0636, 7921-0637 and 7921-0638) and one artefact scatter Mya-Long AS2 (VAHR: 7921-0629)	Testing indicated that archaeological artefacts are most likely to be located on rises and ridgelines. The remainder of the study area had only low potential for archaeological deposits.
Long 2007 (3839)		Three isolated artefacts - VAHR 7921-0804, 7921-0805, 7921-0806;	All sites assessed as having a low level of archaeological significance as they are isolated finds with a poor level of preservation. No areas of archaeological sensitivity were identified.
Debney 1999 (1558)	Desktop	N/A Desktop Assessment	Areas considered archaeologically sensitive include undeveloped pastoralized land, stands of native vegetation, all sections of Cardinia Creek frontage, Cranbourne sand dunes and hummocks & elevated landforms.
Marshall& Schell 1998-9 (1370)	Desktop	N/A Desktop Assessment	None Identified – report is a due diligence assessment which focusses solely on mitigating impact to known sites.
Sciuso 1996 (989)	Survey	None	Areas of high archaeological sensitivity include areas in which mature river red or manna stringy bark gums occur, ridges & hilltops.
Marshall 1997 (720)	Resurvey following (989) and excavation	None	Areas of archaeological sensitivity as identified by Sciuso (1996).
Marshall & Webb 2001 (815)	Desktop assessment/drive through survey	VAHR 7921-0124, 7921-0125	Both sites assessed as low in scientific significance in poor preservation. Sensitive landform identified although no details provided.

5.7 Review of Local Studies (Cultural Heritage Management Plans)

A total of 45 Cultural Heritage Management Plans have been undertaken within an approximate 5km of the study area. A summary of these investigations and any implications for the study area are provided below.

5.7.1 Murphy & Rymer 2009a (10939)

A CHMP was prepared for a residential subdivision in Officer, north-east of the current study area. One sub-surface Aboriginal place (VAHR 7921-1137) was located as part of this investigation, comprising 13 artefacts manufactured from silcrete and quartz[41] . The artefacts were recovered from a single shovel test probe from the upper 30cm of a sandy silt horizon on the lowland plain. Extent testing recovered no further cultural heritage material[42]. VAHR 7921-1137 was therefore characterised as a low density scatter of material with limited research potential, and assessed as being of low scientific significance[43].

5.7.2 Hyett & O'Connor 2009 (10704)

Terraculture Heritage Consultants were commissioned by Intrapac Projects Pty Ltd to prepare a voluntary CHMP for a subdivision at 110 Cardinia Road, Officer[44]. The activity area was not within an area of cultural heritage sensitivity; however Intrapac Projects Pty Ltd elected to prepare a CHMP due to the high number of known cultural heritage places in the vicinity of the activity area. No particular areas of cultural heritage sensitivity were identified during the standard assessment. The Complex assessment comprised excavation of one 1m x 1m trench, one 50cm x 50cm trench and ten mechanically excavated trenches (1.5m x 2-3m). No Aboriginal places were identified within the activity area during the course of the CHMP[45].

5.7.3 Murphy & Owen 2010 (11452)

Archaeology At Tardis Pty Ltd was engaged by Cardinia Shire Council to prepare a voluntary CHMP (Desktop and Standard assessment) for a proposed structure plan as part of feasibility studies for a residential subdivision for land allocated at Glismann Road, Beaconsfield. From the results of the Desktop & Standard assessments, Archaeology At Tardis Pty Ltd determined that the levels of disturbance associated with urban and rural development would have removed/destroyed any Aboriginal archaeological evidence present within the activity area[46] .

5.7.4 Hislop & Barker 2012 (12161)

Heritage Insight prepared a mandatory CHMP for a residential subdivision at 120 Cardinia Road, Officer. The CHMP included desktop, standard and complex assessments. The results of the standard assessment confirmed that the activity area was flat, featureless and devoid of sandy rises,

[41] Murphy, A. & Rymer, T. Residential Subdivision, Lots 2 & 3 Rix Road, Officer. CHMP, unpublished report prepared for National Pacific Properties, 2009c, p. 47.
[42] ibid., p. 46
[43] ibid., p. 47
[44] Hyett, J. & O'Connor, A., Planned Subdivision 110 Cardinia Road, Officer: CHMP, unpublished report prepared for Intrapac Projects Pty Ltd, 2009, p. i.
[45] ibid., pp. 16-17.
[46] Murphy, A. & Owen, D., Glismann Road, Beaconsfield Structure Plan CHMP, unpublished report prepared for Cardinia Shire Council, 2010, pp. 23-24.

however it was considered Aboriginal sites were likely to be present based on the existence of four previously recorded sites located in close proximity to the activity area[47] . One 1m x 1m test trench and twenty-one shovel probes were excavated as part of the complex assessment. No Aboriginal cultural heritage was identified during the course of the CHMP[48].

5.7.5 Barker 2012 (12160)

Ochre Imprints, on behalf of Abiwood BCR P/L, prepared a voluntary CHMP for a residential subdivision of a 2.6ha parcel of land located at 265 Berwick-Cranbourne Road, Clyde North. The standard assessment found that the activity area comprised a flat low lying plain, with a discrete low rise located in the North western section of the property[49]. Three 1m x 1m trenches and twelve 0.4 x 0.4 shovel test pits were excavated. No Aboriginal cultural heritage was identified within the activity area[50].

5.7.6 Murphy & Rymer 2011 (11636)

Murphy and Rymer prepared a CHMP comprising Desktop, Standard and Complex Assessments, for a proposed residential subdivision in Clyde North[51] , approximately 1km north of the study area. It was suggested that as the area under investigation had been frequently inundated in the past, and the archaeological potential was therefore very poor. The area was investigated in two land units, the floodplain and alluvial plain[52] . No Aboriginal cultural heritage was located on either of these landforms, which in some areas had been built up by introduced fill[53] .

5.7.7 Murphy & Rymer 2009 (10659)

Hunt Club Pty Ltd sponsored a CHMP for a residential subdivision in Cranbourne East, approximately 1.9km west of the study area. The investigation area for this study comprised the intersection of a low Cranbourne sand dune and Carrum swamp landforms. During the Standard Assessment, an isolated silcrete artefact (VAHR 7921-0664) was located on the surface outside of the study area[54]. Complex Assessment identified two sub-surface Aboriginal places (VAHR 7921-1080; 7921-1081) on the elevated dune landform[55].

VAHR 7921-1080 comprised 13 silcrete stone artefacts recovered from the upper 30cm of the soil profile. VAHR 7921-1081 comprised 24 stone artefacts, manufactured from silcrete, quartz and crystal quartz, recovered from the upper 45cm of the soil profile. Both Aboriginal places were characterised as low density scatters and evaluated as having low scientific significance. A portion of VAHR 7921-1080 and 7921-1081 was recommended to be preserved within a heritage conservation zone[56].

[47] Hislop, K., & Barker, M., Proposed Residential Subdivision – 120 Cardinia Road, Officer, CHMP, unpublished report prepared for Andrew Purdie, 2012, p. iv.
[48] Barker, A., Residential Subdivision 265 Berwick-Cranbourne Road, Clyde North CHMP, unpublished report to Beveridge Williams P/L, 2012, p. 37.
[49] ibid., p. 26.
[50] ibid., p. 65.
[51] Murphy, A. & Rymer, T., Residential Subdivision 121 Grices Road, Clyde North CHMP, unpublished report prepared for Moremac Property Group Pty Ltd, 2011, p.1.
[52] ibid., p. 44.
[53] ibid., p.56
[54] Murphy, A. & Rymer, T., Hunt Club Residential Housing Estate 202S Cameron Street, Cranbourne East CHMP, unpublished report prepared for Hunt Club Pty Ltd, 2009, p.30.
[55] ibid., pp. 42-44.
[56] ibid., p. 54

5.7.8 Murphy & Dugay-Grist 2009 (10531)

A CHMP was prepared for a residential estate in Cranbourne North, approximately 1.3km north-west of the study area. Investigations as part of this CHMP identified nine sub-surface Aboriginal cultural heritage places, all of which were located on the archaeologically sensitive Cranbourne Sands landform[57] . Aboriginal places identified comprise:

- VAHR 7921-0986, a low density artefact scatter comprising four silcrete artefacts.
- VAHR 7921-0987, a low density artefact scatter comprising 30 stone artefacts, manufactured from crystal quartz, quartz, quartzite and silcrete. Artefact types identified include flakes, angular fragments and tools such as backed blades[58] .
- VAHR 7921-0988, a low density artefact scatter comprising 48 stone artefacts manufactured from quartz, quartzite, silcrete and basalt.
- VAHR 7921-0989, a low density artefact scatter comprising 44 stone artefacts manufactured from quartz, crystal quartz, quartzite, silcrete and basalt[59] .
- VAHR 7921-0990, a low density artefact scatter comprising 5 artefacts manufactured from quartz, quartzite and silcrete.
- VAHR 7921-0991 and 7921-0992, both comprising isolated basalt artefacts[60] .
- VAHR 7921-0993, a low density artefact scatter comprising 15 silcrete and quartz stone artefacts.
- VAHR 7921-0994, a low density artefact scatter comprising 27 artefacts manufactured from silcrete and quartz, which includes some backed artefacts[61].

Analysis undertaken on the material recovered from these Aboriginal places identified an upper (0-60cm) and lower (70-110cm) phase of artefact deposition across the Cranbourne Sands landform. As the average artefact density for each place was less than 1/m2, each place was interpreted as a background scatter[62], and significance assessments were assigned as either low or very low[63]. Management recommendations comprised the avoidance of harm to two places (VAHR 7921-0986, 7921-0989), and the salvage of two places with potential for further research (VAHR 7921-0987, 7921-0988). The remaining Aboriginal places (VAHR 7921-0990, 7921-0991, 7921-0992, 7921-0993, 7921-0994) were considered to have been sufficiently defined during testing and no further excavation was required[64].

5.7.9 Schlitz & Matic 2009 (10813)

Head & Humphreys Pty Ltd commissioned Biosis Research to undertake a voluntary CHMP for construction of a residential development at 115 Cardinia Road, Pakenham. The desktop assessment found that one previously recorded site, an artefact scatter, was present within the activity area (VAHR 7921-0571). No new Aboriginal places were located during the standard assessment,

[57] Murphy, A. & Dugay-Grist, L., Crown Allotment 29, Thompsons Road, Cranbourne North Residential Subdivision CHMP, unpublished report prepared for Greenridge Properties Pty Ltd 2009, p.9.
[58] ibid., p. 42
[59] ibid., p. 43
[60] ibid., p. 44
[61] ibid., p. 45
[62] ibid., pp. 46-7
[63] ibid., p. 65
[64] ibid., p. 67-71

however a series of low rises within the activity area was considered sensitive to contain subsurface deposits of Aboriginal archaeological evidence. Two previously unrecorded Aboriginal places (VAHR 7921-0780, VAHR 7921-0781) were located during the subsurface testing undertaken as part of the complex assessment[65] . All artefacts were located at a depth of 25cm – 75cm on the low rise landforms, with the densest concentrations encountered between 35cm – 55cm[66]. VAHR 7921-0780 and VAHR 7921-0781 were ascribed a high and moderate level of scientific significance respectively[67].

5.7.10 Kennedy 2012 (11858)

Melbourne Waterway – Waterways Alliance commissioned AHMS Pty Ltd to prepare a voluntary CHMP for creek maintenance works along a 2.5km stretch of Cardinia Creek[68] . One isolated artefact (VAHR 7921-1380) was identified during subsurface excavation undertaken as part of the complex assessment. VAHR 7921-1380 was assessed as having very low scientific significance as it represents an isolated discard event with no archaeological research potential located within a disturbed context which also contained modern debris including glass[69].

5.7.11 Murphy & Rymer 2012 (11697)

Sam Mondous commissioned Archaeology At Tardis Pty Ltd to prepare a mandatory CHMP for the residential subdivision of a 59.45ha parcel of land situated at 1100 Pound Road, Clyde North[70].

During a survey of the activity area one previously unrecorded Aboriginal place was located (VAHR 7921-1358). The survey also identified the low rises in the North of the activity area as archaeologically sensitive landforms[71]. VAHR 7921-1358 comprised a scatter 15 stone artefacts situated on the crest of a rise which had been substantially disturbed by excavation of a silage pit. The site was assessed as having extremely low scientific significance[72]. No artefacts were located during the complex assessment.

5.7.12 Vines et al 2008 (10130)

Biosis Research Pty Ltd, on behalf of VicUrban completed a CHMP for a Cardinia Road Precinct. Three previously unrecorded Aboriginal places were identified during the standard assessment (VAHR 7921-0603, VAHR 7921-0604, VAHR 7921-0876). A further seven Aboriginal places were identified during subsurface testing (VAHR 7921-0632, VAHR 7921-0633, VAHR 7921-0634, VAHR 7921-0635, VAHR 7921-0638) and one artefact scatter (VAHR 7921-0629). The complex assessment found that Aboriginal archaeological evidence was most likely to be located on rises and ridgelines. The Aboriginal places identified during the archaeological assessment were assessed as being of low

[65] Schlitz, M., & Matic, A., Lakeside Extension Structure Plan (Stage 2), Pakenham, Victoria, unpublished report prepared for Delfin Lend Lease Pty Ltd, 2009, pp. 48-49.
[66] ibid., p. 62.
[67] ibid., p. 60.
[68] Kennedy, S., Cardinia Creek Maintenance: Old Princes Hwy, Berwick to Princes Hwy, Beaconsfield CHMP, unpublished report prepared for Melbourne Water – Waterways Alliance, 2012, p.III.
[69] ibid., p. 69.
[70] Murphy, A. & Rymer T., 1100 Pound Road, Clyde North Subdivision of Land CHMP, unpublished report prepared for Sam Mondous, 2012, pp. iii-iv.
[71] ibid., p. 45.
[72] Ibid., p. 57.

scientific significance due to the level of disturbance and the very low density of the deposits, with the exception of VAHR 7921-0629 which was ascribed a low-moderate level of scientific significance[73].

5.7.13 Murphy & Thomson 2008 (10125)

Devine Ltd sponsored a voluntary CHMP for 150 Berwick-Cranbourne Road, Cranbourne, approximately 1.6km west of the study area. Ground surface survey, undertaken as part of the Standard Assessment, and controlled excavations involving test pit, probes and mechanical transects, undertaken as part of the Complex Assessment did not identify the presence of Aboriginal cultural heritage or any culturally sensitive landforms within the study area. No further specific management other than Contingency plans for unexpected Aboriginal cultural heritage was recommended[74].

5.7.14 Fiddian & Lawler 2007 (10084)

Stockland Development commissioned a CHMP for a development in Cranbourne, approximately 2km north-west of the study area. Survey of the proposed development area identified archaeologically sensitive areas comprising undisturbed groves of trees, and a rise of Cranbourne Sands[75]. Sub-surface testing identified four Aboriginal cultural heritage places (VAHR 7921-0689, 7921-0690, 7921-0691, 7921-0692), all associated with the sandy rise landform[76].

VAHR 7921-0689 and 7921-0690 comprise isolated artefacts recovered from the top 5cm of ploughed soil. One of these artefacts (VAHR 7921-0689) was located at the base of the sandy rise, and was presumed to have washed downslope. Due to the poor condition and low density of these sites, they were assessed as having low scientific significance[77].

VAHR 7921-0691 comprises 22 artefacts manufactured from stone and modern glass. These artefacts were recovered from depths of 0.35m, and due to the density and undisturbed context of the sandy rise, were assessed as having moderate significance. VAHR 7921-0692 comprises 31 artefacts, including 18 yellow silcrete artefacts located within a 1m2 area, interpreted as deriving from a single knapping event. This place was therefore assigned a high significance rating. As harm could not be avoided for any of the cultural heritage identified, salvage was recommended for all four Aboriginal places[78].

5.7.15 Walker 2012 (12380)

The City of Casey commissioned Andrew Long & Associates to prepare a mandatory CHMP for construction of a sports oval, pavilion, cricket practice nets, a car park and associated recreational facilities[79]. As the ground surface visibility was <1%, the CHMP progressed to Complex assessment. A total of 19 shovel test pits were excavated during the subsurface testing component of the CHMP.

[73] Vines, G., et al., VicUrban's Residential Subdivision Project at Officer, Victoria, Cardinia Road Precinct CHMP, unpublished report prepared for VicUrban, 2008, p. ix.
[74] Murphy, A., & Thomson, S., 150 Berwick-Cranbourne Road, Cranbourne CHMP, unpublished report prepared for Devine Ltd, 2008, pp. 1-25.
[75] Fiddian, J. & Lawler, M., Proposed development at 560 Narre Warren – Cranbourne Road, Cranbourne Victoria: CHMP, unpublished report prepared for Stockland Development Pty Ltd, 2007, p. 14.
[76] ibid., 62
[77] ibid., 54.
[78] Ibid., 39-40.
[79] Walker, J., Hunt Club Development, Cranbourne CHMP, unpublished report prepared for City of Casey, 2012, p. v.

No Aboriginal cultural heritage was identified within the activity area, and no areas of archaeological sensitivity were identified[80].

5.7.16 Day 2010 (11051)

A CHMP was prepared for a residential subdivision within a PSP, north-west of the study area. Desktop, Standard and Complex Assessments were undertaken as part of these investigations, which divided the PSP area into four land units: Cranbourne Sands, Gentle/flat terrain, Gentle hill and slopes, and Alluvial terrain[81]. During the Standard Assessment, the conservation area for a previously recorded site was identified (VAHR 7921-0989), and recommendations made for this conservation to be ongoing[82].

During Complex Assessment, one sub-surface Aboriginal place was located within the Gentle hill and slopes land unit (VAHR 7921-1158)[83]. This place comprised 2 quartz artefacts recovered from a depth of 47cm on a gentle hill slope. This place was assigned a low significance rating based on a scoring system of contents, condition and representativeness. The Complex Assessment also revealed that the Cranbourne Sands landform was not as extensive as suggested by published Geological mapping. Day therefore suggested that the low density of cultural heritage material encountered as part of the investigations was due to the preferred use of the more prominent Cranbourne Sand landforms to the west by past Aboriginal groups[84].

5.7.17 Murphy & Rymer 2009 (10865)

Murphy & Rymer prepared a CHMP for a residential subdivision, approximately west of the current study area. The investigated area comprised a ridge of Cranbourne Sand and the swampy low-lying plains[85] . An isolated silcrete flake (VAHR 7921-0664) was recorded on the surface during the Standard Assessment[86]. The Complex Assessment expanded VAHR 7921-0664 to incorporate 54 sub-surface stone artefacts, as well as locating an additional sub-surface Aboriginal cultural heritage place (VAHR 7921-1119)[87].

VAHR 7921-0664 comprised artefacts manufactured from silcrete, crystal quartz and basalt, recovered from an area spanning 50m by 20m, from depths up to 95cm. The average low artefact density was used to evaluate the place as having low scientific significance. As harm could not be avoided at this location, a salvage program was recommended to further investigate this place[88].

VAHR 7921-1119 comprised an isolated silcrete scraper recovered from a shovel test probe from a depth of 30cm. This artefact was assigned a low scientific significance, and was considered to be isolated, therefore no further salvage was required[89].

[80] ibid., p. 55.
[81] Day, C., PSP No. 16 – Cranbourne North (Stage 2) – Cnr Thompsons & Clyde Road CHMP, unpublished report prepared for Growth Areas Authority, 2010, p. 45
[82] *ibid., p. 32*
[83] ibid., p. 24
[84] ibid., p. 31
[85] Murphy, A. & Rymer, T., Hunt Club Estate Residential Subdivision, Mayfield Precinct, Mayfield Road, Cranbourne East, unpublished report prepared for Hunt Club Pty Ltd, 2009, p. 42.
[86] ibid., p. 39.
[87] ibid., pp. 51-54.
[88] ibid., pp. 66-67.
[89] ibid., pp. 66-67.

5.7.18 Adams & Stevens 2008 (10222)

A CHMP was completed for a residential subdivision in Cranbourne, North-west of the study area. A program of survey, shovel testing and mechanical excavation was employed across the low ridge line landform that made up the study area. No Cranbourne Sand landforms were identified[90]. One silcrete artefact (VAHR 7922-0925) was located during mechanical testing, as well as a possible quartz manuport[91]. Due to the amount of testing conducted and the low significance assigned to the isolated artefact, no further excavation was recommended [92]

5.7.19 Murphy & Rymer 2008 (10045)

A voluntary CHMP was prepared for a 6km sewerage pipeline in Officer South, approximately 3km north of the study area. The Desktop Assessment identified the pipeline easement as archaeologically sensitive due to its proximity to Cardinia Creek and its tributaries[93]. The Standard Assessment relocated re-deposited material from the monitoring of two previously identified sites (VAHR 7921-0737 & 7921-0801), which were collected[94]. The Complex Assessment identified two subsurface Aboriginal places (VAHR 7921-0866 & 7921-0867) and expanded one previously recorded Aboriginal place (VAHR 7921-0739).

The assemblage recovered from VAHR 7921-0739 comprises 156 artefacts manufactured from silcrete, quartz, crystal quartz and quartzite, with a range of artefact types identified, including cores, tools and debitage. The density of this site, combined with the range of tools led to the place being ascribed moderate scientific significance. Conservation of this site and other sensitive areas along Cardinia Creek was recommended.[95]

The low density of artefacts recovered from Aboriginal places VAHR 7921-0866 and 7921-0867 led to these sites being assigned low scientific significance ratings. Salvage was recommended for both these Aboriginal places[96].

5.7.20 Murphy & Morris 2012 (10656)

Cardinia Shire Council engaged Archaeology At Tardis Pty Ltd to prepare a mandatory CHMP for the Cardinia Road Employment Precinct (CREP), south of the Pakenham Bypass in Pakenham. From the results of the survey of the activity area, it was considered that portions of the activity area had moderate sensitivity for low density deposits of Aboriginal cultural heritage. These include land within 200m of Gum Scrub and Toomuc Creeks and low lying, gently undulating former floodplains greater than 200m from present or former watercourses[97].

The survey identified one previously unrecorded Aboriginal archaeological place (VAHR 7932-1205) which contained 2 silcrete artefacts located on the exposed banks of a dam. The site was considered to have extremely low scientific significance. Subsurface excavation of 62 test holes located only 1 isolated silcrete artefact (VAHR 7932-1205) within a low lying former floodplain bordering the Koo

[90] Adams, C. & Stevens, J., 1040 Glasscocks Road, Cranbourne North CHMP, unpublished report prepared for Collin Madden, 2008, p. 33.
[91] ibid., p. 57
[92] ibid., p. 68.
[93] Rymer, T. & Murphy, A., Sewer Rising Main, Officer South CHMP, unpublished report prepared for South East Water, 2008, p. 23.
[94] ibid., p. 32.
[95] ibid., p. 40.
[96] ibid., pp. 43-45.
[97] Murphy, A. & Morris, A., Cardinia Road Employment Precinct Structure Plan, Officer South CHMP, unpublished report prepared for Cardinia Shire Council, 2012, p. 48.

Wee Rup Swamp[98]. It was considered that the site had extremely low scientific significance based on its low density and levels of disturbance. From the results of the complex assessment it was determined that the activity area has a low potential to contain low density (<30/m2) stone artefact scatters[99].

5.7.21 Murphy & Thomson 2009 (10574)

Murphy & Thomson completed a CHMP for a proposed school, sponsored by the Department of Education and Early Childhood Education[100]. The study area for this investigation is located approximately 3km west of the study area. Extremely poor visibility was encountered during the Standard Assessment, and one Aboriginal cultural heritage place (VAHR 7921-0975) was identified during the Complex Assessment[101]. VAHR 7921-0975 comprises 63 artefacts recovered from within the ploughed unit on a slope, between depths of 20 and 33cm. The Aboriginal place was assessed as being of low scientific significance due to its presence within a disturbed soil profile and the low density of artefacts spread over an area 35m x 15m[102]. VAHR 7921-0975 was considered to have been sufficiently salvaged during the Complex Assessment and no further excavation was required[103].

5.7.22 Clarke, D. et al 2009 (10009)

A CHMP was prepared for a residential housing subdivision in Clyde North[104], west of the current study area and comprising Desktop, Standard and Complex Assessments. The Desktop Assessment identified the presence of three Aboriginal places (VAHR 7921-0884, 7921-0885, 7921-0887) within the activity area which were relocated during archaeological survey undertaken during the Standard Assessment. Sub-surface testing undertaken during the Complex Assessment identified further Aboriginal cultural heritage associated with these sites and as a result the extent of each site was expanded. An additional three new Aboriginal places (VAHR 7921-1027, 7921-1028, 7921-1058) were also identified during sub-surface testing[105]. Each of the above Aboriginal places comprised stone artefact scatters located on elevated landforms such as small rises and hills.

Raw materials identified within the assemblages included silcrete, quartz, crystal quartz, quartzite and basalt[106]. Salvage was recommended for VAHR 7921-0885, 7921-0887, 7921-1027, 7921-1028 and 7921-1058, which were all assessed as having moderate significance. Two Aboriginal places (VAHR 7921-884 and 7921-1058) were assessed as having low scientific significance. These places had been disturbed through pipeline and dam construction, were not considered in situ, and therefore salvage of these sites was not recommended.[107]

[98] ibid., p. 48.
[99] ibid., pp. 67-71.
[100] Murphy, A. & Thomson, S., Prep to Year 12 School Development 34s Broad Oak Drive, Cranbourne East CHMP, unpublished report prepared for the Department of Education & Early Childhood Development, 2009, p. 1.
[101] ibid., p. 28.
[102] ibid., p. 32.
[103] ibid., p. 35
[104] Clarke, D., A. Edwards, Kirkwood, L. & Nicolson, O. Proposed Housing Subdivision, 305 Berwick-Cranbourne Road, Clyde North, Victoria CHMP, unpublished report prepared for Stockland Pty Ltd, 2009, p. 9
[105] ibid., 68.
[106] ibid., 68-74.
[107] ibid., 88

5.7.23 Light 2009 (10569)

Peet Cranbourne Central Syndicate Ltd sponsored a voluntary CHMP for 50 Berwick-Cranbourne Road, Cranbourne East[108]. During ground surface survey, undertaken as part of the Standard Assessment, four stone artefacts were identified. Two of the artefacts were considered to be isolated occurrences comprising a ground axe head (VAHR 7921-0998) and a silcrete core (VAHR 7921-1005). The other two artefacts were found eroding out of sandy rabbit burrows and thought to be representative of a greater sub-surface deposit, therefore further investigation in the form of sub-surface testing across the sandy rises landform present with the study area was considered warranted[109]. Twenty-three transects of 167 shovel test pits were excavated across nine sandy rises. As a result of the excavations ten Aboriginal places were identified (VAHR 7921-0998 to 7921-1007). Two Aboriginal places (VAHR 7921-1007 & 7921-1002) demonstrated high concentrations of stone artefacts (n=18-22)[110], therefore in order to gain additional information on each site further 1 x 1m test pits were excavated within each of the site's boundaries.

5.7.24 Murphy & Rymer 2009 (12115)

Archaeology At Tardis Pty Ltd was engaged by Pound Road Clyde Pty Ltd to prepare a voluntary CHMP for a residential subdivision at 1505-1525 Pound Road, Clyde North. From the survey, it was considered that the silty-sandy soil profile of the activity area was sensitive for subsurface deposits of Aboriginal cultural heritage.

Two previously unrecorded Aboriginal places were identified during subsurface excavation undertaken as part of a Complex assessment for the activity area. VAHR 7921-1420 comprised one silcrete complete flake located on the upper slope of a gentle low rise. VAHR 7921-1426 comprised one quartz complete flake located on the lower slope of a gentle low rise. The scientific significance of both sites was considered to be extremely low. Harm to VAHR 7921-1420 and VAHR 7921-1426 could not be avoided or minimised during development.

5.7.25 Schell et al 2009 (10091) & 2012 (11884)

A CHMP was prepared for a residential subdivision immediately west of the study area[111]. Two previously recorded places (VAHR 7921-0881 & 7821-0883), comprising a stone artefact scatter and scarred tree were reinvestigated, and one new place (VAHR 7921-1008), also comprising a stone artefact scatter was identified as part of the Standard and Complex Assessments[112]. VAHR 7921-0881 comprised 75 stone artefacts manufactured from quartz, silcrete, basalt and sandstone, recovered from an aeolian sand unit and VAHR 7921-0883 was a scarred tree in poor condition. VAHR 7921-1008 consisted of 36 stone artefacts manufactured from silcrete, quartz and basalt, also associated with an aeolian sand unit. Both stone artefact scatters were assessed as having moderate scientific significance. Conservation was recommended where possible, but where harm could not be prevented, salvage excavation was suggested[113].

[108] Light, A., Berwick-Cranbourne Road, Cranbourne East (Residential Subdivision) CHMP, unpublished report prepared for Peet Cranbourne Central Syndicate Ltd, 2009, p. 2.
[109] ibid., pp. 36-37.
[110] ibid., pp. 59-65.
[111] Schell, P., Light, A., Barker, A., Reid, C., Bowler, J., 415 Clyde-Five Ways Road, Clyde, CHMP, unpublished report prepared for Villawood Properties P/L, 2009, p. 5.
[112] ibid., p. 7
[113] ibid., p. 10.

CHMP 11884 was subsequently prepared by Schell in 2012 to allow for amendments in the proposed development road and lot layout[114].

5.7.26 Light et al. 2009 (10568)

Peet Gippsland Highway Pty Ltd sponsored a CHMP for a proposed residential estate, road and recreational reserve in Cranbourne East[115]. No Aboriginal cultural heritage was located during the Standard Assessment; however, 8 Aboriginal places were identified during the Complex Assessment. All sub-surface places were identified within sand deposits, with the majority of the artefacts being located between depths of 50-60cm, suggesting ages of less than 12,000 years ago[116]. Aboriginal places identified during the Complex Assessment comprise:

- VAHR 7921-1041: 103 stone artefacts manufactured from silcrete, quartz, fine-grained siliceous and hornfels recovered from a large sandy rise. The high artefact density and condition of the place led to the assessment of the place as having moderate scientific significance[117].
- VAHR 7921-1042: 9 stone artefacts manufactured from silcrete, quartz, fine-grained siliceous and quartzite recovered from a small sandy rise.
- VAHR 7921-1043[118]: artefact scatter comprising 3 silcrete artefacts recovered from the base of a sand dune.
- VAHR 7921-1044, 7921-1045[119]: low density stone artefact scatters comprising 17 and 12 stone artefacts respectively, including raw materials such as silcrete quartz, quartzite, crystal quartz and chert, recovered from a dune slope.
- VAHR 7921-1046[120]: artefact scatter comprising 8 stone artefacts manufactured from silcrete, quartz, crystal quartz and fine-grained siliceous, recovered from the crest of a sand dune.
- VAHR 7921-1047[121], 7921-1048[122]: low density artefact scatters comprising 4 and 7 artefacts respectively, manufactured from silcrete, quartz and quartzite, which was recovered from a low sand sheet.

With the exception of VAHR 7921-1041, all other Aboriginal places were assessed as being of low scientific significance, due to low density and representativeness[123] . Management recommendations included partial conservation and salvage for VAHR 7921-1041 and 7921-1045, whereas the remaining Aboriginal places were considered to have been sufficiently defined during the Complex Assessment and, as such, no further management actions were required[124].

[114] Schell, P., Pasadena Residential Subdivision, 415 Clyde-Five Ways Road, Clyde, unpublished report prepared for Cranbourne Road, Holdings P/L, 2012.
[115] Light, A., Lang, J.D., Bowler, J. & Rood, S., 1555 Sth Gippsland Hwy, 5 Adrian St, 6 Adrian St & 7 Nelson St (Residential Subdivision) Cranbourne East CHMP, 2009, pp. 11-13.
[116] ibid., p. 54
[117] ibid., p. 58
[118] ibid., p. 59
[119] ibid., pp. 60-61
[120] ibid., p. 61
[121] ibid., p. 62
[122] ibid., p. 63
[123] ibid., p. 64.
[124] ibid., p. 71.

5.7.27 Stevens & Vines 2011 (11091)

A CHMP was prepared for the residential and mixed-use development of a PSP area in Officer, west of the current study area. The investigated area comprised two land units: gentle rises on the open plain, and swamp floodplain[125]. Five Aboriginal places (Surface: VAHR 7921-590; Sub-surface: 7921-0630, 7921-0631, 7921-0637) were previously recorded within the PSP[126], and a further three new sub-surface places (VAHR 7921-1225, 7921-1226, 7921-1227)[127] were all located on the elevated open plain landform[128] . Raw materials recovered were predominantly silcrete, with low numbers of quartz, quartzite and chert also recorded. All sub-surface artefacts were observed to have derived from the interface between the A1 and A2 soil horizons, at approximately 25-40cm depth[129] . Significance was assessed at a local and regional level, and all places were assessed as having low scientific significance due to the low density of artefacts with limited research potential[130].

Management recommendations comprised the salvage of VAHR 7921-1226 to investigate the potential for further artefacts within a minimally disturbed context[131]. All other Aboriginal places were considered to have been sufficiently salvaged during the Complex Assessment testing, and no further management actions were required.

5.7.28 Debney et al 2009 (10620)

The Department of Sustainability and Environment (DSE) engaged Biosis Research Pty Ltd to prepare a CHMP for the construction of services ancillary to the Victorian desalination plant, specifically for construction of a transfer pipeline and installation of underground power supply. The activity area covered an 83km x 400m corridor extending from Wonthaggi to Cranbourne[132].

The major landform units within the activity area comprise swamp deposits, alluvial plains, sandy rises, relict sand sheets and dunes, low hills and deeply dissected ranges[133]. During the standard and complex assessments sites were identified across all landforms. A total of 8 previously unrecorded Aboriginal places were located during the Standard assessment, including 3 artefact scatters and 5 isolated artefacts. Aboriginal places identified during the survey were predominantly located in association with sandy rises adjacent to watercourses and low-lying former sandy marshland. During the subsurface investigation which formed part of the complex assessment, a total of 30 previously unrecorded Aboriginal places were located (18 artefact scatters, 12 isolated artefacts). During the complex assessment, higher density artefact deposits were predominantly located on low rises within 100m of permanent watercourses. Lower density surface and subsurface sites were encountered on the flat floodplain environment and in the deeply dissected and heavily wooded hills landforms[134].

[125] Stevens, J. & Vines, G., VicUrban@Officer Mixed Use Development, Officer CHMP, unpublished report prepared for VicUrban, 2011, p. 79.
[126] ibid., p. 74.
[127] ibid., p. 112-118.
[128] ibid., p. 136.
[129] ibid., p. 120
[130] ibid., p. 147
[131] ibid., p. 151
[132] Debney, et. al. op. cit., p. ii.
[133] ibid., p. vii.
[134] ibid., p. 207

5.7.29 Murphy & Rymer 2011 (10857)

Archaeology At Tardis were engaged by Australand Holdings Ltd, to prepare a mandatory CHMP for a residential and retail subdivision at 1095 and 181 Grices Road, Clyde North, an area of 77ha[135].

No Aboriginal cultural heritage was located during the standard assessment. Two landforms, an alluvial floodplain and a gentle rise were identified. It was considered that the low rise located at 181 Grices Road had the highest potential for subsurface deposits of Aboriginal Archaeological evidence[136]. This inference was supported with subsequent subsurface testing finding artefacts on the slope of the gentle rise and determining that Aboriginal cultural heritage was unlikely to be present on the alluvial floodplain[137].

5.7.30 Lawler et al 2009 (10086)

Biosis Research Pty Ltd was engaged by the Department of Sustainability and Environment (DSE) to undertake a mandatory CHMP for the construction of a seawater desalination plant on the Bass Coast; 3km west of Wonthaggi (ii). The activity area comprises 264ha of farm and public land.

Three previously unrecorded Aboriginal places were located during the standard assessment. (VAHR 8020 0219, VAHR 8020-0220, VAHR 8020-0223). A large portion of the activity area was also determined to be sensitive for subsurface deposits of Aboriginal archaeological evidence, including terraced sandy rises, former heath mounds and sand and clay rises above the coast paddocks. The complex assessment identified a number of subsurface deposits. This data was used to amalgamate a number of previously recorded sites into 7 VAHR site recordings, resulting in relatively low density deposits recorded over a large area (e.g. VAHR 8020-0236 contains a total of 87 artefacts and covers an area 450m east-west x 340m north-south . These sites were rated moderate – high in terms of archaeological significance.

Radiocarbon age determinations revealed the archaeological deposits ranged from 200 years BP to 1750 years BP.

5.7.31 Murphy & Rymer 2012 (10636)

Archaeology at Tardis Pty Ltd was engaged by Moremac Property Group Pty Ltd to complete a mandatory CHMP for a residential subdivision for a 21ha parcel of land at 121 Grices Road, Clyde North[138].

The desktop and standard assessments considered it unlikely that Aboriginal archaeological evidence would be located within the activity area. Complex assessment was undertaken as Aboriginal Affairs Victoria considered that the alluvial plain and floodplain environment of the activity area had potential for Aboriginal cultural heritage. No Aboriginal cultural heritage was located within the activity area, it was considered that floodplain and alluvial plain environment of the activity area was subject to frequent inundation and unsuitable for habitation[139].

[135] Murphy, A., & Rymer, T., Residential and Retail Subdivision 1095 Pound Road and 181 Grices Road, Clyde North CHMP, unpublished report prepared for Australand Holdings Limited, 2011a p. iii
[136] ibid., 49.
[137] ibid., 58
[138] Murphy & Rymer, 2011b, op cit, p. iii.
[139] Murphy, A., & Rymer, T., Subdivision of Land 335 Grices Road, Clyde North, unpublished report prepared for Moremac Property Group Pty Ltd, 2011, p. iii., p. iv.

5.7.32 Murphy & Rymer 2012 (12096)

Archaeology At Tardis Pty Ltd was commissioned by Moremac Property Group Pty Ltd to prepare a mandatory CHMP for a residential subdivision of a 31ha parcel of land at 335 Grices Road, Clyde North. From the results of the desktop and standard assessments, it was determined that a low gentle rise, land within 50m of the dam and land within 50m of the eastern boundary of the activity area closest to Cardinia Creek had the most potential for subsurface deposits of Aboriginal archaeological evidence[140]. Three Aboriginal places were recorded during the course of the assessment (VAHR 7921-1416, VAHR 7921-1417 & VAHR 7921-1418). VAHR 7921-1416 comprised a low density scatter of 28 stone artefacts with a small area of concentration determined to have low-moderate archaeological significance. VAHR 7921-1417 was an isolated stone artefact ascribed an extremely low scientific significance rating. VAHR 7921-1418 comprised 2 isolated artefacts assessed as extremely low scientific significance.

5.7.33 Ford et al 2009 (10881)

A CHMP was prepared for the Victorian Desalination Project – Cranbourne Extension of the power supply alignment, Victoria[141]. The activity area comprised a 130m wide, 8km long stretch of land between Pound Road and Cranbourne[142].

The standard assessment identified a number of areas of archaeological sensitivity and one previously unrecorded Aboriginal place, an artefact scatter (VAHR 7921-1133)[143]. Subsurface testing conducted as part of the complex assessment located 4 previously unrecorded Aboriginal places (VAHR 7921-1132, VAHR 7921-1131, VAHR 7921-1129, VAHR 7921-1130). Artefact scatters VAHR 7921-1133 and VAHR 7921-1132 were assessed as having a very high level of scientific significance, artefact scatter VAHR 7921-1129 was determined to have a high level of scientific significance due to the variety of artefact types present in the assemblage(s). The remaining sites were all considered to have a very low level of scientific significance primarily as a result of disturbance and low density[144].

5.7.34 Murphy & Kennedy 2010 (11380)

Hunt Club Pty Ltd sponsored a CHMP for a residential and retail development in Cranbourne East[145], approximately 2.3km north-west of the study area. The investigated area was highly disturbed, containing a water drain and imported fill soils[146]. Complex Assessment demonstrated that imported fill overlay sterile clay across the area. No Aboriginal places were located, and the potential for cultural heritage within the study area was considered unlikely[147]

[140] ibid., p. 65.
[141] Ford, A., Hutchinson, M., Burch, J., & Freedman, D., Victorian Desalination Project – Cranbourne Extension of the Power Suppled Alignment, Cranbourne, Victoria CHMP, unpublished report prepared for Department of Sustainability & Environment, 2009, p. 9
[142] ibid., p. I
[143] ibid., pp. 47-8
[144] ibid., p. 119
[145] Murphy, A., & Kennedy, S., Subdivision & Residential/Retail Development, Hunt Club Estate, No 41 Gatehouse Parade Cranbourne East CHMP, unpublished report prepared for Hunt Club Pty Ltd, 2010
[146] ibid., p. 46-8
[147] ibid., p. 57

5.7.35 Long et al 2009 (10008)

Blue Hills Residences sponsored a CHMP for a proposed retirement village, golf course and shopping centre in Cranbourne East[148], immediately north of the study area. Desktop, Standard and Complex assessments were undertaken as part of the investigation. Three Aboriginal places (VAHR 7921-0804, 7921-0805, 7921-0806) were discovered during an initial phase of sub-surface testing that consisted of auger and mechanical excavation. Stone artefacts were recovered from sandy deposits from depths ranging between 35 and 70cm.

VAHR 7921-0804 and 7921-0805 were further investigated through hand excavation, and described as low density stone artefact scatters[149]. VAHR 7921-0806 comprised an isolated hornfels artefact and was conserved within a reserve. Silcrete was the dominant raw material recovered, followed by quartz. The low density of stone artefacts led Long et al to assess the above Aboriginal places as being of low scientific significance. However, the location of the Aboriginal places on sandy rises confirmed models for the region that stone artefacts were more likely to be found in this landform than the clay-rich flats[150].

5.7.36 Nicolson 2011 (11158)

A CHMP was commissioned to provide management recommendations for two properties that had previously been investigated by CHMPs (#s 10568 and 10569), 300m west of the study area[151] . The CHMP comprises a Desktop Assessment which discusses eighteen sites within the study areas: VAHR 7921-0998, 7921-0999, 7921-1000, 7921-1001, 7921-1002, 7921-1003, 7921-1004, 7921-1005, 7921-1006, 7921-1007, 7921-1041, 7921-1042, 7921-1043, 7921-1044, 7921-1045, 7921-1046, 7921-1047, 7921-1048. These places comprise one isolated artefact and seventeen artefact scatters ranging from low to moderate significance[152] .

Three places (VAHR 7921-1000, 7921-1001 and 7921-1041) which had originally been recommended to be conserved within open spaces and that could not have harm avoided in the long term by the local council were recommended to be impacted through salvage.

5.7.37 Gilchrist 2011 (10646)

A CHMP was sponsored by the Brookford Estate for a residential subdivision, west of the current study area. The investigation comprised Desktop, Standard and Complex Assessments, with the Complex Assessment involving a combination of auger and shovel testing. Two previously unrecorded Aboriginal places (VAHR 7921-1056 & 7921-1057) were identified by Gilchrist[153]. Both places were located on sandy rises. VAHR 7921-1056 was a stone artefact scatter comprising silcrete, quartz, quartzite and crystal quartz artefacts. Management recommendations for this place included a combination of conservation and some salvage, where harm could not be avoided. VAHR

[148] Long, A., Mathews, D., & Light, A., Blue Hills Rise, 220-280 Berwick-Cranbourne Road, Cranbourne CHMP, unpublished report prepared for Blue Hills Residences Pty Ltd, 2009, p. 3.
[149] ibid., p. 43-6.
[150] ibid., p. 4.
[151] Nicolson, O., Residential Subdivision 1555 South Gippsland Highway and 50 Berwick Cranbourne Road, Cranbourne East, Victoria: CHMP, unpublished report prepared for Peet Cranbourne Central Syndicate Ltd and Peet Gippsland Highway Pty Ltd 2011, p.1
[152] ibid., pp. 2-5
[153] Gilchrist, A., op. cit. p. 36

7921-1057 comprised an isolated surface artefact with no sub-surface component. It was therefore recommended that this artefact be collected and relocated[154].

5.7.38 Patton 2011 (11684)

Biosis Research Pty Ltd was commissioned by Melbourne Water to prepare a mandatory CHMP for installation of a storm water quality treatment system, pipe, culverts and other associated works at Mary Street, Officer. The activity area is situated on low-lying waterlogged swampland[155]. No areas of archaeological sensitivity were located during the standard assessment. No Aboriginal places were located during the standard and complex assessments[156].

5.7.39 Murphy & Rymer 2010 (11042)

Devine Communities engaged Archaeology At Tardis Pty Ltd to prepare a mandatory CHMP for a utility installation and road construction between Henry and Cardinia Roads, Pakenham[157]. The CHMP comprised a desktop and complex assessment, a standard assessment had been previously conduct by Jenkins & Paterson 2009[158]. One Aboriginal place (VAHR 7921-1169), an isolated surface artefact had been previously recorded within the activity area. No further Aboriginal places were located during subsurface investigation. The complex assessment also revealed that VAHR 7921-1169 did not have a subsurface component[159].

5.7.40 Green 2011 (11833)

Andrew Long & Associates, on behalf of A & J Johnston Excavations Pty Ltd, completed a CHMP for a residential subdivision at 240 Rix Road, Officer. The desktop and standard assessments determined that the area was of low-moderate archaeological sensitivity based on the presence of Quaternary alluvium[160]. No Aboriginal places were located during the course of the investigations conducted as part of this CHMP. It was considered unlikely that Aboriginal places would be present due to the degree of past agricultural and residential disturbances[161].

5.7.41 Toscano et al 2011 (11555)

TerraCulture Pty Ltd was commissioned by Devine Ltd to prepare a mandatory CHMP for a residential subdivision of a 52.9ha section of land in Pakenham. The desktop and standard assessment identified the following;

- Areas up to 100m from watercourses = high potential
- Toomuc Creek Floodplain = moderate potential
- Low rises / levee banks = high potential

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[154] ibid., p. 39

[155] Patton, K., 15 & 33 Mary Street Officer, Victoria: CHMP, unpublished report prepared for Melbourne Water, 2011, p. 46.

[156] ibid., p. 62

[157] Murphy, A., & Rymer, T., Edenbrook Residential Estate Ancillary Works (utilities, road, bridge and creek works and access track diversion) Henry Road to Cardinia Road, Pakenham CHMP, 2010, p. I.

[158] ibid., p. 33

[159] ibid., p. 51

[160] ibid., p. 21

[161] Green, M., 240 Rix Road, Officer Residential Subdivision CHMP, unpublished report prepared for A & J Excavations Pty Ltd, 2011, p. 61

- Disturbed areas = Very low potential for intact archaeological deposits.

A total of 75 test trenches (1m x 1m) and 69 test pits (40cm x 40cm) were excavated along 100m transects during the complex assessment in order to test the model. Two new Aboriginal places, both low density artefact scatters (VAHR 7921-1307 & VAHR 7921-1306) were identified during subsurface excavation. Both sites were located on the low sandy rise landform within the activity area[162]. No Aboriginal places were identified on the low-lying flat landform, which was determined to have been susceptible to regular flooding and swampy conditions and therefore unsuitable for Aboriginal occupation[163].

5.7.42 Allia & Vines 2009 (10982)

VicUrban engaged Biosis Research Pty Ltd to prepare a CHMP for a fauna habitat. No Aboriginal places were identified within the activity area from a desktop assessment. No areas of potential archaeological sensitivity were identified during the standard assessment[164]. During the complex assessment, a total of three 50cm x 50cm test pits were excavated to variable depths ranging from 38cm – 68cm. A total of 18 shovel test probes (0.3m x 0.3m) were also excavated to a maximum depth of 66cm. No Aboriginal places were located during the standard or complex assessments. It was considered the low lying swamp deposits had nil potential for subsurface deposits of Aboriginal cultural heritage[165].

5.7.43 Schlitz 2008 (10065)

Biosis Research, on behalf of Delfin Lendlease P/L completed a voluntary CHMP for a Lakeside Extension Masterplan (residential and commercial development) at Pakenham Victoria[166]. From the results of the desktop and standard assessments, it was determined that the series of low elevated landforms had the greatest potential to contain subsurface deposits of Aboriginal cultural heritage within the activity area. Three previously unrecorded Aboriginal places comprising two scatters (VAHR 7922-0779, VAHR 7922-0783) and one isolated artefact (VAHR 7922-0782) were identified during the complex assessment/subsurface testing component of the CHMP. All of the artefacts were recovered from low rise landforms at a depth of 25-75cm. The bulk of the artefact assemblage was located between depths of 35-55cm[167]. VAHR 7922-0783 & VAHR 7922-0779 were assessed as having a high and moderate level of scientific significance respectively as both sites were considered to be relatively undisturbed[168]. VAHR 7921-0782 was assessed as having low scientific significance as it represents an isolated find.

5.7.44 Murphy & Owen 2010 (11147)

Tardis Enterprises Pty Ltd was commissioned by Cardinia Shire Council to prepare a voluntary CHMP for construction of a motor recreation and education park in Pakenham, Victoria. A standard assessment of the activity area revealed the landscape to be flat, featureless and devoid of any landforms with potential for subsurface deposits of Aboriginal archaeological deposits. One manually excavated 1m x 1m trench and two 50m x approx. 40cm x 40cm machine excavated trenches were

[162] Toscano, M., MacCullock, J., & Hyett, J., Edenbrook Estate (Part 2) Pakenham Residential Development CHMP, unpublished report prepared for VR Pakenham Trust, 2011, p. 41.
[163] ibid., p. 42
[164] Allia, S., & Vines, G., Gum Scrub Creek Frog Pond Officer Victoria CHMP, unpublished report prepared for VicUrban, 2009, p. 47
[165] ibid., p. 59
[166] Schlitz, op cit., p. V.
[167] ibid., p. 32
[168] ibid., p. 87

excavated during the complex assessment[169]. No Aboriginal archaeological evidence was located as a result of the standard or complex assessments[170].

5.7.45 Matthews & Long 2008 (10285)

Andrew Long + Associates were commissioned by Metricon Land Pty Ltd to prepare a mandatory CHMP for a residential subdivision at Lot 29A, Thornley Drive, Berwick. The activity area comprises a flat landscape devoid of natural drainage features or elevated landforms. One previously unrecorded Aboriginal place, an isolated silcrete flake (VAHR 7921-0918), was located within a grassy root layer (0-50mm depth) of an introduced fill deposit during the complex assessment[171]. The site was assessed as having a low level of scientific significance and was considered to have been introduced to the activity area with the fill deposit. It was considered unlikely that any further archaeological evidence would be present within the activity area[172].

5.7.46 Burrow & Kennedy 2013 (12524)

AHMS were engaged by Bruno Grossi Farm Pty Ltd to prepare a CHMP for residential subdivision of 71.7 hectares of land at 275, 285 and 289 Pattersons Road, Clyde North, as part of the Growth Areas Authority Precinct Structure Plan. Desktop and Standard assessments were undertaken as part of the investigation. No previously recorded Aboriginal places were recorded in or within 200 metres of the Activity area, and survey no new Aboriginal places were recorded as part of the study.

Desktop assessment revealed that the activity area had low potential for Aboriginal cultural heritage to be present. The activity area consisted of a flat plain with no drainage corridors or archaeologically sensitive landforms present. A review of archaeological investigations and CHMPs within the immediate area indicated that this is a landform that is unlikely to have been attractive for past habitation. The Desktop assessment also revealed that high levels of ground disturbance had occurred across the activity area from market gardening,

Survey undertaken as part of the Standard Assessment confirmed that the entire Activity Area was heavily disturbed and therefore was highly unlikely to contain any Aboriginal cultural heritage. Due to this assessment, it was not considered warranted to undertake further testing.

5.7.47 Kennedy, Rae & Crocker 2013 (12529)

Abiwood Clydevale Pty Ltd engaged AHMS to prepare a CHMP for 660 Berwick-Cranbourne Road and 30 Hardys Road, Clyde. The activity area comprised 73.3 hectares of land and formed part of the Growth Areas Authority Precinct Structure Plan. Desktop, Standard and Complex Assessments were undertaken as part of the study. One new Aboriginal Place (VAHR 7921-1468) was recorded as part of the study.

Desktop assessment showed that the activity area contained no previously recorded Aboriginal places, and predictive modelling showed varying sensitivity across the area, grading from high to disturbed. Standard assessment confirmed the disturbance, with ploughing present across the entirety of the activity area. Some landforms were identified as having potential intact deposits below the level of ploughing. No Aboriginal places were identified during survey.

[169] Murphy & Owen, op cit., p. 51
[170] ibid., p. 50
[171] Matthews, D., & Long, A., Lot 29a Thornley Driver Berwick CHMP, unpublished report prepared for Metricon Land Pty Ltd, 2008, p. 35.
[172] ibid., p. 38

Complex assessment involved the excavation of nineteen 1m² controlled trenches, along topo-sequence transects to test the range of landforms and environmental variables within the activity area. Two trenches were found to contain a total of eight stone artefacts and these were recorded as a Low Density Artefact Distribution (VAHR 7921-1468).

5.7.48 Kennedy, Sutton & Rae 2014 (12533)

A CHMP was prepared by AHMS for J & JM Schreurs and Sons for 96 hectares of land at 410 Clyde-Five Ways Road, 70 Pattersons Road and 30 Twyford Road, Clyde North. Desktop, Standard and Complex Assessments were undertaken as part of the study.

5.8 Aboriginal Ethno-history

5.8.1 Preamble

This section presents a history of Aboriginal occupation and use of the study area based on documentary evidence and early ethnographic records. This information is important in providing a context to archaeological investigations, to assist in interpreting the results of the archaeological test excavations and to aid in assessing the cultural heritage values of the area.

5.8.2 The Bun wurrung Language Group

Prior to permanent European settlement in Victoria, the study area was occupied by people of the Bun wurrung (also Bunurong, Boon wurrung and various other spellings). The Bun wurrung clan which appears to have had ties to the study area were the Mayune balug (Clark 1990:364-365).

5.8.3 Food Resources

Although traditional food gathering practices and access to resources were restricted by European occupation of the region at the time, ethno-historical sources record Aboriginal exploitation of a range of plant and animal foods during the contact period. Food resources would have been comparatively plentiful across the region in the pre-contact period. Plant foods comprised an important part of the diet of the local Bun wurrung people, having the advantage over animal resources in that they provided a resource that was 'more regular and reliable than that derived from hunting or fishing'.[173]

Of the wide variety of plant foods commonly exploited by local Indigenous peoples, the tuber of the Yam Daisy, or Murnong, was commented upon by European observers as providing a staple food resource. Thomas records the Murnong being eaten both raw (from younger plants), and after being cooked in the ashes of a fire when more mature and fibrous[174]. Tubers such as that of the Yam Daisy provided a valuable source of carbohydrate for Indigenous populations of the region in spring and early summer, supported by other common plant foods such as the ferntree (bracken) pulp and 'some parts of a thistle'[175].

Aboriginal people of Port Phillip also readily exploited the fresh and salt-water animal resources of the region. Thomas [176]noted the plentiful supply of eels in the district during the summer, describing 'sufficient numbers to support the Yarra Tribe for one month each year', which were easily caught with

[173] Presland, G. 'An Archaeological Survey of Melbourne Metropolitan Park', Victoria Archaeological Reports 15, 1983, 35.
[174] Goulding, M, Aboriginal Occupation of the Melbourne Area, District 2: a report to the Land Conservation Council, Land Conservation Council, Melbourne, 1988, p. 21.
[175] Presland op. cit., p. 35.
[176] Presland op. cit., p. 32

the aid of a spear. Fish were obtained through the use of nets and weirs, and an early (1803) account, prior to European settlement of the area, records the presence of a weir along the Maribrynong River in the vicinity of Keilor[177]. Middens present both along the coastline and lining inland rivers and streams attest to the exploitation of shellfish as an additional food resource.

Local birdlife, reptiles and mammals also provided potential food resources for the Bun wurrung, with kangaroo and possum a popular staple[178]. Gaughwin details an instance where at a gathering of Bun wurrung, and Daung wurrung tribes, part of the group travelled to the Dandenongs in order to hunt, procuring 'kangaroo, porcupine, 'native bear or sloth', wombats, oppossum and fish[179].

5.9 Review of Thomas Journals to identify local Aboriginal occupation

5.9.1 Movements and Camps

The purpose of the current section is to review selected sections of the William Thomas Journals held in the Mitchell collection at the State library of NSW that throw light on specific aspects of Aboriginal occupation and landuse in and near the study area. The primary research focused on a journey Thomas took with the Bun wurrung people in his role as Protector of Aborigines between January – May 1840. This particular journey passed through the local area, either through or very near the study area.

Thomas' journey commenced at Tuerong on 4 February 1840 and ended at Dandenong on 17 March of that year[180]. The final stages of the journey took Thomas from Ruffy's Station "Mayune" (located immediately east of Cranbourne) northeast towards Cardinia Creek past 'Mr Bates' Station (James Bathe) to O'Connor's Station (Terence O'Connor) - a distance of approximately 9km (refer to Figure 5). O'Connor's Station was located in the Northern section of the PSP 1055 study area and extended across to Cardinia Creek. O'Connor's Station appeared to be a favoured stopping place since the party was well received and work was made available to members of the group. A reasonable road also extended from the Station to Dandenong and thence to Melbourne.

[177] Presland op. cit., p. 33
[178] Presland op. cit., p. 34.
[179] Goulding op. cit., 19. See also Presland op. cit., p. 34
[180] Thomas, W. ML, Private Papers, 16 volumes and 8 boxes of papers, journals, letterbooks, reports etc. Uncatalogued manuscripts, Set 214: items 1-28, Mitchell Library, Sydney, n.d.

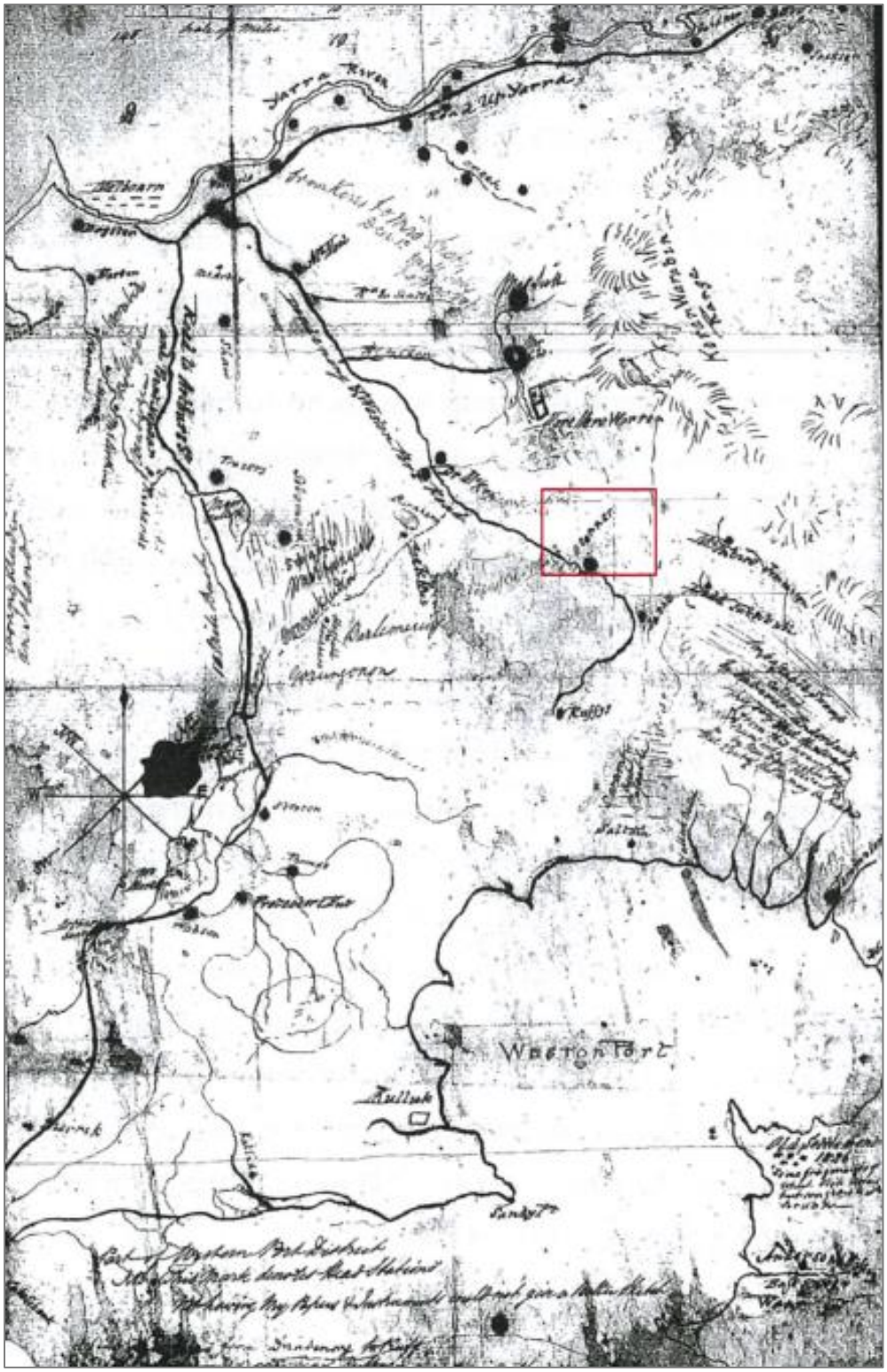

Figure 5 Undated plan (William Thomas) showing the road from Ruffy's Mayune Station to O'Connors Station and thence to Dandenong. O'Connors Station is outlined in red.

5.9.2 O'Connor's Station (Narmnup)

One of the principal documents regarding the survival of Aboriginal names-places in this region is Hilary Sullivan's 1981 report[181]. Figure 3 of Sullivan's report indicated the presence of a named Aboriginal place, a camping place, in the northernmost section of the PSP 1055 study area (Figure 8). This place was named in Sullivan (1981) as Nurmnup based on information on a map prepared in 1841 by the Assistant Protector of Aborigines, William Thomas (refer to Figure 6)[182]. On examining the Thomas papers the name Nurmnup was found to be Narmnup[183]. It was also clear that this place was not designated as a camping place per se as were other places shown on Thomas' maps. The information shown on the map was prepared by Thomas in January 1841 and was a compilation of the results of a journey he had undertaken the previous year with a party of Bun wurrung people.

The map prepared by Thomas in January 1841 (Figure 6) names 'Mr Bates' (Bathe) Station as Kemgrim. It is unclear if this was the name of the locality in which the station was located or if it was a formally adopted name for the run. In a later map (shown on Figure 7) Thomas names Cardinia Creek between Berwick and O'Connor's Station as O'Connor's or Ner Nup Creek[184]. The precise rendering of Narmnup or Ner Nup varies in Thomas' records, as do so many other Aboriginal place names. The term Ner Nup is used on one other occasion in Thomas' journal for 1840. In describing the food situation at one of the encampments on the yallock near the Head of Western port he stated that: Their supplies of Narnup is abundant but a few possums & on the whole scanty[185]. The use of the term in this context suggests that Narnup/Ner nup is an item of diet.

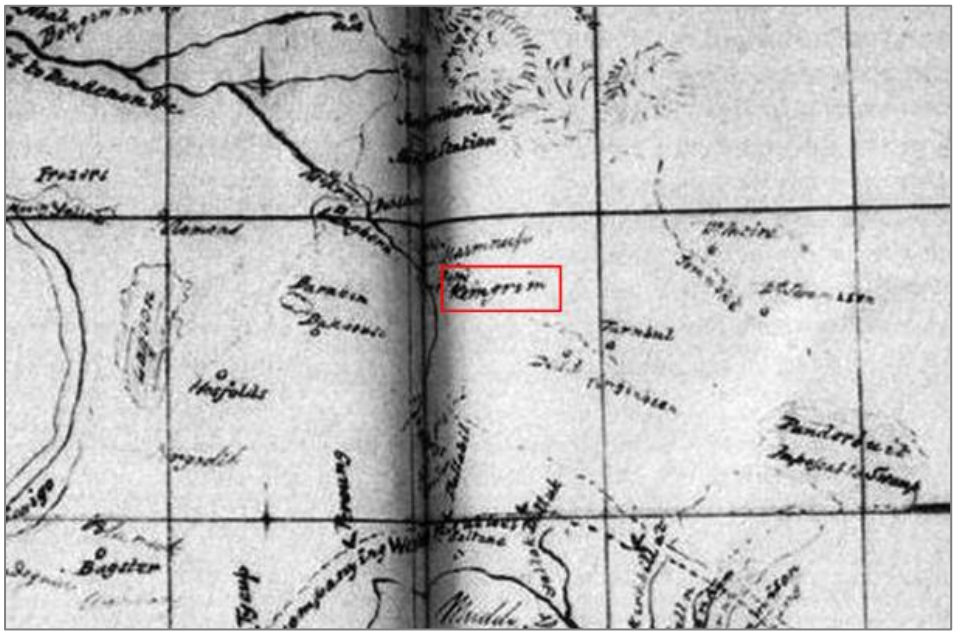

Figure 6 Thomas' map showing 'Mr Bates' (Bathe) Station (Kemgrim). Source: Hilary Sullivan, An Archaeological Survey of the Mornington peninsula, Victoria. VAS Occasional Report Series No. 6 August 1981.

[181] Sullivan, H. 'An Archaeological Survey of the Mornington Peninsula Victoria' Archaeological Survey Occasional Reports 6, 1981: 120 Figure 3
[182] PROV VPRS 10 Inward Registered Correspondence to the Superintendent of Port Phillip District, relating to Aboriginal Affairs map accompanying letter of 29 January 1841
[183] Thomas Journal 1840 ZML MSS 214 Item 22 (28) fol 533
[184] Thomas Journal 1840 ZML MSS 214 Item 22 (28) fol 533
[185] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Thomas Journal 1840 ZML MSS 214 Item 22 (28) folournal January to May 1840 entry for 2 march 1840

One of Thomas' maps of the Melbourne district shows a place-name containing an element similar to Narnup/Ner Nup - this was Nunnupberrin or Wrights Creek located in the Burwood-Canterbury region[186]. The name Narnup/Nernup may be a contraction of a longer place name that related this place to a particular food resource. Such European contractions of indigenous place names are not uncommon.

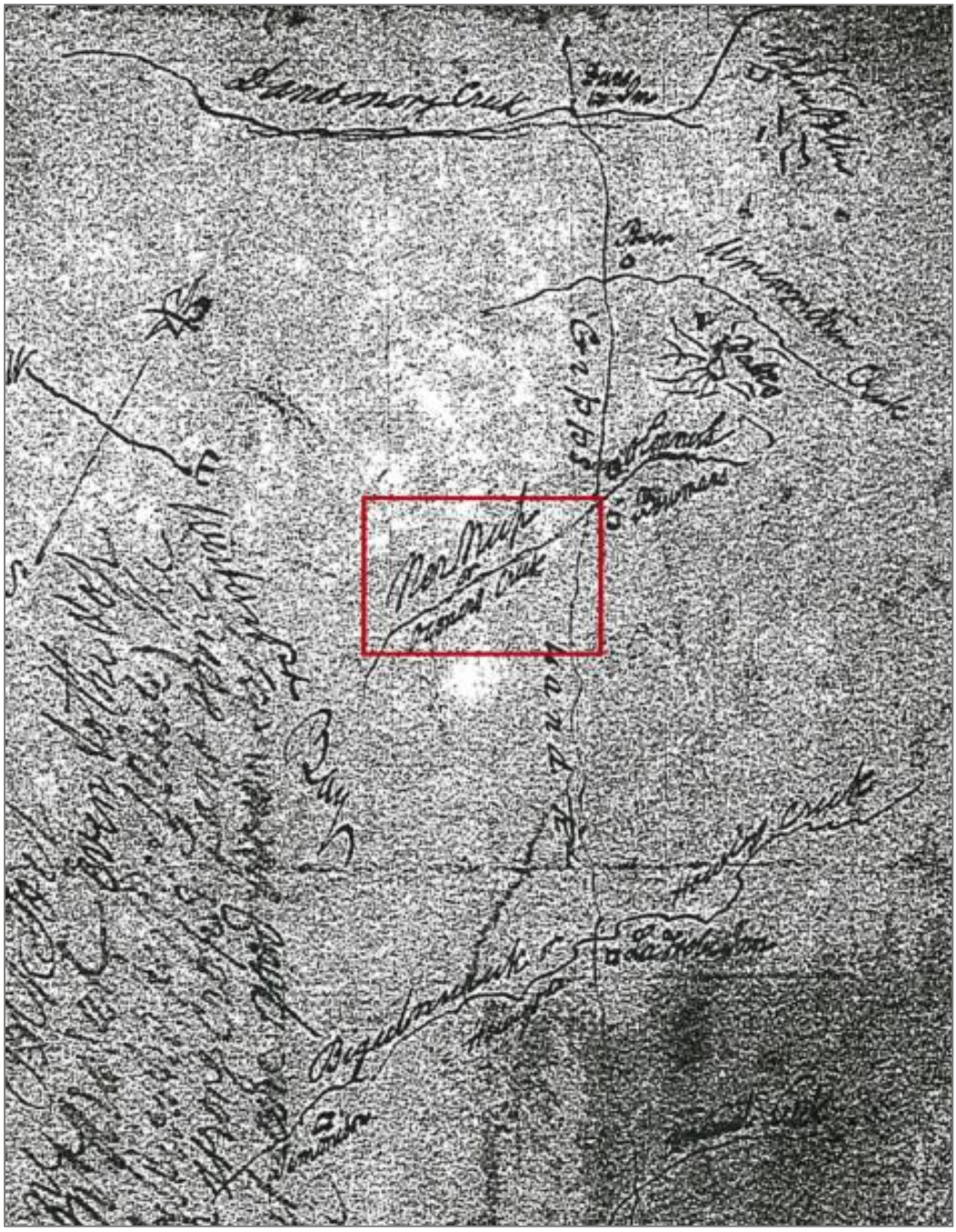

Figure 7 Undated plan (William Thomas) showing the Gippsland Road (Princes Highway) and Ner Nup Creek (centre), Dandenong Creek at top.

[186] Thomas Journal 1840 ZML MSS 214 Item 22 (28) fol 535

5.9.3 Cardinia Creek

Cardinia Creek is situated on the eastern boundary the study area but does not appear in the written record as a toponym until the late 1840s. In 1848 the name was rendered as “Cordinia' Creek” but the spelling Cardinia and Cordinia appear to have been interchangeable at this time[187]. It has been suggested that the term Cardinia derives from the form “Karr-Din-Yarr” and has been interpreted as meaning “Looking at the Rising Sun” or simply "Rising Sun" although the authority for these interpretations is not explained[188]. It is also unclear if the term Cardinia referred to a particular section of the creek and was later applied to the whole creekline, or the term was associated with a particular part of the creek. Thomas indicates elsewhere in his papers that particular parts of a single body of water were given separate names.

Two early pastoral runs with Aboriginal names north of O'Connor's Station were located on either side of Cardinia Creek.In the west was a property referred to as Garem Gam and on the eastern side of Cardinia Creek was Gin Gin Bean. Garem Gam was centred on what would later become the Cranbourne PR located . The property extended as far west as present-day Hampton Park. The name Garem Gam has been interpreted as a corruption of Carrum Carrum (Garrum Garrum) and is supposed to derive from the Carrum Carrum Swamp (Seaford Swamp)[189]. However, the Garem Gam run was approximately 10km east of the Carrum Carrum Swamp so it is possible that Garem Gam is a separate term that has no direct relationship with Carrum Carrum.

The name of the property east of Cardinia Creek has been rendered as Gin Gin Been, Gin Gin Bean, Ghin Ghin Been and Gin Gin Bein. This property extended eastwards to Toomuc Creek and was originally a run occupied by a Mr Turnbull - occupation may date to as early as 1837. Murphy (2009) states that ""Ghin Ghin Bean” (Gin Gin Bin) was said to have meant “Deep Dark Waters” and refers in particular to a deep water hole, one of the best known features of Cardinia Creek" [190] (Figure 8).

An undated plan (Figure 8) shows that O’Connor’s Station is located in the northern section of PSP 1055. The plan also shows two temporary springs, one situated within the current 110 Smiths Lane property, and one within 200m of the western boundary of the study area.

[187] The Argus 29 Sep 1848:4, Crown Leases
[188] Beaumont, N.E., Curran, J.F. and R.H. Hughes. Early days of Berwick and its surrounding districts. Impress Printing, Dandenong, 1979: 10
[189] Billis, R.V & A.S Kenyon. Pastoral pioneers of Port Phillip. Stockland Press Pty Ltd, Melbourne, 1974: 209. Thomas names this swamp or lagoon as Low-yee-ung
[190] Murphy, A & Kennedy, S. Clyde North & MINTA FARM Precinct Structure Plan. Desktop Cultural Heritage Assessment. Report to GAA and Tract Consultants on behalf of Australand Holdings Ltd by Tardis Enterprises Pty Ltd, 2009: 14

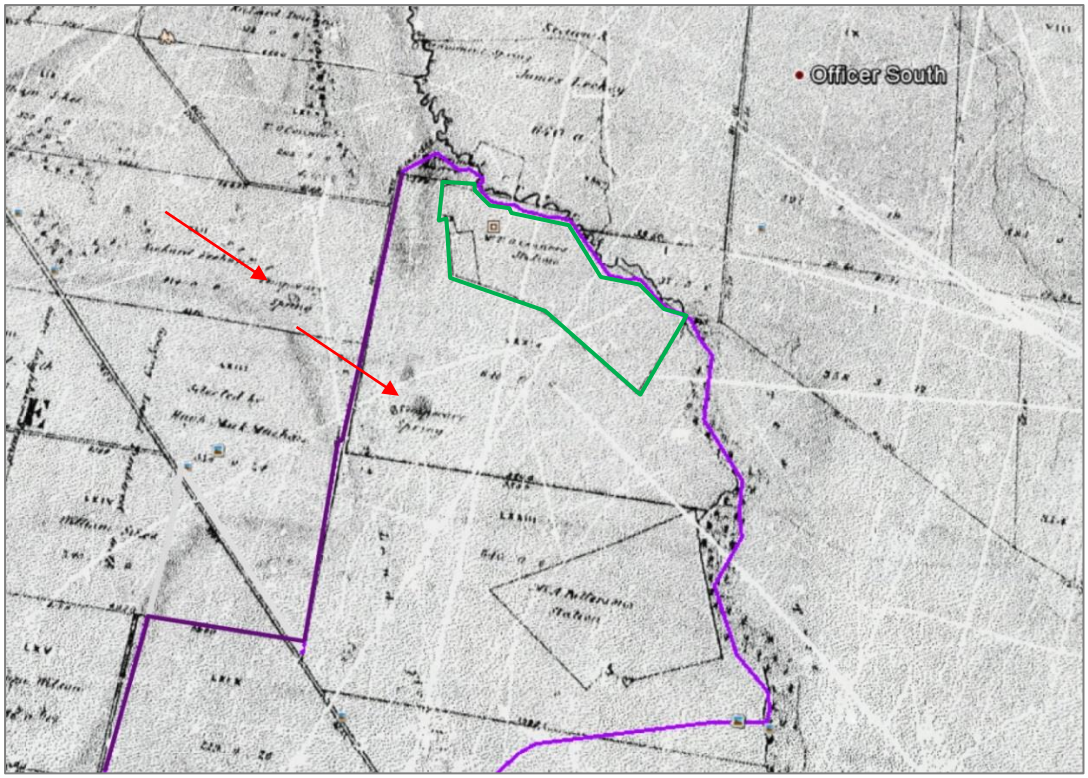

Figure 8 Undated plan showing the location of O'Connors Station (in green) and two temporary springs near Cardinia Creek (marked by red arrows).

5.9.4 Settlement Patterns

Permanent European settlement in the region altered many aspects of Bun wurrung traditional lifestyle within a remarkably short period of time. Thomas' journey of 1840 was in part a continuance of a traditional seasonal movement through the eastern portion of Bun wurrung territory modified by new points of interest that were to be either avoided or visited[191]. The appearance of pastoral stations had greatly altered where Bun wurrung people could hunt and camp either through exclusion or attraction. Areas survived within the region that remained largely intact as traditional food gathering areas. This was particularly the case with streams that entered and flowed out of the Koo-wee-rup where vegetation clearance had not been undertaken and where roads had not been formed. Melbourne had also become a particular attraction and it is noteworthy that on finding that a dray was leaving Ruffy's Mayune Station for 'town' a number of Thomas' party chose to leave the group and take advantage of this conveyance. On the following day at O'Connor's Station a further five members of the party took another dray to Melbourne leaving the remainder of the party to travel by foot to Dandenong[192].

Other aspects of life documented by Thomas on his journey included the relationship between the Bun wurrung and their neighbours, and particularly the depopulation of the eastern part of the Bun wurrung range where it adjoined Gippsland. The journey itself was from water source to water source. On two occasions poor water was encountered and another two instances of absence of water that had been anticipated were recorded. The time spent at any one encampment varied considerably over the 42 nights spent on the journey. Where there was an absence of good water the stay was

[191] Sullivan op. cit.
[192] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840: entry 14 March 1840

usually overnight. In one location the party remained for fifteen days and eight at another. Where a lengthy stay was made at any one location small groups would sometimes go hunting for several days before returning to the main encampment.

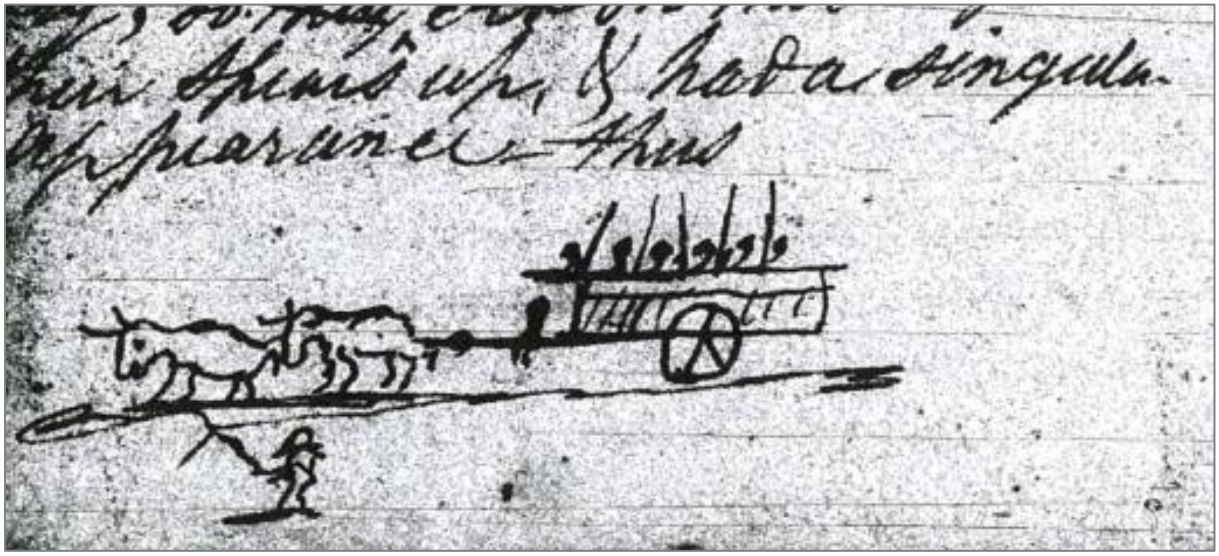

Figure 9 Thomas sketch of Bun wurrung travelling by dray.

5.9.5 Material Culture

The Aboriginal people of the region manufactured and employed a wide range of material culture, sourced from animal, plant and earth resources available locally, in addition to resources and implements acquired through trade with neighbouring clans.

Plant resources were used in a wide variety of ways, with wood employed in the manufacture of tools such as boomerangs, spears and digging sticks, bark and reeds in the manufacture of string for bags and nets, and species of rushes in the manufacture of baskets[193]. The bark of larger trees such as the Red Gum was used to make canoes and shields.

Stone resources, were employed in the manufacture of stone tools, and are the most likely form of Aboriginal material culture to survive in the archaeological record today. Presland notes that the Woi wurrung used a range of what he calls '"maintenance tools", usually of stone, which included hatchets, knives and scrapers'[194]. These tools were often employed in the production of other elements of material culture, including clothing and ornaments made from animal skin and bone[195].

5.9.6 Early Settlement & Frontier Relations

Introduced diseases had a devastating impact on Aboriginal populations. An epidemic of small pox struck between 1829 and 1830. This may have wiped out over half of the Aboriginal population in the region. Introduced childhood diseases killed all ages, and venereal diseases dramatically lowered the birth rate[196]. This coupled with displacement from traditional places and resources, affected critical kinship and religious activities crucial to the operation of indigenous social systems. Pseudo-Syphilis

[193] Presland op. cit., pp. 35-7
[194] Presland op. cit., p. 37
[195] Presland op. cit., p. 37
[196] Broome, R. 'Aboriginal Australians: Black Responses to White Dominance' 1788- 2001 Allen & Unwin New South Wales, 2002:11

and respiratory difficulties were recorded amongst the population in a report to Chief Protector Robinson in 1840[197] .Thomas commented in 1845 that most of the Bun wurrung people who died had never even seen a European[198].

Dispossession of traditional land occurred as the settlers and their livestock arrived in the Port Philip area. Malnutrition and starvation were common amongst the local Aborigines by 1837[199]. Food resources were rapidly depleted by the settlers' stock and industry. European expansion caused structural changes within Aboriginal societies, affecting traditional lifestyles, living arrangements and social practices as Aboriginal people were forced from their traditional lands and deprived of access to resources.

5.10 Environmental Context (landforms and geomorphology)

Archaeological assessments include information about the environmental context of study areas because of the important role environmental characteristics played in influencing the types of archaeological sites in any given area. Physical environments influence both the type and availability of natural resources and the types of cultural activities that were carried out in the past. Correspondingly, this also influences the types of archaeological sites that may be found.

A determination of the former environmental context is essential to develop accurate models of cultural activity, site distribution patterns and the archaeological potential of any given area. The environmental setting of the study area is discussed below.

5.10.1 Landscape

The study area is located within the Victorian Uplands and Sunklands system, formed through past volcanic activity as well as through changes in the sea level. Geological evidence suggests that the Port Philip and Western Port areas were 'probably not inundated before 10,000 years before present (BP)'[200]. Further evidence suggests that Port Philip did not begin to fill until 9,000 years BP and Western Port not until 8,000 years BP[201]. The nearby French and Philip Islands are unlikely to have been formed until 5,000 – 6,000 years BP when the highest sea levels approached current levels[202]. During the mid-Holocene high stand, the sea level increased by approximately 1.70 metres above the current sea level.

Sea level fluctuations have created Pleistocene sands (in the form of dunes) which have blocked drainage. Impediments to local drainage have resulted in the formation of large swamp deposits, in particular the Carrum and Koo Wee Rup Swamps[203]. In general as a result, current drainage patterns across the region are broad and informal (with the exception of Cardinia Creek).

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[197] Gaughwin, D. 'Sites of Archaeological Significance in Western Port Catchment, vol. 1' Report prepared by the Division of Prehistory La Trobe University, Victoria for the Environmental Studies Division, Ministry for Conservation, Victoria, 1981:53

[198] bid

[199] ibid:48

[200] Coutts et al. 1976:68 as cited by Sullivan op. cit:3

[201] *Sullivan op. cit:3*

[202] Coutts et al. 1976:68 as cited in Sullivan op. cit:3

[203] Andrew Long and Associates 'Strategic Approach to Aboriginal Heritage Management for Melbourne's Growth Areas Desktop Assessment Report - South-East Growth Area' (Volume 5 of 5). Draft report prepared for the Growth Areas Authority, 2010 (DRAFT p29)l

In general, the landforms of the South East region consist of three main types, relating directly to the geomorphology. These are hard Palaeozic sediments, weathered Pliocene sandstones, and younger (Quaternary) sediments formed by either alluvial or aeolian action[204].

5.10.2 Drainage and Water Resources

Drainage across the study area comprises poorly defined and shallowly-incised drainage lines that flow from the north-west to the south-east. There are two named waterways, Cardinia and Clyde Creek, situated on the north-eastern and south-western boundaries of the study area respectively.

Due to artificial drainage, channelling, and dam construction, the original hydrology of the landscape has been significantly altered. Dams in particular have been excavated within most properties within the study area which have captured water flows and preventing the natural flow of water downstream. Similarly, ditches and channels have been cut into low lying open depressions to drain these areas and open them up for grazing. The effect of these modifications has been to effectively drain-out former wetlands.

Koo Wee Rup swamp was the dominant landscape feature in the region prior to the artificial channelling works conducted during the 19th century. The success of post-contact settlement in the district was reliant on attempts to clear and reclaim the swamp, in effect, altering the natural environment until original water resources have become near unrecognisable.

Koo Wee Rup swamp has been discussed in depth as part of the report prepared by Andrew Long and Associates:

> *According to early account the region was originally a thick tangle of ti-tree, mud, water, red gum, blackwood wattles and prickly acacias[205]. The Koo Wee Rup Swamp dominated the region's natural landscape, extending over 100,000 acres[206]. For European squatters and settlers, the Koo Wee Rup Swamp was seen as a barrier. The townships of Officer South, Clyde and Cranbourne were on the fringes of the swamp. Land in and around the township of Cranbourne was considered excellent for agricultural purposes.*
>
> *The rivers and creeks in the region all fed into the Koo Wee Rup Swamp and served as natural boundaries for townships and properties, while the Koo Wee Rup Swamp itself acted as a natural barrier[207]. The swamp originally had two natural outlets into Westernport Bay. Cardinia Creek, Dandenong Creek, Deep Creek, Toomuc Creek and Bunyip River all led to the Koo Wee Rup Swamp from the north. The Bunyip River and Ararat Creek and their tributaries were the major water sources feeding into the swamp from the north, the King Parrot, Musk and Heifer Creeks the most significant from the east[208].*

5.10.3 Landforms within the study area

The key landform features of the study area are the two creeks that bisect parts of it, Clyde Creek and Cardinia Creek. Cardinia Creek is located at the base of a narrow steep-sided and deeply incised

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[204] *ibid*

[205] Williams, E. 'Look to the rising sun, back to Cardinia 1984: a history of Cardinia and district, including Rythdale and Pakenham South' Back to Cardinia Committee, Cardinia, 1984, p. 8

[206] bid

[207] Williams op. cit. p.9

[208] Shire of Pakenham, 'Flooding in Kooweerup Swamp: Pakenham Shire' Pakenham Shire, Pakenham, 1981, p.3.

gully. The small section of Clyde Creek within the study area is located at the base of a broad, shallow valley with a narrow open depression forming the current creek-line.

The remainder of the study area comprises flat to gently undulating topography, with several small, isolated crests (probably small discrete stable Aeolian dunes associated with the Cranbourne Sand soil landscape).

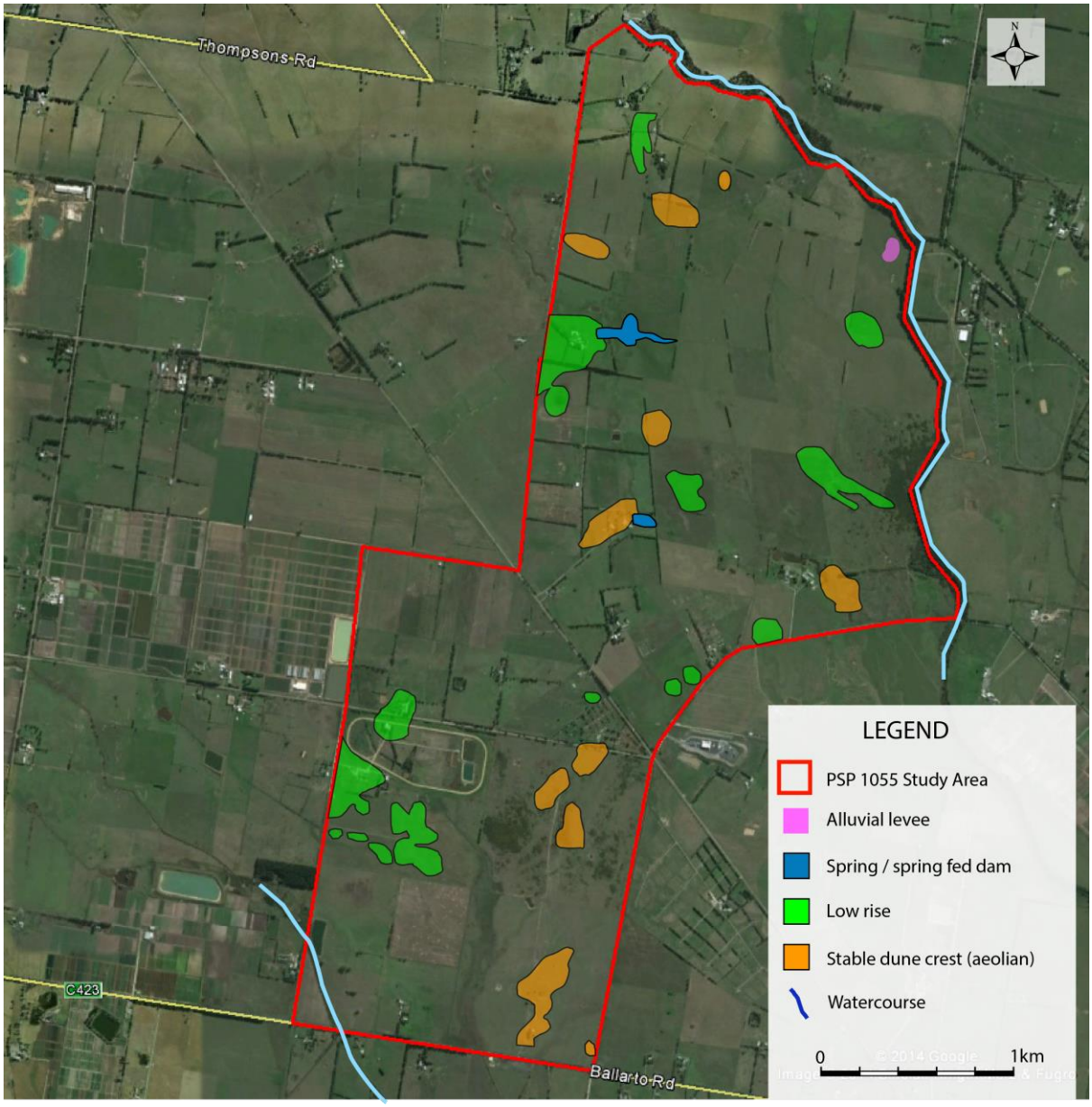

Figure 10 Landforms Present within the Study Area.

5.10.4 Published Geological Information

Geological and soil landscape mapping provides a useful insights into the expected conditions within the study area, but due to the scale of the mapping (1:100,000) it is not a reliable predictor of

conditions on the ground at any selected point. Ground truthing is usually required to confirm geological and soil types.

Published mapping on the GeoVic website shows Unnamed Alluviums (Qa1) made up of gravel, sands and silt; dominates the North-eastern portion of the study area. The majority of the south-western portion of the study area comprises a Baxter Sandstone (Nxx) formation of fluvial sandstone, conglomerates, siltstone and ironstone. The Unnamed Swamp/Lake Deposit (Qm1) may be associated with the former extent of the Koo Wee Rup Swamp which has been previously discussed in section 5.10.2 of this report (Figure 11).

5.10.5 Geomorphology & Soils

Sargeant mapped the soil units and landscapes around Western Port in the 1970s, including the study area (See Figure 12). The study area is dominated by the Toomuc Association (Tº) in the North, and the Narre Association (Nr) soil units in the south, with smaller patches of the Bittern Association (B) present on the North-eastern boundary of the study area.

Soils classed as the Toomuc Sandy Loam are derived from Quaternary sands and sandy clays. Surface soils are characterised by grey or dark grey loamy sands (0-25cm) overlying a bleached layer of similar texture (25-60cm). Medium clays, mottled light yellow-grey, grey and yellow brown occur from 60-1.4cm, with clays becoming heavier after 1m[209].

Bittern Sandy Loams derive from Tertiary clays or sandy clays. The soil profile comprises a dark brownish grey fine sandy clay loam (0-15cm), which overlies a bleached zone that contains iron oxide concretions (15-400cm), under which heavy medium clays (400m)[210] are found. These clays become increasingly sandier with depth, with sandstone occurring generally before 1.5m.

Narre Clay Loams soils are dark brown grey to dark grey-brown clay and sandy clay loams (0 - 25cm), overlying a brownish-grey to grey-brown sandy-clay loams or light clays. Mottled grey-brown to medium brown clays occur from 40cm and proceed to 1.8m. Increase in sand in these soil deposits typically occurs on landscapes adjoining drainage channels. Coffee rock (cemented sand) or iron concretions are generally encountered at 1m, and mottled yellow-brown and light grey clays occur at depths of up to 1.8m[211].

5.10.6 1750 Ecological Vegetation Classes

Published information on vegetation and biodiversity is included on the Victorian Resources Online website (DSE). It provides a good indication of the prevailing vegetation patterns prior to European settlement and clearance of the land. For the purposes of showing the general patterns of vegetation across the study area, we have re-produced a copy of the DSE 1750 Vegetation Communities (EVC) Map relevant to the study area (Figure 13).

The EVC map indicates that the study area likely contained Plains Grassland/Plans Grassy Woodland mosaic to the North and Swamp Scrub to the south. The Cardinia Creek watercourse would likely have contained a Swampy Riparian Woodland. The range of EVC's within and surrounding the study area would have supported a wide variety of flora and fauna exploitable by the local Aboriginal people.

[209] Sargeant 1975: pp. 6-8
[210] bid
[211] bid

Comparison of the 1750 (modelled) and 2005 (current) (Figure 13) ecological vegetation communities (EVC) extent indicates that the majority of the vegetation across the study area has been removed; however pockets of Plains Grassland/Plans Grassy Woodland, Swamp Scrub and Swampy Riparian Woodland may exist, particularly along the fringes of watercourses.

Analysis of historical and current aerial photographs indicates the majority of the study area has been cleared for agricultural uses (see Figure 15).

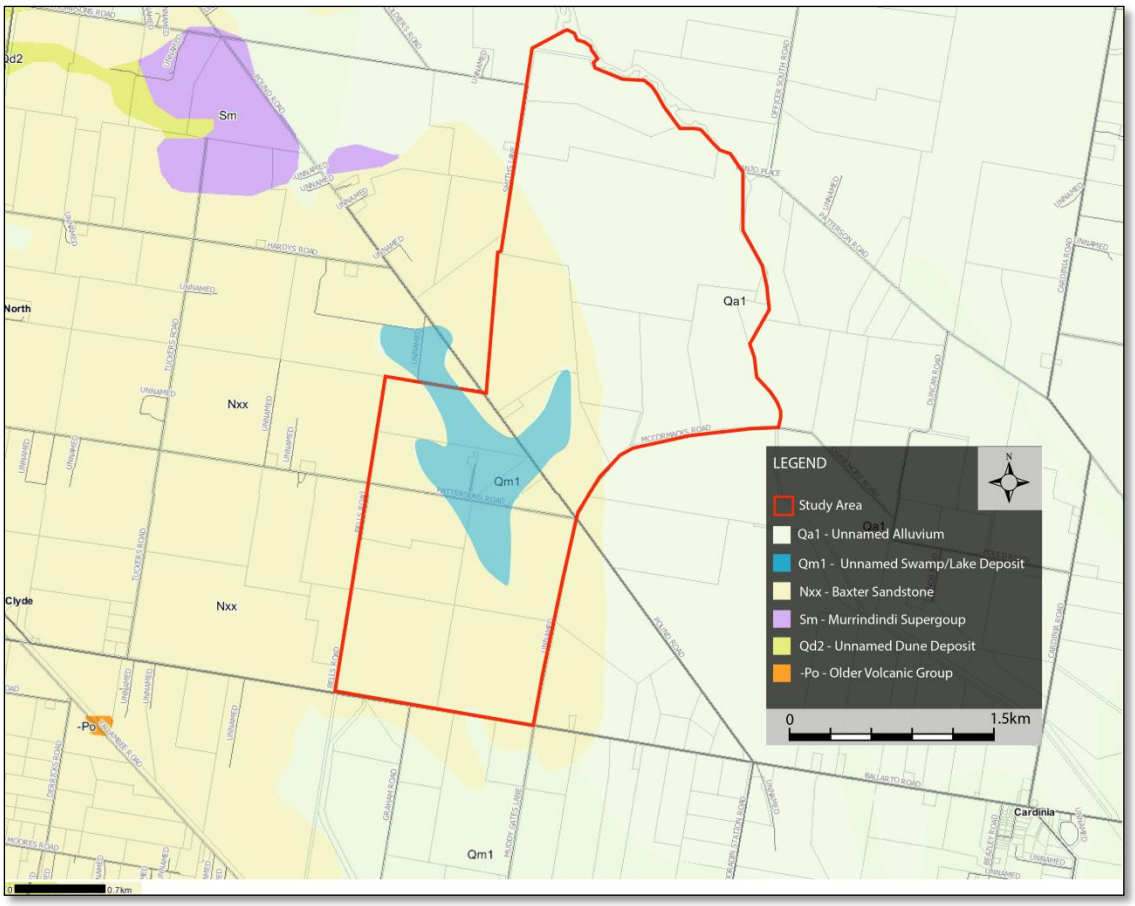

Figure 11 Geological Map of Study Area and Immediate Surrounds. Source: GeoVic

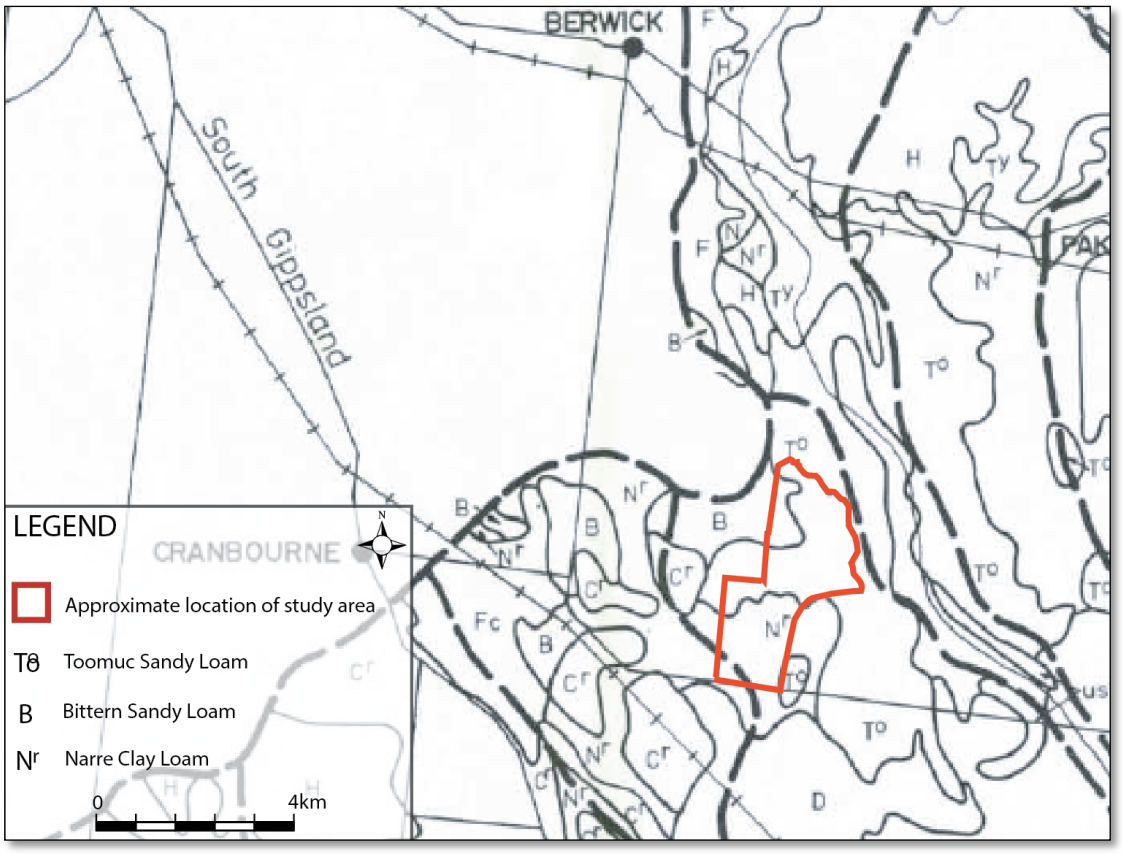

Figure 12 Sargent Soil Mapping Westernport Bay Catchment (Source: Sargent 1975).

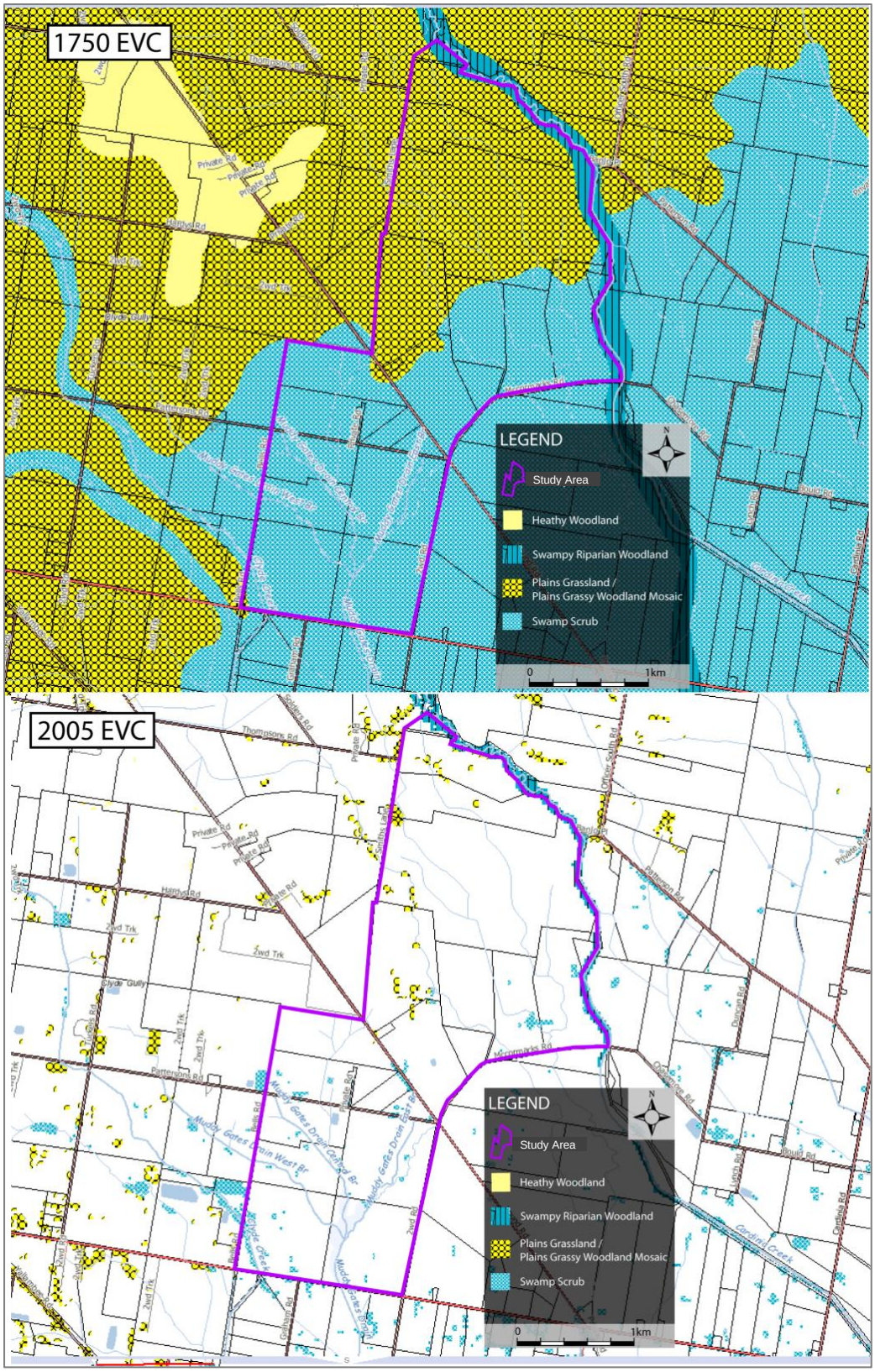

Figure 13 1750 & 2005 EVCs map of the Study Area and Immediate Surrounds. Source: DEPI.

5.11 Land use Disturbance History in the Study Area

The primary land-use of the study area is pastoral and agricultural, with substantial portions of the area subject to ploughing and/or pastoral activity in the past. Historical aerial photography from the early 1970s (see Figure 15), confirms this, although it is near certain that this activity dates back considerably further. There has been extensive deep ploughing, alteration to original drainage and irrigation systems and massive scale dam construction across PSP 1055

The current pattern of hydrology across the area has been substantially altered due to artificial drainage, channelling, and dam construction. Dams in particular have inhibited the natural flow of water along parts of Cardinia and Clyde Creeks.

Throughout the PSP study area numerous other land disturbance activities have occurred. These disturbances have been confirmed by analysis of historical aerial photography (Figure 14 & Figure 15) and are listed below:

- Clearing of native vegetation across the entire study area;
- Repeated ploughing in areas of crop production;
- Construction of fences and cattle yards;
- Construction of equestrian facilities;
- Construction of houses and farm buildings;
- Construction of driveways and tracks providing access throughout the properties;
- Excavation of Dams within the study area;
- Minor channelling for drainage control; and
- Installation of market gardening.

5.12 Predictive Model

Drawing on the desktop research and previous archaeological survey work, the following predictions are made:

- Stone artefact deposits are likely to be found at varying densities across most landforms;
- Higher density artefact scatters and sub-surface deposits may be found on crest landforms and the 'Cranbourne sands';
- Higher density artefact scatters and sub-surface deposits are likely to be found adjacent to creeks or wetlands. Artefact density and frequency is likely to increase with higher stream order (for creeks) and permanence (for wetlands);
- A higher density and frequency of artefact scatters and sub-surface deposits may be found adjacent to former natural springs;
- The density and complexity of artefact scatters and sub-surface deposits is likely to decrease with distance from water sources and wetlands;
- Higher density of artefact scatters and sub-surface deposits in close proximity to stone sources (either outcrops or river pebble sources);
- A particularly high density and complexity of archaeological deposits at major confluences and resource intersection zones;
- Stable aeolian and alluvial landforms are likely to have deeper profiles and better preservation conditions. These landforms may contain greater archaeological integrity;
- Scarred trees may be present within areas containing mature remnant native trees of sufficient age and as isolated mature trees in agricultural settings; and
- Isolated finds may be found anywhere across the landscape.

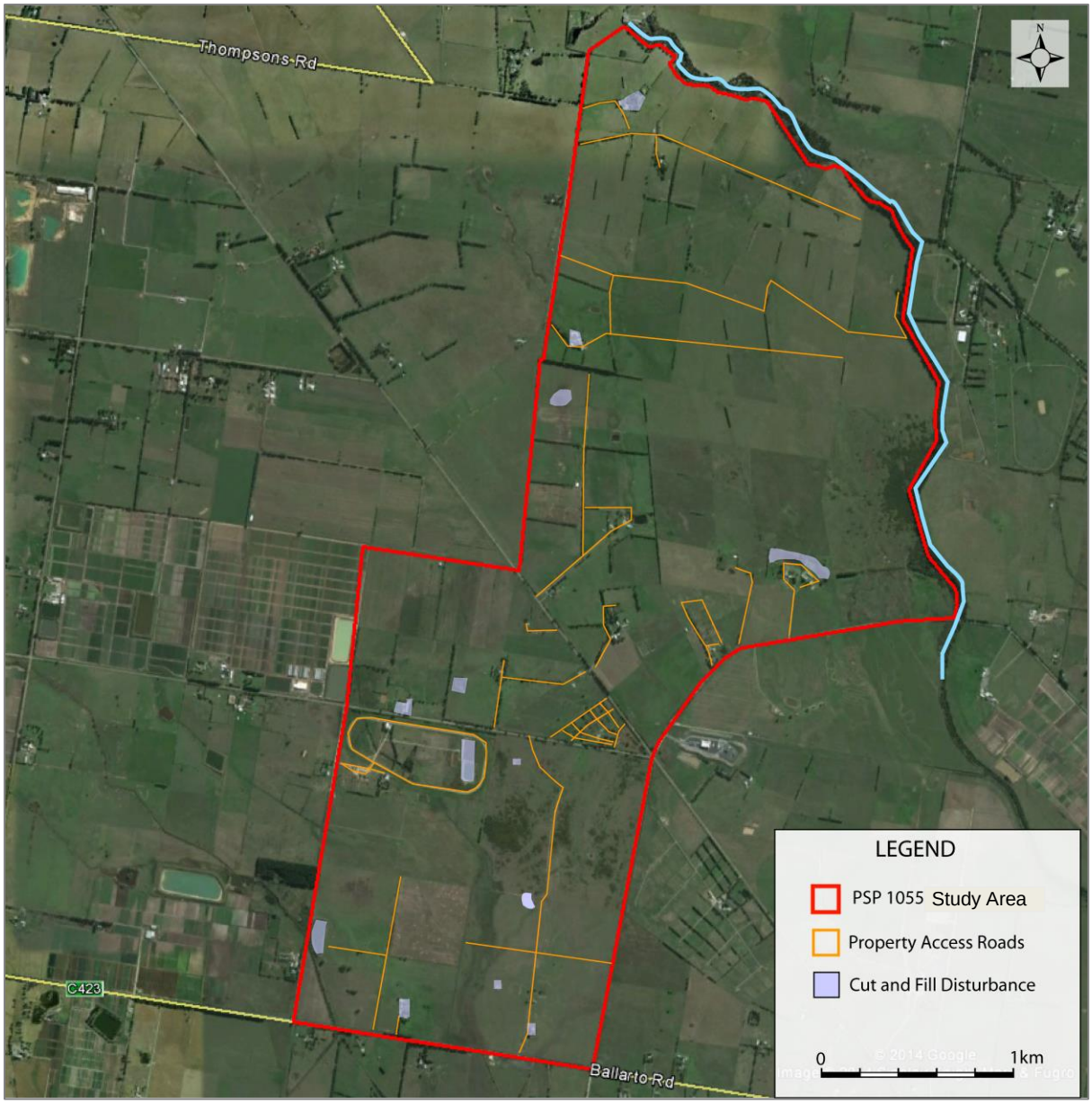

Figure 14 Mapped disturbances within McPhersons PSP 1055. (Source: Google Earth).

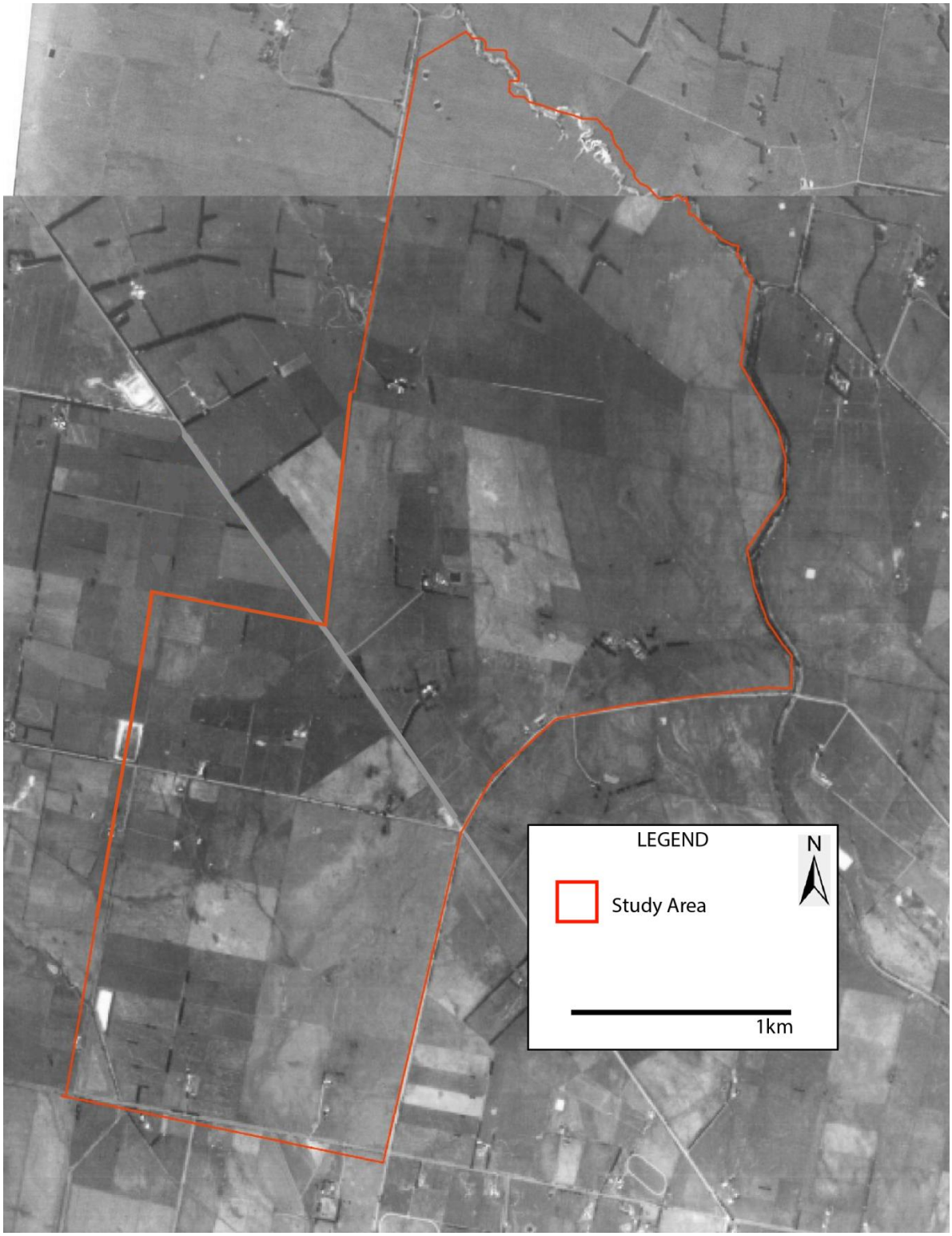

Figure 15. Aerial imagery of McPherson PSP 1055 study area comprising composite historic aerial photographs 1979 (northern section) and 1975 (southern section). (Source: Victorian State Archives).

PART TWO

6 PREDICTIVE SENSITIVITY MAPPING

6.1 Field Assessment

In order to test the proposed predictive model, Standard Assessment (field survey) was undertaken across the McPhersons PSP planning area. Details of the Standard Assessment are provided in Appendix 1.

6.2 Predictive Modelling Aims

The results of the Desktop and Standard Assessment/survey were used to test and revise the predictions developed during the Desktop Assessment phase of the project. Due to the large area covered by the PSP we used MapInfo GIS (Geographical Information System) to develop and map the predictions made regarding archaeological potential. The aims of the predictive model were to:

- Provide information regarding relative Aboriginal archaeological sensitivity within the PSP area that can influence future constraints and opportunities analysis;
- Help inform early PSP planning and design work;
- Help inform future studies and desktop assessments within the PSP area, and
- To provide guidance when developing a methodology for future complex assessment.

In developing the model, we drew on a number of environmental and disturbance variables that were used to identify areas of varying 'archaeological sensitivity'. For the purposes of the model, the term 'archaeological sensitivity' is defined as a combination of likely density, integrity and research value of archaeological deposits within any given area.

6.2.1 Factors Included in the Model

The following is a list of variables that contribute to archaeological potential within the PSP 1055 study area. The variables are ranked in order of importance.

Proximity to water sources.

Proximity to water is one of the key determinants of archaeological potential. In general, sites are larger, more complex and more frequently found in close proximity to water sources. Levels of sensitivity are predicted to increase with proximity to higher order drainage lines, more permanent wetlands and natural springs. Drainage and hydrology patterns have been significantly altered since European settlement in order to retain water in storage dams for agricultural purposes and drain waterlogged areas to open them up for grazing and cultivation. GIS-modelling combined with analysis of topographic maps, historical maps and plans and historical aerial photos were used to determine the likely extent of original drainage lines, swamps / wetlands and springs.

Crest landforms.

Previous investigations in the area have shown that crest landforms are often associated with a higher density and frequency of archaeological deposits – particularly when they are also located in close proximity to water sources. Crest landforms were delineated using aerial photography,

topographic mapping and mapping carried out during the survey. The extent of the crest landforms was mapped using Map Info GIS software.

Aeolian Sandy Rises and Cranbourne Sands.

Aeolian sandy rise (dune) landforms and Cranbourne Sands soil landscape are predicted to have an elevated level of archaeological sensitivity because aeolian dunes are considered likely to contain deeper cultural sequences and good preservation conditions in areas that have not been disturbed by market gardening. These landforms also have a slightly higher potential to contain Aboriginal burials, although the potential for burials within the study area is still generally low.

Alluvial Levee Deposit

Alluvial levees are formed by the flood deposition of sediment on a floodplain environment. Naturally forming alluvial levee deposits are considered to have a higher level of potential for buried archaeological deposits as they are likely to contain deep profiles of alluvial sediment, they are also located in close proximity to watercourses. One alluvial levee was identified on the eastern margin of property ID# 18 near Cardinia Creek. The extent of the alluvial levee was mapped using Map Info GIS software.

Areas of cut and fill disturbance

These areas are considered unlikely to contain Aboriginal archaeological deposits because topsoil units (i.e. artefact bearing soil units) have been removed. These areas include roads, dams and the construction of building platforms for houses and sheds. They are considered to have been disturbed.

Swamps and wetlands

Are considered to have a lower level of archaeological potential because they were unfavourable areas for sustained occupation and use (because they were inundated), and are less likely to contain evidence of Aboriginal occupation and use. There is some potential for these areas to contain low densities of cultural material associated with foraging into the wetlands and exploitation of resources.

6.2.2 Factors Not Included in the Predictive Model

The following variables were not included in the model, because the desktop assessment research and analysis of the local landscape indicated they are unlikely to be factors that affect local archaeological patterning within the subject land.

Previously recorded Aboriginal archaeological sites

Under the Aboriginal Heritage Act 2006 & Regulations 2007, it is offence to disturb or destroy Aboriginal sites or objects except where a Permit to Harm has been approved by OAAV and/or an approved CHMP allows for the disturbance.

These places/sites have not been included as an influence on archaeological sensitivity in the model. This is because most of the sites are surface artefact scatters identified on erosional landforms, in areas of ground exposed by soil disturbance and within areas specifically investigated during previous archaeological studies. Therefore, the current local distribution of known sites is unlikely to accurately reflect the real distribution and nature of sub-surface archaeological deposits.

Areas of ploughing

These areas are considered to have a lower level of archaeological sensitivity because the top 20 – 30cm of topsoil has been disturbed by ploughing. These areas may contain Aboriginal cultural deposits but they are likely to have a lower level of integrity and a lower level of scientific significance. It is noted, however, that in deeper soils there is potential for more intact archaeological deposits to survive beneath the plough zone.

Areas of ploughing have not been included in the model because the PSP study area has been cleared of original vegetation and sections of the study area have been subject to ploughing in the past. Therefore, because the ploughing has occurred right across the study areas, it does not have an influence on the model.

Proximity to stone sources

Aboriginal stone sources and geological mapping may provide an indication about where raw materials were gathered for making stone tools. Stone sources may occur across the local landscape in the form of boulders and weathered pieces outcropping on valley slopes and on volcanic plains, and gravels and pebbles washed downstream and deposited in alluvial terraces and on gravel bars.

Dominant raw material types in the region include silcrete, quartz, quartzite and chert, with other materials such as basalt, also present.

No specific stone sources or potential stone sources were identified during the desktop research.

Slope Gradient

The local landscape within the study areas is flat to gently undulating. Based on our desktop research and standard assessment survey there is no steep terrain within PSP 1055. Therefore, slope gradient is unlikely to be a factor influencing archaeological potential.

6.2.3 Predicted Sensitivity and Future PSP Planning

The modelling and mapping is based on a probabilistic approach, where a combination of traits was used to determine the combined level of potential. The model traits are as follows:

- Alluvial levee = Very High Sensitivity
- Sandy Rise (stable dune crest) = Very High Sensitivity
- Low Crest = Moderate Sensitivity.
- Within 200m of Higher order stream – High Sensitivity.
- Low rise + Within 200m of Higher order stream = Very High Sensitivity
- Within 200m of spring / spring fed dam = High Sensitivity;
- Flat low-lying areas = Low Sensitivity;
- Market Gardening = Very Low Sensitivity;
- Cut and Fill Disturbance = Negligible or Disturbed Sensitivity; and
- All other areas low sensitivity.

Figure 16 shows the results of the GIS predictive model. The figure shows areas of high potential (dark pink) grading to very low potential and disturbed areas (grey).

It is important to note that the predictive sensitivity mapping is based on the results of desktop research and the standard assessment. The accuracy of the modelling and mapping presented in this report should be quite robust, given the amount of archaeological investigation carried out over the last few years within the south-eastern growth areas that underpin the predictions made. Therefore, the sensitivity mapping could be used to inform PSP design decisions in the initial stages of planning, particularly in regards to proposed configuration of open space networks, activity centre and key infrastructure such as main roads that need to be established early in the PSP planning and design process.

The predictive modelling and predictive sensitivity mapping should be tested during future complex assessments, using methods specifically designed to test conclusions made in the predictive modelling and shown on the sensitivity mapping. The model and sensitivity mapping should then be refined (if necessary) and used as the basis for making design decisions at an individual CHMP / development project level in consultation with the Office of Aboriginal Affairs Victoria and Aboriginal traditional owner representative groups.

Where a CHMP is required we recommend the use of a landform based approach to complex assessment (test excavation). The landform based approach aims to systematically test each landform within an study area to establish the extent of cultural material present. This approach is recommended because it is an efficient and effective means of assessing the nature, extent and significance of Aboriginal cultural heritage across large landscapes.

The extent of landform testing and sample effort should be established on a case by case basis but make reference to the level of sensitivity shown on the predictive sensitivity mapping shown on Figure 16 and undertaken in a way that sufficiently tests this model.

It is also important to note that the predictive model and sensitivity mapping does not include predictions about cultural values to the Aboriginal community. Identification of cultural values and places cannot be predicted by a scientific model, they can only be identified during consultation with traditional owner knowledge holders.

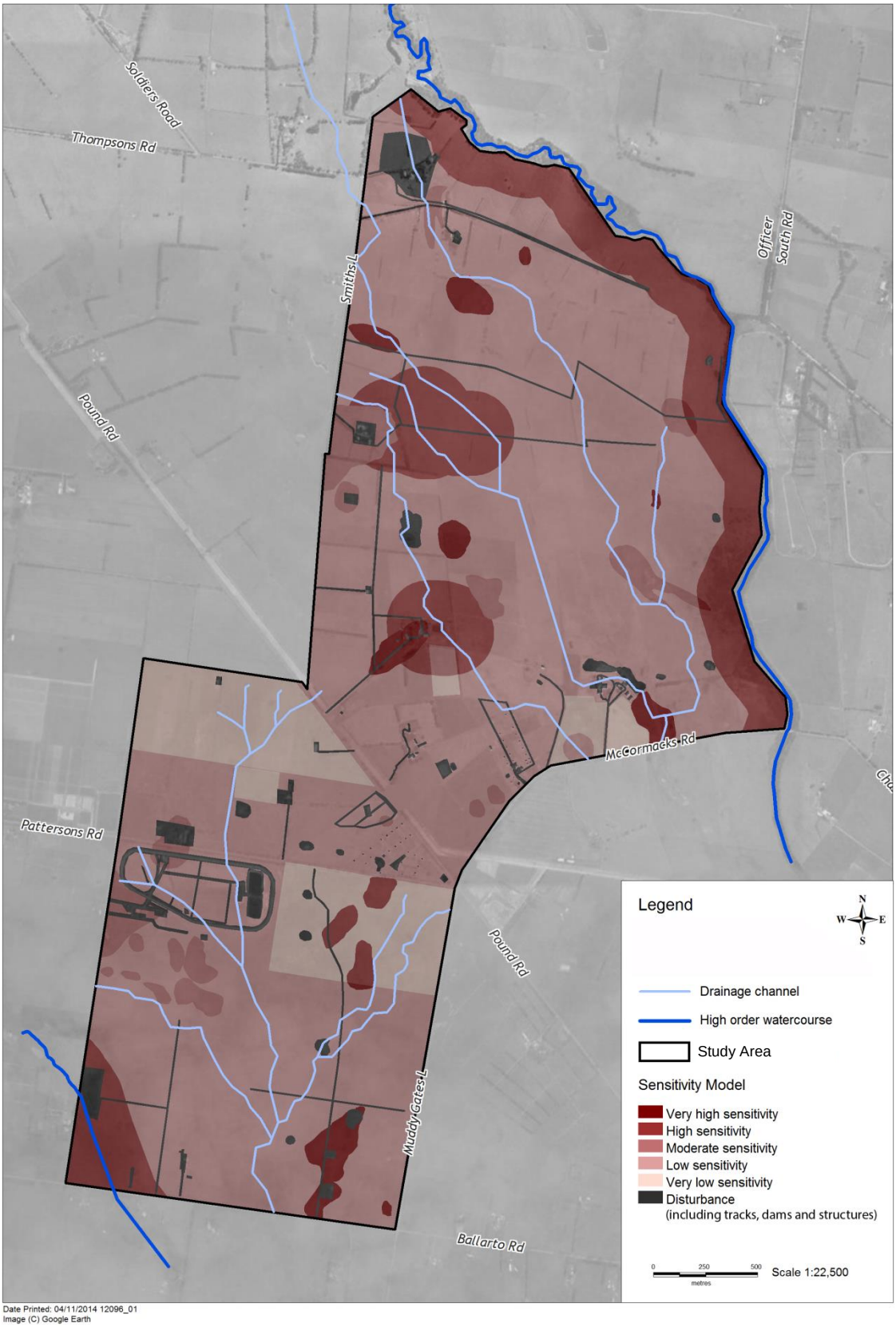

Figure 16. McPherson PSP 1055 Predictive Archaeological Sensitivity Model

7 MANAGEMENT RECOMMENDATIONS

7.1 PSP Planning and Design

The results of the Desktop and Standard Assessment were used to develop a predictive model of the archaeological sensitivity across the McPhersons PSP area. The Desktop Assessment identified three registered Aboriginal places within the PSP area. The management of these places is addresses within separate CHMP assessments.

The predictive model and archaeological sensitivity map shown in Figures 16 are designed to inform future PSP design and planning work. The sensitivity map is also designed to provide landowners and development proponents with a guide to archaeological sensitivity within various parts of the PSP area to assist in assessing risk and making decisions about development design that are informed and appropriately consider Aboriginal heritage sensitivity and values.

In general terms, the risk of impact on significant archaeological and Aboriginal cultural heritage values is likely to increase in accordance with sensitivity level. Therefore, areas that are in the very high sensitivity zone are likely to have the highest level of archaeological significance and, as a result, these areas are also likely to have the highest level of risk for development proponents. Likewise, areas of very low sensitivity or which are disturbed have a very low risk level.

7.2 Recommendations

The following recommendations are made in the context of developing the McPhersons Precinct Structure Plan and to emphasise the intent of this study as a strategic planning document.

Recommendation 1:

Impact Avoidance and Minimisation.

We recommend that this heritage assessment be used as a reference document for relevant planning staff and other proponents and be taken into consideration as early as possible during the initial PSP design stage. **With reference to Figure 16 of this report, and wherever possible, planning decisions should:**

- Ensure development impact is focused on areas of lower heritage sensitivity (i.e. Disturbed to Low), and across those areas that result in the least potential impact to Aboriginal heritage values.

- Ensure development impact is constrained in areas of higher heritage sensitivity (i.e. Moderate – Very High), and across those areas that result in the greatest potential impact to Aboriginal heritage values.

Recommendation 2:

Aboriginal Heritage Sensitivity & PSP Planning and Design.

Specifically, we recommend the following PSP design responses with reference to the sensitivity zones shown on Figure 16:

Very High & High Sensitivity: retain as much as possible in open space, riparian, bio-link, set-backs and asset protection zones. The aim of PSP design should be to minimise future development impact on these areas (particularly the Very High sensitivity zone). This approach will protect areas with high potential for significant archaeological deposits and cultural values. The approach will also save time and money in reducing the scope of mitigation and salvage of sensitivity areas;

Moderate Sensitivity: where there is an opportunity, development impact should be minimized where practicable. For instance, where there are opportunities to establish open space, these could be placed on areas of moderate sensitivity to protect Aboriginal heritage and reduce the scope of expensive and time consuming archaeological mitigation measures and salvage.

Low Sensitivity: no design and planning recommendations. These areas are essentially archaeologically 'neutral'.

Very Low Sensitivity and Disturbed: these areas could be the focus of development, particularly high impact features of a subdivision like a town centre, medium or high density residential, industrial or commercial.

8 HERITAGE LEGISLATION AND FUTURE PSP ACTIVITIES

Many of the proposed future activities associated with development of the area would be defined as 'high-impact' developments under Division 5 of the Aboriginal Heritage Regulations 2007.

Prior to the commencement of any future individual projects within the PSP, projects that are located within or partly within an area of cultural heritage sensitivity, as defined by the Aboriginal Heritage Regulations 2007 (see Figure 17), will be required to prepare a cultural heritage management plan before proceeding. The only exception to this would be if all of a particular development area has been subject to prior significant ground disturbance.

Significant ground disturbance is defined as disturbance of the topsoil or surface rock layer of the ground or a waterway by machinery in the course of grading, excavating, digging, dredging or deep ripping but does not include ploughing or other deep ripping in the Aboriginal Heritage Regulations 2007. In most cases, it is very difficult to demonstrate prior significant ground disturbance across the entirety of a typical residential sub-division project. Therefore any developments within or partly within the areas of sensitivity shown on Figure 23 are highly likely to require completion of a complex CHMP before a Planning Permit can be approved for those projects.

Where a CHMP will be required we recommend the use of a landform based approach to complex assessment (test excavation). The landform based approach aims to systematically test each landform within an study area to establish the extent of cultural material present. This approach is recommended because it is a very efficient and effective means of assessing the nature, extent and significance of Aboriginal cultural heritage across large landscapes. It also provides for a consistent approach across PSP 1055 and significant sampling efficiencies by using a common approach that can be utilized by all the landowners and proponents within the study area.

The extent of testing and sample effort should be based on the level of sensitivity shown on the predictive sensitivity mapping shown on Figure 16. Areas which are disturbed or have very low sensitivity should not require further test excavation because they are considered 'unlikely' to contain Aboriginal cultural heritage (the Aboriginal Heritage Regulations 2007 only require complex assessment in areas that are 'likely' to contain Aboriginal cultural heritage. However, areas ranging from low to very high sensitivity should be included in a systematic programme of landscape-based archaeological test excavation that aims to establish the extent nature and significance of the Aboriginal cultural material within areas of proposed development impact (NB: Areas set aside as open space, conservation or other uses that do not entail development disturbance will not be included in complex assessment and can therefore be excluded from complex assessment scope of work). Levels of sensitivity ranging from low to very high will need to be included in the scope of complex assessments in order to efficiently test the predictive model.

Figure 17. McPherson PSP 1055 - Areas of defined Cultural Heritage Sensitivity within the study area (Source VAHR).

REFERENCES

Aboriginal Affairs Victoria. 'Guide to Preparing Cultural Heritage Management Plans', 2007.

Adams, C. and J. Stevens. Cultural Heritage Management Plan: 1040 Glasscocks Road, Cranbourne North (10222). Sponsor: Colin Madden, Taylors Development Strategists, 2008.

Allen, J., Hewitt, G. de Lange, J. with a contribution by Long, A. 'Report on Bend Rd archaeological investigations: Bend Rd 1 phases 1 to 3', unpublished report to Thiess John Holland, 2008.

Allia, S., & Vines, G., Gum Scrub Creek Frog Pond Officer Victoria CHMP, unpublished report prepared for VicUrban, 2009.

Andrefsky, W. 1998 Lithics: macroscopic approaches to analysis Cambridge University Press, Cambridge, 1998.

Andrew Long and Associates 'Strategic Approach to Aboriginal Heritage Management for Melbourne's Growth Areas Desktop Assessment Report - South-East Growth Area' (Volume 5 of 5). Draft report prepared for the Growth Areas Authority, 2010.

Barker, A., Residential Subdivision 265 Berwick-Cranbourne Road, Clyde North CHMP, unpublished report to Beveridge Williams P/L, 2012

Beaumont, N.E., Curran, J.F. and R.H. Hughes. Early days of Berwick and its surrounding districts. Impress Printing, Dandenong, 1979.

Bell, J. L. An Archaeological Survey of Proposed Realignment of Clyde-Five Ways Road. Report Prepared for VicRoads, 2001.

Bell, J. L.An Archaeological Survey: Clyde Five-Five Ways, Cranbourne. Final report for VicRoads, 2002.

Billis, R.V & A.S Kenyon. Pastoral pioneers of Port Phillip. Stockland Press Pty Ltd, Melbourne, 1974.

Broome, R. 'Aboriginal Australians: Black Responses to White Dominance' 1788- 2001 Allen & Unwin New South Wales, 2002.

Burke, C. Analysis of the Lithic Assemblage from the Keilor Archaeological Site, Victoria Archaeological Survey Occasional Report No. 30, Department of Conservation and Environment, Melbourne, 1990.

Clarke, D., A. Edwards, L. Kirkwood, O. Nicolson, T. MacManus & J. Ward. Proposed Housing Subdivision, 305 Berwick-Cranbourne Road, Clyde North, Victoria: Aboriginal Cultural Heritage Management Plan (10009). Sponsor: Stockland Pty Ltd, 2009.

Day, C., PSP No. 16 – Cranbourne North (Stage 2) – Cnr Thompsons & Clyde Road CHMP, unpublished report prepared for Growth Areas Authority, 2010.

Debney, T, J. Fiddian, H. Cekalovic, A. Orr, M. Lawler, T. Meara, R. Regal and K. Houghton. Desalination Project Transfer Pipeline and Power Utilities Corridor, Wonthaggi to Cranbourne, Victoria: Cultural Heritage Management Plan (10620). Sponsor: Department of Sustainability and Environment, 2009.

DPCD. Guide to Preparing Aboriginal Cultural Heritage Management Plans. Aboriginal Affairs Victoria, 2010.

du Cros & Associates, a sub-surface investigation of terraces affected by Cardinia Creek by-pass, Officer, Victoria, unpublished report to VicRoads, 1992

du Cros, H., & D. Rhodes. Aboriginal Archaeological sensitivities study of the waterways and floodplains of Greater Melbourne. Sponsored by Melbourne Water - Waterways Alliance Corporation, 1998.

Feldman, R., & A. Long. Melbourne 2030 Casey – Cardinia Growth Area: Aboriginal Archaeological Desktop Report. A Report to The Built Environment Group – Department of Sustainability & Environment, 2004.

Fiddian, J. and M. Lawler. 2007. Proposed development at 560 Narre Warren – Cranbourne Road, Cranbourne, Victoria: Cultural Heritage Management Plan (10084). Sponsor: Stockland Development Pty Ltd, 2007.

Ford, A., M. Hutchinson, J. Burch & D. Freedman, Victorian Desalination Project- Cranbourne Extension of the Power Supply Alignment, Cranbourne, Victoria: Aboriginal Cultural Heritage Management Plan (10881). Sponsor: Department of Sustainability and Environment, 2009.

Gaughwin, D. 'Sites of Archaeological Significance in Western Port Catchment, vol. 1' Report prepared by the Division of Prehistory La Trobe University, Victoria for the Environmental Studies Division, Ministry for Conservation, Victoria, 1981.

Gallus, A. The Middle and early Upper Pleistocene stone industries at the Dry Creek archaeological sites near Keilor, Australia. The Artefact 2:75-108, 1976.

Gilchrist, A. Brookfied Estate, Proposed Multi-Lot Subdivision, Cranbourne East, Cultural Heritage Management Plan (10646). Sponsor: John Marvelli, New Age Real Estate, 2011.

Goulding, M. Aboriginal Occupation of the Melbourne Area, District 2: a report to the Land Conservation Council, Land Conservation Council, Melbourne, 1988.

Green, M., 240 Rix Road, Officer Residential Subdivision CHMP, unpublished report prepared for A & J Excavations Pty Ltd, 2011

Hills, E. S. Physiography of Victoria. Whitecombe & Tombs Pty Ltd, Melbourne and Sydney, 1940.

Hiscock, P. 'Sizing up Prehistory: Sample Size and Composition of Archaeological Assemblages' Australian Aboriginal Studies 2001(1).

Hiscock, P. and V. Attenbrow. 'Early Holocene Backed Artefacts from Australia' Archaeology in Oceania 33(2), 1998.

Hiscock, P. and V. Attenbrow, V. 'Morphological and Reduction Continuums in Eastern Australia: Measurement and Implications at Capertee 3' Tempus 7, Anthropology Museum, University of Queensland, 2002.

Hislop, K., & Barker, M., Proposed Residential Subdivision – 120 Cardinia Road, Officer, CHMP, unpublished report prepared for Andrew Purdie, 2012

Holdaway, S. and N. Stern, A Record in Stone: the study of Australia's flaked stone artefacts Museum of Victoria and Aboriginal Studies Press, 2004.

Hyett, J. & O'Connor, A., Planned Subdivision 110 Cardinia Road, Officer: CHMP, unpublished report prepared for Intrapac Projects Pty Ltd, 2009.

Kennedy, S., J. Wheeler & E. Foley, 44 First Avenue, Chelsea Heights: Residential Subdivision. Cultural Heritage Management Plan (11958), 2012

Kennedy, S., Cardinia Creek Maintenance: Old Princes Hwy, Berwick to Princes Hwy, Beaconsfield CHMP, unpublished report prepared for Melbourne Water – Waterways Alliance, 2012.

Lapidus, D. Collins Dictionary of Geology. Harpercollins: London, 1990.

Light, A. 50 Berwick-Cranbourne Road, Cranbourne East (Residential Subdivision): Aboriginal Cultural Heritage Management Plan (10569). Sponsor: Peet Cranbourne Central Syndicate Ltd, 2009.

Light, A., J. de Lange, J. Bowler and S. Rood, 1555 Sth Gippsland Hwy, 5 Adrian St & 7 Nelson St (Residential Subdivision), Cranbourne East: Aboriginal Cultural Heritage Management Plan (10568). Sponsor: Peet Gippsland Highway Pty Ltd, 2009.

Long, A. Blue Hills Rise, 220-280 Berwick-Cranbourne Road, Cranbourne: Archaeological and Heritage Assessment. A Report to Blue Hills Residences Pty Ltd, 2007.

Long, A., D. Mathews & A. Light. 2009. Blue Hills Rise, 220-280 Berwick Cranbourne Road, Cranbourne: Aboriginal Cultural Heritage Management Plan (10008). Sponsor: Blue Hills Residences Pty Ltd, 2009.

Long, A., P. Schell & J. Howell-Meurs. Eastern Irrigation Scheme: Archaeological Assessment. A Report to Earth Tech Engineering Pty Ltd, 2004.

Marshall, B. & C. Webb. 2001. A Cultural Heritage Assessment of Proposed Realignments of Clyde-Five Ways Road. Prepared for Hyder (Australia) Pty Ltd, 2001.

Marshall, A. An overview of the Aboriginal archaeology within the non-urban foreshore, Victoria, unpublished report to the City of Casey, 1997.

Marshall, B. & Schell, P. Coast action/coast care 1998/99 Aboriginal archaeological desktop study, unpublished report to DNRE Coasts Division, 1998.

Matthews, D., & Long, A., Lot 29a Thornley Driver Berwick CHMP, unpublished report prepared for Metricon Land Pty Ltd, 2008.

Melbourne Water (na) Healthy Waterways Waterwatch Program: http://www.waterwatchmelbourne.org.au/content/your_local_waterway/eastern_catchments/bunyip_river.asp, accessed 05/09/2011.

Munroe, M. 1998 'The stone artefact assemblage from Keilor' The Artefact 2 1 : 19-34, 1998.

Muir, S. Stage 1 and 2 cultural heritage survey of Clyde Five Ways Road, Pound Road to Ballarto Road, Victoria. Report for VicRoads, 2003a.

Mulvaney, J and Kamminga, J, 'Prehistory of Australia', Smithsonian Institution Press, Washington D.C. 1999.

Murphy, A., and L. Dugay-Grist. Crown Allotment 29, Thompsons Road, Cranbourne North, Residential Subdivision: Cultural Heritage Management Plan (10531). Sponsored by Greenridge Properties Pty Ltd, 2009.

Murphy, A & Kennedy, S. Clyde North & MINTA FARM Precinct Structure Plan. Desktop Cultural Heritage Assessment. Report to GAA and Tract Consultants on behalf of Australand Holdings Ltd by Tardis Enterprises Pty Ltd, 2009.

Murphy, A., and S. Kennedy. Subdivision & Residential/Retail Development, Hunt Club Estate, No 41 Gatehouse Parade, Cranbourne East: Cultural Heritage Managament Plan No 11380. Sponsored by Hunt Club Pty Ltd, 2010.

Murphy, A. & Owen, D., Glismann Road, Beaconsfield Structure Plan CHMP, unpublished report prepared for Cardinia Shire Council, 2010

Murphy, A and T. Rymer. Sewer Rising Main, Officer South: Cultural Heritage Management Plan (10045). Sponsored by South East Water Ltd, 2008.

Murphy, A. and T. Rymer. Hunt Club Residential Housing Estate, 202S Cameron Street, Cranbourne East: Cultural Heritage Management Plan (10659). Sponsored by Hunt Club Pty Ltd, 2009a.

Murphy, A. and T. Rymer. Hunt Club Estate Residential Subdivision, Mayfield Precinct, Mayfield Road, Cranbourne East: Cultural Heritage Management Plan (10865). Sponsored by Hunt Club Pty Ltd, 2009b.

Murphy, A. and T. Rymer. 2009c. Residential Subdivision, Lots 2 & 3 Rix Road, Officer: Cultural Heritage Management Plan (10939). Sponsored by National Pacific Properties Pty Ltd, 2009c.

Murphy, A. and T. Rymer. Residential and Retail Subdivision, 1095 Poun Road and 181 Grices Road, Clyde North: Cultural Heritage Management Plan (10857). Sponsored by Australand Holdings Limited, 2001a.

Murphy, A., & Rymer, T., Edenbrook Residential Estate Ancillary Works (utilities, road, bridge and creek works and access track diversion) Henry Road to Cardinia Road, Pakenham CHMP, 2010.

Murphy, A. and T. Rymer. Residential Subdivision 121 Grices Road, Clyde North. Cultural Heritage Managament Plan No (11636). Sponsored by Moremac Property Group Pty Ltd, 2011b.

Murphy, A. & Rymer T., 1100 Pound Road, Clyde North Subdivision of Land CHMP, unpublished report prepared for Sam Mondous, 2012.

Murphy, A. & Morris, A., Cardinia Road Employment Precinct Structure Plan, Officer South CHMP, unpublished report prepared for Cardinia Shire Council, 2012.

Murphy, A and S. Thomson. 150 Berwick-Cranbourne Road, Cranbourne: Cultural Heritage Management Plan (10125). Sponsored by Devine Ltd, 2008.

Murphy, A., and S. Thomson. Prep to Year 12 School Development, 34s Broad Oak Drive, Cranbourne East: Cultural Heritage Management Plan (10574). Sponsored by Department of Education & Early Childhood Development, 2009.

Nicolson, O., Residential Subdivision 1555 South Gippsland Highway and 50 Berwick Cranbourne Road, Cranbourne East, Victoria: CHMP, unpublished report prepared for Peet Cranbourne Central Syndicate Ltd and Peet Gippsland Highway Pty Ltd 2011.

Patton, K., 15 & 33 Mary Street Officer, Victoria: CHMP, unpublished report prepared for Melbourne Water, 2011.

Presland, G. 'An Archaeological Survey of Melbourne Metropolitan Park' Victoria Archaeological Reports 15, 1983.

PROV VPRS 10 Inward Registered Correspondence to the Superintendent of Port Phillip District, relating to Aboriginal Affairs map accompanying letter of 29 January 1841.

Rymer, T. & Murphy, A., Sewer Rising Main, Officer South CHMP, unpublished report prepared for South East Water, 2008.

Sargeant, I. J. Soil Survey Western Port Catchment. Soil Survey Report No. 52, 1975.

Schell, P., Pasadena Residential Subdivision, 415 Clyde-Five Ways Road, Clyde, unpublished report prepared for Cranbourne Road, Holdings P/L, 2012

Schell, P., A. Light, A. Barker, C. Reid & J. Bowler. 415 Clyde-Five Ways Road, Clyde: Cultural Heritgae Management Plan No. 10091. A Report to Villawood Properties P/L, 2009.

Sciusco, L. An archaeolgoical survey of a pipeline easement between Dandenong and Hastings road and Knowles road Cranbourne, unpublished report to Melbourne Water, 1995.

Schlitz, M., & Matic, A., Lakeside Extension Structure Plan (Stage 2), Pakenham, Victoria, unpublished report prepared for Delfin Lend Lease Pty Ltd, 2009.

Shire of Pakenham, 'Flooding in Kooweerup Swamp: Pakenham Shire' Pakenham Shire, Pakenham, 1981.

Smith, I. The Berwick-Pakenham Corridor. The Archaeological Survey of Aboriginal Sites. Report to Victoria Archaeological Survey, Ministry for Planning and Development, 1989.

Smith, L. Berwick-Pakenham Corridor: Aboriginal Archaeology. Report produced by the Victoria Archaeological Survey and the Ministry for Planning and Environment, 1991.

Stevens, J. & G. Vines. VicUrban@Officer Mixed Use Development, Officer Cultural Heritage Management Plan 11091. Sponsor: VicUrban, 2011.

Sullivan, H. 'An Archaeological Survey of the Mornington Peninsula Victoria' Archaeological Survey Occasional Reports 6, 1981.

The Argus 29 Sep 1848:4, Crown Leases.

Thomas, W. Journal November (1858)

Thomas, W. ML. Private Papers, 16 volumes and 8 boxes of papers, journals, letterbooks, reports etc. Uncatalogued manuscripts, Set 214: items 1-28. Mitchell Library, Sydney, n.d.

Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840.

Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840: entry 11 February 1840.

Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840: entry 14 March 1840.

Thomas Journal 1840 ZML MSS 214 Item 22 (28) fol 533.

Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840 entry for 2 march 1840.

Thomson, M. & Muir, S. stage 2: Aboriginal archaeological sub-surface investigations for the proposed Officer development project, Officer, Victoria, unpublished report to VicUrban.

Toscano, M., MacCullock, J., & Hyett, J., Edenbrook Estate (Part 2) Pakenham Residential Development CHMP, unpublished report prepared for VR Pakenham Trust, 2011.

Tunn, J. Pleistocene Landscapes of Brimbank Park, Keilor, Victoria. In The Artefact, Vol. 21, pp.35-47, pp 46, 1998.

Tunn, J. An Aboriginal Campsite on the Maribyrnong River – New Dates for Keilor. In The Artefact, Vol. 29, pp.14-21, 2006.

Vines, G., et al., VicUrban's Residential Subdivision Project at Officer, Victoria, Cardinia Road Precinct CHMP, unpublished report prepared for VicUrban, 2008.

Walker, J., Hunt Club Development, Cranbourne CHMP, unpublished report prepared for City of Casey, 2012

Williams, E. 'Look to the rising sun, back to Cardinia 1984: a history of Cardinia and district, including Rythdale and Pakenham South' Back to Cardinia Committee, Cardinia, 1984.

William Thomas, Protector of Aborigines, Victoria. Papers 1832-1902 Mitchell Library ZML MSS214/22 (28) fol 547.

William Thomas, Protector of Aborigines, Victoria. Papers 1832-1902 Mitchell Library ZML MSS214/22 (28) fol 533.

Appendix 1 – STANDARD ASSESSMENT

STANDARD ASSESSMENT

Archaeological Survey Details

The following sections describe the results of an archaeological survey undertaken by AHMS across McPhersons PSP 1055, Clyde North from 19th – 22nd November 2012. The survey aimed to identify areas of archaeological potential, landforms, vegetation patterns, geomorphic units, and areas of disturbance.

The investigation was also used to assess the extent to which past land-uses may have affected natural soil profiles. This information was used to assess the depth and potential integrity (intactness) of natural soil profiles across the study area and the likely impact of future construction.

The results of the survey were used to help inform PSP planning and design and to inform development of management recommendations for the study area.

Survey Methodology

The archaeological survey was designed to balance a comprehensive and representative sample of landforms across the study area and landowner requirements. The survey team included Shannon Sutton, Adrian Burrow, Jim Wheeler, Liz Foley and Evan Livingstone-Thomas of AHMS. Representatives of each Registered Aboriginal Party Applicant or Traditional Owner Group were present during the survey (the participants are listed in the Table 6 below):

Table 8 Survey Participants

Date	Wurundjeri	Boon Wurrung	Bunurong
19/11/12	Garry Galway	None Available	Dan Turnbull
20/11/12	Garry Galway	Ngara Williams	Izzy Pepper
21/11/12	Shane Nicholson	Michael Williams	Dan Turnbull
22/11/12	Trevor Downe	Michael Williams	Dan Turnbull

The Standard Assessment involved a five stage approach:

Stage 1 – AHMS sought contact with all landowners who had agreed to be a part of the study to arrange a date for the archaeological survey to be conducted. AHMS also sought advice from each landowner on access issues and discussed requirements which some landowners had stipulated. All of the landowners who had agreed to be part of the study were contactable. This stage of work was used to define the scope of the standard assessment, including which parcels of land would be included in the investigation and therefore form a revised 'study area'. A map showing the participating landholdings is shown on Figure 16 and the property details are shown on Table 8.

Stage 2 - An analysis of topographic maps and aerial photographs of applicable properties was undertaken prior to the survey to identify landforms across the study area and to identify areas of ground surface exposure in the form of tracks, unsealed roads, dams, cuttings and areas of ground exposure. These areas were targeted during the survey because they provided an opportunity to identify surface artefact scatters and to investigate exposed soil profiles.

Stage 3 - The first step we took when entering each property was to drive around the property (where the landowner had given permission) to familiarise ourselves with the landscape and identify any mature/old growth native trees and areas of ground surface visibility. This assisted in scoping out our approach to survey in each property.

Stage 4 - Following the initial scoping work surveying was conducted on foot in areas of ground surface exposure. The team typically walked in transects with a spacing of 5m between each team member.

The survey used the information obtained from analysis of aerial photographs and topographic maps (Stage 2), as well as the initial scoping work (Stage 3), to survey areas of ground surface visibility (to identify surface artefact scatters) and mature/old growth trees (to identify scarred trees). Areas of erosion and ground exposure were examined for archaeological evidence such as stone artefacts, charcoal and shell. Ground surfaces and cuttings were also examined to determine the degree of soil disturbance, erosion and potential for archaeological deposits below current ground. Mature trees were examined for evidence of scarring, axe marks and/or old footholds.

Stage 5 – Surface artefact scatters found during the surveys were recorded in detail using a pro-forma developed for field recording. The location and extent of each surface site was recorded with a Leica CS15 Differential GPS which provides sub metre accuracy. Field notes were made and photographs taken to document landscape configuration, soil profiles, soil disturbance, ground visibility and vegetation types. During the survey we also sought to relocate previously registered Aboriginal places using a DGPS and the co-ordinates supplied for each place.

Survey Coverage

A total of 18 properties were surveyed within the study area (Figure 19, Table 1)[212]. Details of the accessible properties and influences on survey coverage for each property are outlined in Table 8.

Survey coverage aimed to balance sampling of areas of ground surface exposure on these properties with detailed coverage of areas of high to very high sensitivity indicated in the predictive model developed during the Desktop Assessment. The survey also aimed to sample each of the landform types, providing coverage of crest, slope and floodplain landforms. While the entire PSP area was subject to systematic pedestrian survey, the survey was particularly comprehensive in areas demonstrating good ground surface visibility and those areas highlighted as having the highest predicted sensitivity along the margins of Cardinia Creek, Clyde Creek, as well as suspected sandy rise landforms identified during the desktop assessment and identified during the Stage 3 survey investigation.

Effective survey coverage during the survey was limited. At the time of survey visibility was extremely low due to thick pasture grasses growing throughout the study area following recent heavy winter rain. Areas of increased ground surface visibility were typically the areas of greatest disturbance (i.e. rabbit burrowing, farm access tracks and areas of erosion adjacent to watercourses).

[212] Note that several landowners own more than one property

Figure 18 Landholdings within McPherson PSP 1055.

Table 9 Survey Coverage Data – McPherson PSP 1055 (refer to Figure 19 for property IDs).

PSP ID	Address	Ground Surface Visibility	Accessibility	Artefacts
1	10 Smiths Lane, Clyde North VIC	Visibility approx. 1% due to very heavy long grass cover. Patches of exposure in area bordering Cardinia Creek – above creek on flat underneath pine trees.	100%	None
2	20 Smiths Lane, Clyde North VIC	<5% due to low pasture grasses. Areas of visibility along fences, water tanks and along flat above Cardinia Creek.	95% - Did not access area near dwelling	None
3	1665 Pound Road, Clyde North VIC	5% - <5% Visibility in property. Increased visibility in areas of disturbance including areas of cattle treadage and vehicular access tracks. One paddock recently ploughed = 100% visibility. Traversed in 2.5m transects in ploughed paddock.	80% - Did not enter paddocks with bulls.	None
4	1715 Pound Road, Clyde North VIC.	Flat field with long fallow grasses (<1 visibility) and low pasture grasses (<5% visibility) throughout. Minimal topsoil disturbance resulting in minimal ground surface visibility.	100%	None
5	95 McCormack's Road, Clyde North VIC	<1% visibility due to long fallow grasses throughout. The only ground surface visibility within the property is around the dam and its associated drainage channel.	100%	None
6	125 McCormack's Road, Clyde North VIC	<5% visibility due to presence of long fallow grasses and gorse throughout and presence of dumped refuse (car bodies, asbestos, road materials) sand quarrying. Thick gorse growing throughout limited visibility and property access.	80%	None
7	55 McCormack's Road, Clyde North VIC	<5% visibility. All paddocks contained low grasses and horses. Increased visibility in areas of exposure along access track to main driveway.	100%	None
8	75 McCormack's Road, Clyde North VIC	1% - 5% Visibility. Property covered by thick pasture grasses. Increased visibility in areas of stock treadage, under trees and along fence lines, sheds, dams and along shallow drainage channels.	100%	None
9	270 Hardy's Road, Clyde North VIC	Thick grasses in all fields <1% visibility. Northernmost section of paddock has been recently ploughed – 100% visibility in this area. Traversed this section in pedestrian transects with 2.5m spacing.	95% - did not access area near dwelling.	None
10	375 Patterson's Road, Clyde North VIC	<1% visibility due to thick pasture grasses. The only ground surface exposure within the property is along fence lines.	100%	None
11	1720 Pound Road,	<5% visibility. Increased ground surface visibility along access tracks. Property	100%	None

PSP ID	Address	Ground Surface Visibility	Accessibility	Artefacts
	Clyde North VIC	predominantly covered by low pasture grasses.		
12	465-475 Pattersons Road, Clyde North VIC	Minimal ground surface visibility (<5%). Ground surface visibility increased in areas of exposure – particularly vehicular access tracks and farm access gates (horse treadage), as well as around dam.	50% Limited due to horse yards which could not be accessed	None
13	370 Pattersons Road, Clyde North VIC	High visibility (>60%) reflecting substantial modification of property for equestrian riding centre. Ground surface covered by imported sand.	100%	None
14	470 Pattersons Road, Clyde North VIC	Visibility <5% due to low grasses (>30cm high) and gorse coverage (approx. 60-70% of the property) which hampered visibility and property access. Increased visibility along pedestrian access tracks and around dam.	60% due to presence of thick gorse throughout	None
15	370 Pattersons Road, Clyde North VIC	<5% visibility due to long fallow grasses growing throughout property. Increased visibility in areas of ground disturbance, including access tracks, areas around fencing and areas of stock trampling.	95% - did not access area near dwelling.	None
16	1895 Ballarto Road, Clyde North VIC.	Low ground surface visibility (1%) due to grasses up to 50cm high. Visibility greatest in areas of cattle disturbance (around access gates, water troughs), and along access tracks and dams.	95% excludes Alpaca paddock	None
17	1965 Ballarto Road, Clyde North VIC.	Generally low exposure (<5%). Visibility greatest in areas of disturbance/ground surface exposure which include access tracks and ruins associated with a 1950's dwelling. Rabbit burrowing on low rises revealed underlying soil matrix of silt descending to lighter sand.	100%	None
18	110 Smiths Lane Clyde North VIC.	Poor visibility due to low pasture grasses (<5%). Increased visibility in areas of cattle disturbance (treadage around access gates and water troughs), and along fence lines and access tracks.	100% Avoided muddy areas.	None

General Observations

The key landform features of the study area are the two creeks that bisect parts of it, Clyde Creek and Cardinia Creek located on the south western and north eastern boundaries of the properties respectively. Clyde Creek is located at the base of a narrow shallow open depression forming the current creek-line. Cardinia Creek is located at the base of a narrow and deeply incised drainage channel with steep banks. Monterey Cypress pines have been planted along the boundary of Cardinia Creek in an effort to stabilise the bank.

Figure 19 Section of Cardinia Creek (110 Smiths Lane), note the steep banks and vegetation dominated by Monterey Cypress pines.

Only a small section of Clyde Creek is present within the study area - along the south-western boundary of property ID# 16. This section of Clyde Creek has been heavily modified by agricultural activities – specifically to feed into artificial drainage channels and a large dam immediately east of the creek.

The landscape of PSP 1055 is characterised by low-lying floodplains with discrete areas of higher elevation including low rises in the form of broad crest (non-dunal) landforms and low sandy rises. The sand rise landforms dotted across the study area almost certainly form part of the Cranbourne Sands soil landscape. One alluvial levee was also identified. This levee, likely formed through incremental flooding of the Cardinia Creek, has the potential for deep silty sediment profiles. The remainder of the study area comprises flat to gently undulating topography.

Most of the properties were under pasture, both closely cropped and fallow, and historic aerial mapping (Figure 15) shows that sections of the study area have been subject to ploughing. Ground surface visibility was correspondingly very low across nearly all properties (<1% pm2). Areas of high ground surface visibility (80-100%pm²) were typically restricted to isolated patches under trees, along tracks and in areas of stock trampling and other disturbances.

Native vegetation was limited to small pockets in several properties where several non-mature eucalyptus gums were observed. Due to their recent age, cultural scars were not observed on these trees. No areas of remnant native grassland or swamp scrubland were observed within the study area.

The survey was used as an opportunity to improve our model of the extent and nature of past ground disturbance which had previously been assessed from historical and recent aerial images.

Disturbance within the study area was extensive and caused by a wide range of factors. The following specific disturbances to the study area were observed during the survey:

- Furrowing and ploughing for cultivation;
- Construction of dams;
- Construction of houses and out-buildings;
- Construction of formal gardens;
- Construction of sheds for farm activities;
- Construction of major and minor roads throughout the study area;
- Construction of driveways and path networks;
- Construction of farm tracks; and
- Installation of boundary fences.

These impacts have been previously discussed in the Desktop Assessment and are shown on Figure 14. It is considered unlikely that archaeological material will be located within areas of cut and fill disturbance (shaded black on Figure 14) because these areas comprise substantially modified and/or highly disturbed ground resulting from cut and fill for construction of dams, buildings and a desalination pipe. This is likely to have resulted in the complete removal of archaeological deposits from these parts of the study area.

Figure 20 Example of section of Clyde Creek in the south western section of the McPherson PSP 1055 Study Area (property 16).

Figure 21 Large dam immediately east of Clyde Creek on property 16.

Conclusions

The results of the archaeological survey indicate the study area has very low ground surface visibility which resulted in very low effective survey coverage. Survey was generally ineffective in identifying the nature, extent and significance of cultural heritage across the study area. The results did not require modification of any predictions made in the predictive modelling and preliminary sensitivity mapping developed as part of the desktop assessment.

Drawing on the results of survey, a limited number of conclusions regarding likely archaeological patterning were made:

- Ground surface visibility in McPhersons PSP 1055 was extremely low and was therefore ineffective in determining the nature and density of potential surface Aboriginal cultural material within areas of dense pasture grass coverage or other ground cover;
- Although native vegetation was examined (particularly along the creek corridors), none contained evidence of scarring and no mature trees of sufficient age to retain cultural marking or scarring were encountered;
- Areas of prior cut and fill disturbance initially identified during the desktop assessment were examined during the survey and in disturbance in these areas has been considerable – likely resulting in the removal of complete disturbance of any archaeological deposits that may have originally been present; and
- The model in this region is robust and indicates that areas of very low sensitivity will contain low density, low frequency surface and sub-surface deposits reflective of occasional use and casual discard. The Desktop and Standard Assessment also demonstrates the integrity of archaeological deposits in these areas is almost certainly low as a result of some farming and ploughing activities.

Cultural Values

During the survey, the Aboriginal community representatives were consulted about key cultural and landscape values.

The aim of this consultation was to gain an indication of the cultural values which may be relevant to the landscape and to assist in developing a scope for more detailed cultural values assessment during complex assessments.

Cultural values are likely to be associated with but not limited to the following:

- Waterways and wetlands;
- Areas of natural habitat (particularly areas of remnant vegetation);
- Habitat of specific plant or animal species that are / were important resources or had spiritual or totemic significance;
- Known archaeological / cultural sites;

- Old Trees;
- Burial Places (including areas that have a higher potential to contain burials, such as soft alluvial soils on terrace landforms);
- Ceremonial sites;
- Former spring sources;
- Tracks and routes;
- Stone sources;
- Hills and high points within the volcanic landscape;
- Rock outcrops, particularly outcropping rock along creek corridors;
- Places of post contact and contemporary importance / history.

During the survey, the Aboriginal community representatives were asked to comment on any cultural values, particularly in regards to the importance of remnant native vegetation, traditional food plants and landscape values. No comments were received from the Aboriginal community representatives during the survey.

Appendix 2 - PLANNING SCHEME 37.07 (URBAN GROWTH ZONE)

37.07 URBAN GROWTH ZONE

08/08/2012
VC87

Shown on the planning scheme map as **UGZ** with a number.

Purpose

To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.

To manage the transition of non-urban land into urban land in accordance with a precinct structure plan.

To provide for a range of uses and the development of land in accordance with a precinct structure plan.

To contain urban use and development to areas identified for urban development in a precinct structure plan.

To provide for the continued non-urban use of the land until urban development in accordance with a precinct structure plan occurs.

To ensure that, before a precinct structure plan is applied, the use and development of land does not prejudice the future urban use and development of the land.

Application of provisions

Part A – No precinct structure plan applies

The provisions of clauses 37.07-1 to 37.07-8 apply if no precinct structure plan applies to the land.

Part B – Precinct structure plan applies

The provisions of clauses 37.07-9 to 37.07-16 apply if a precinct structure plan applies to the land.

Precinct structure plan provisions

A precinct structure plan applies to land when the precinct structure plan is incorporated in this scheme.

PART A - PROVISIONS FOR LAND WHERE NO PRECINCT STRUCTURE PLAN APPLIES

37.07-1 Table of uses

08/08/2012
VC87

Section 1 – Permit not required

Use	Condition
Agriculture (other than Animal keeping, Apiculture, Intensive animal husbandry, Rice growing and Timber production)	
Bed and breakfast	No more than 6 persons may be accommodated away from their normal place of residence. At least 1 car parking space must be provided for each 2 persons able to be accommodated away from their normal place of residence.
Dependent person's unit	Must be the only dependent person's unit on the lot. Must meet the requirements of Clause 37.07-2.

Use	Condition
Dwelling (other than Bed and breakfast)	Must be the only dwelling on the lot. The lot must be at least 40 hectares. Must meet the requirements of Clause 37.07-2.
Home occupation	
Informal outdoor recreation	
Minor utility installation	
Railway	
Tramway	
Any use listed in Clause 62.01	Must meet the requirements of Clause 62.01

Section 2 – Permit required

Use	Condition
Animal boarding	
Animal keeping (other than Animal boarding)	Must be no more than 5 animals.
Car park	Must be used in conjunction with another use in Section 1 or 2.
Cemetery	
Community market	
Crematorium	
Dependent person's unit – if the Section 1 condition is not met	Must meet the requirements of Clause 37.07-2.
Display home	
Dwelling (other than Bed and breakfast) – if the Section 1 conditions are not met	Must be no more than two dwellings on the lot. Must meet the requirements of Clause 37.07-2.
Education centre	
Emergency services facility	
Freeway service centre	Must meet the requirements of Clause 52.30.
Freezing and cool storage	
Group accommodation	Must be used in conjunction with Agriculture, Outdoor recreation facility, Rural industry, or Winery. Must be no more than 6 dwellings.
Hospital	
Host farm	
Interpretation centre	
Leisure and recreation (other than Informal outdoor recreation and Motor racing track)	
Manufacturing sales	
Medical centre	
Nursing home	
Place of assembly (other than Carnival, Circus, and Place of worship)	Must not be used for more than 10 days in a calender year.
Place of worship	
Primary produce sales	
Real estate agency	

Use	Condition
Residential hotel **Restaurant**	Must be used in conjunction with Agriculture, Outdoor recreation facility, Rural industry, or Winery.
Rice growing **Rural industry** **Rural store**	
Store (other than Freezing and cool storage and Rural store)	Must be in a building, not a dwelling, and used to store equipment, goods, or motor vehicles used in conjunction with the occupation of a resident of a dwelling on the lot.
Utility installation (other than Minor utility installation and Telecommunications facility) **Veterinary centre** **Winery**	
Any use listed in Clause 62.01 if any requirement is not met	

Section 3 - Prohibited

Use
Accommodation (other than Dependent person's unit, Dwelling, Group accommodation, Host farm, Nursing home, and Residential hotel)
Industry (other than Rural industry)
Intensive animal husbandry
Motor racing track
Office (other than Medical centre and Real estate agency)
Retail premises (other than Community market, Manufacturing sales, Primary produce sales and Restaurant)
Saleyard
Warehouse (other than Store)
Wind energy facility
Any other use not in Section 1 or 2

37.07-2 Use of land for a dwelling

10/06/2008
VC48

A lot used for a dwelling must meet the following requirements:

- Access to the dwelling must be provided via an all-weather road with dimensions adequate to accommodate emergency vehicles.
- The dwelling must be connected to a reticulated sewerage system or if not available, the waste water must be treated and retained on-site in accordance with the State Environment Protection Policy (Waters of Victoria) under the Environment Protection Act 1970.
- The dwelling must be connected to a reticulated potable water supply or have an alternative potable water supply with adequate storage for domestic use as well as for fire fighting purposes.
- The dwelling must be connected to a reticulated electricity supply or have an alternative energy source.

These requirements also apply to a dependent person's unit.

37.07-3 Subdivision of land

10/06/2008
VC48

A permit is required to subdivide land.

Each lot must be at least 40 hectares.

A permit may be granted to create smaller lots if any of the following apply:

- The subdivision is to create a lot for an existing dwelling. The subdivision must be a two lot subdivision. An agreement under section 173 of the Act must be entered into with the owner of each lot created which ensures that the land may not be further subdivided so as to create a smaller lot for an existing dwelling. The agreement must be registered on title.
- The subdivision is the re-subdivision of existing lots and the number of lots is not increased. An agreement under section 173 of the Act must be entered into with the owner of each lot created which ensures that the land may not be further subdivided so as to increase the number of lots. The agreement must be registered on title.
- The subdivision is by a public authority or utility service provider to create a lot for a utility installation.

37.07-4 Buildings and works

10/06/2008
VC48

A permit is required to construct or carry out any of the following:

- A building or works associated with a use in Section 2 of Clause 37.07-1. This does not apply to:
  - An alteration or extension to an existing dwelling provided the floor area of the alteration or extension is no more than 50 square metres.
  - An alteration or extension to an existing building used for agriculture provided the floor area of the alteration or extension is no more than 100 square metres. The building must not be used to keep, board, breed or train animals.
- Earthworks which change the rate of flow or the discharge point of water across a property boundary.
- Earthworks which increase the discharge of saline water.
- A building which is within any of the following setbacks:
  - 100 metres from a Road Zone Category 1 or land in a Public Acquisition Overlay to be acquired for a road, Category 1.
  - 40 metres from a Road Zone Category 2 or land in a Public Acquisition Overlay to be acquired for a road, Category 2.
  - 20 metres from any other road.
  - 5 metres from any other boundary.
  - 100 metres from a dwelling not in the same ownership.
  - 100 metres from a waterway, wetlands or designated flood plain.

37.07-5 Referral of applications

10/06/2008
VC48

An application of the kind listed below must be referred in accordance with section 55 of the Act to the referral authority specified in Clause 66.03.

- An application to use or develop land for any of the following:
  - Display home
  - Education centre
  - Hospital
  - Medical centre
  - Nursing home
  - Place of worship
  - Real estate agency.
- An application to subdivide land to create a lot smaller than 40 hectares in area.

37.07-6 Environmental audit

10/06/2008
VC48

Before a nursing home, pre-school centre or primary school commences on potentially contaminated land, or before the construction or carrying out of buildings and works in association with a nursing home, pre-school centre or primary school commences on potentially contaminated land, either:

- A certificate of environmental audit must be issued for the land in accordance with Part IXD of the Environment Protection Act 1970, or
- An environmental auditor appointed under the Environment Protection Act 1970 must make a statement in accordance with Part IXD of that Act that the environmental conditions of the land are suitable for the sensitive use.

In this clause, "potentially contaminated land" means land used or known to have been used for industry, mining, or the storage of chemicals, gas, wastes or liquid fuel (if not ancillary to another use of the land).

37.07-7 Decision guidelines

10/06/2008
VC48

Before deciding on an application to use or subdivide land, construct a building or construct or carry out works, in addition to the decision guidelines in Clause 65, the responsible authority must consider, as appropriate:

- The State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- The effect on the future urban development and use of the land, and adjacent or nearby land, having regard to:
  - Any relevant Growth Area Framework Plan.
  - Any precinct structure plan being prepared for the area.
  - Any comments or directions of the referral authority.
- Whether the proposal will prejudice the logical, efficient and orderly future urban development of the land, including the development of roads, public transport and other infrastructure.
- The capability of the land to accommodate the proposed use or development, including the disposal of effluent.
- How the use or development relates to sustainable land management.
- Whether the site is suitable for the use or development.
- The impact of the siting, design, height, bulk, colours and materials to be used on the natural environment, major roads, vistas and water features, future urban use of the land, and the measures to be undertaken to minimise any adverse impacts.
- The impact on the character and appearance of the area or features of architectural, historic or scientific significance or of natural scenic beauty or importance.
- The location and design of existing and proposed infrastructure including roads, public transport, walking and cycling networks, gas, water, drainage, telecommunications and sewerage facilities.
- Whether the use and development will require new or upgraded infrastructure, including traffic management measures.

37.07-8 Advertising signs

21/09/2009
VC60

Advertising sign requirements are at Clause 52.05. The zone is in Category 3.

Despite the provisions of Clause 52.05-9, a permit may be granted, for a period of not more than 5 years, to display an advertising sign that promotes the sale of land or dwellings.

PART B - PROVISIONS FOR LAND WHERE A PRECINCT STRUCTURE PLAN APPLIES

37.07-9 Use of land

23/09/2011
VC77

Any requirement in the Table of uses and any requirement specified in the schedule to this zone must be met.

A permit granted must be generally in accordance with the precinct structure plan applying to the land.

Table of uses

Section 1 – Permit not required

Use	Condition
Any use in Section 1 of a zone applied by the schedule to this zone	Must comply with any condition opposite the use in Section 1 of the applied zone Must comply with any condition or requirement specified in the schedule to this zone or in the precinct structure plan
Any use specified in the schedule to this zone as a use for which a permit is not required	Must comply with any condition or requirement specified in the schedule to this zone or in the precinct structure plan

Section 2 – Permit required

Use	Condition
Any use in Section 2 of a zone applied by the schedule to this zone	Must comply with any condition opposite the use in Section 2 of the applied zone Must comply with any condition or requirement specified in the schedule to this zone or in the precinct structure plan
Any use specified in the schedule to this zone as a use for which a permit is required	Must comply with any condition or requirement specified in the schedule to this zone or in the precinct structure plan
Any other use not in Section 1 or 3	

Section 3 - Prohibited

Use
Any use in Section 3 of a zone applied by the schedule to this zone
Any use specified in the schedule to this zone

37.07-10 Subdivision of land

23/09/2011
VC77

A permit is required to subdivide land. Any requirement in the schedule to this zone or the precinct structure plan must be met.

A permit granted must:

- Be generally in accordance with the precinct structure plan applying to the land.
- Include any conditions or requirements specified in the schedule to this zone or the precinct structure plan.

37.07-11 Buildings and works

23/09/2011
VC77

If the schedule to this zone specifies:

- That the provisions of a zone apply to the development of land, the provisions of the zone apply to land in the circumstances specified in the schedule.
- Provisions relating to the development of land, those provisions apply to land in the circumstances specified in the schedule.

If the schedule to this zone specifies that a permit is required to construct a building or construct or carry out works, a permit granted must:

- Be generally in accordance with the precinct structure plan applying to the land.
- Include any conditions or requirements specified in the schedule to this zone or the precinct structure plan.

37.07-12 Application requirements

10/06/2008
VC48

An application to use or subdivide land, construct a building or construct or carry out works, must be accompanied by any information specified in the schedule to this zone.

37.07-13 Exemption from notice and review

23/09/2011
VC77

An application under clause any provision of this scheme which is generally in accordance with the precinct structure plan applying to the land is exempt from the notice requirements of section 52(1)(a), (b) and (d), the decision requirements of section 64(1), (2) and (3) and the review rights of section 82(1) of the Act., unless the schedule to this zone specifies otherwise.

37.07-14 Decision guidelines

10/06/2008
VC48

Before deciding on an application to use or subdivide land, construct a building or construct or carry out works, in addition to the decision guidelines in Clause 65, the responsible authority must consider, as appropriate:

- The State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- Any relevant Growth Area Framework Plan.
- The precinct structure plan applying to the land, including the vision and objectives of the precinct structure plan.
- Any guidelines in the schedule to this zone.

37.07-15 Inconsistencies between specific and applied zone provisions

10/06/2008
VC48

If there is an inconsistency between the specific provisions specified in the schedule to this zone and the provisions of a zone applied by the schedule to this zone, the specific provisions prevail to the extent of any inconsistency.

37.07-16 Advertising signs

10/06/2008
VC48

Advertising sign requirements are at Clause 52.05. This zone is in the category specified in the schedule to this zone or, if no category is specified, Category 3.

Notes: *Refer to the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement, for strategies and policies which may affect the use and development of land.*

Check whether an overlay also applies to the land.

Other requirements may also apply. These can be found at Particular Provisions.

Appendix 3 - GLOSSARY OF TECHNICAL TERMS

Aeolian	Wind generated geological processes. In an archaeological context it usually refers to wind blown deposits and sands.
Backed Artefact / Backing	A retouched tool (maybe a complete, distal, medial or proximal flake) that displays evidence of backing along one lateral margin. This backing may be initiated from the ventral surfaces or alternately may be an example of bidirectional backing initiated from both surfaces (Holdaway and Stern 2004:259). There are four main types of commonly recognised backed artefacts, which include 'Bondi Points; geometric microliths (or 'Backed Blades'), Juan Knives and Eloueras'.
Bipolar	A method of removing flakes from a core, by striking a core against an anvil (Holdaway and Stern 2004:11). This is often evidenced by crushing at the platform and/or at the termination of the flake; Bipolar flaking is also evidenced as crushing at the base (end opposite the platform) of a core.
Blade	A flake that is twice as long as its width.
Bulbar	Refers to a bulb of percussion produced during a conchoidal fracture
Chert	'a dense, extremely hard, microcrystalline or cryptocrystalline, siliceous sedimentary rock, consisting mainly of interlocking quartz crystals, sub-microscopic and sometimes containing opal (amorphous silica). It is typically white, black or grey, and has an even to flat fracture. Chert occurs mainly as nodular or concretionary aggregations in limestone and dolomite, and less frequently as layered deposits (banded chert). It may be an organic deposit (radiolarian chert), an inorganic precipitate (the primary deposit of colloidal silica), or a siliceous replacement of pre-existing rocks' (Lapidus 1990:102).
Conchoidal	Where a force strikes the surface of a core forming a circular or 'ring' crack that bends back towards the surface of the core, forming a partial bulb of percussion. The fracture frequently moves towards the exterior surface of the core, detaching a flake (Holdaway and Stern 2004:34).
Core	Andrefsky (1998:80-81) states a core can be understood as 'an objective piece that has had flakes removed from its surface'; Holdaway and Stern (2004:37; 5-8) provide further clarification 'artefacts that retain the negative flake scars of previous flake removals'.
Cortex	The outer layer of patination of rock is known as cortex. It is found on weathered stone (Holdaway & Stern 2004: 26-27). Cortex types (mostly rough, water worn or pebble) can indicate the source that stone material was obtained from.
Debitage	Small spalls and flakes produced during percussion, bipolar and pressure flaking.

Fine Grained Basalt	Basalt is a volcanic rock. See Volcanic below.
Flake	Depending on the completeness of the flake, a flake may have a number of common characteristics which may include: a platform, bulb of percussion, errailure (or bulbar) scar, point of force impact (PFI or umbo), dorsal ridge and ventral surface, fissures (or indentations), ripple marks (which radiate away from the point of force impact/umbo) and a termination. Not all of these features are typically found on every flake, however they are attributes likely to be present from conchoidal fracture.
Negative Flake Scar	The negative indentation or scar left behind on a flake, core or tool when a flake is removed. The presence and abundance of negative flake scars can reveal information about the process of flaking. For example negative flake scars on a) cores can provide information on how intensely the core has been used, b) on the dorsal surface of a flake can indicate how intensely the core was flaked before this flakes was removed and/or that the core platform was cleaned off to start flaking again (platform rejuvenation), c) along the edge of a flake can indicate retouch/backing (Holdaway and Stern 2004:184).
Point	A term applied to certain formal types such as Bondi Points.
Platform	A striking platform or a platform is the surface from which a flake is struck from a Core (Holdaway and Stern 2004:5); flakes retain part of the platform on their proximal end.
Quartz	**'**crystalline silica, SiO_2. It crystallizes in the trigonal system, commonly forming hexagonal prisms. For cryptocrystalline varieties of silica see Chalcedony. Colourless and transparent quartz, is found in good crystals, is known as rock crystal. Varieties that are colours due to the presence of impurities may be used as gemstones, amethyst, purple to blue-violet, rose quartz, pink; citrine, orange-brown; smoky quartz, pale yellow to deep brown' (Lapidus 1990:429).
Quartzite	'a metamorphic rock consisting primarily of quartz grains, formed by the recrystallization of sandstone by thermal or regional metamorphism; a metaquartzite and a sandstone composed of quartz grains cemented by silica; an orthoquartzite' (Lapidus 1990:430).
Retouch	Modification of a flake or core prior to use. Retouch is the 'removal of a series of small, contiguous flakes' from the edges of the artefact (Holdaway and Stern 2004:33). There are several different types of retouch which are identified as backing; stepped; scalar; invasive; notched and serrated retouch.
Reduction	By definition stone material is made smaller when it is struck to produce stone flakes and tools. This process is known as stone reduction.

	'Modern stone artefact analyses use the reductive nature of stone artefact manufacture as the basis for reconstructing the processes by which artefacts were made. By analysing the size and form of artefacts, archaeologists can obtain information about how stone was acquired from its source, the form in which the stone was transported to campsites, how it was worked, and the way stone artefacts were use until discarded' (Holdaway and Stern 2004:3).
Scarred Tree	A tree that has been marked as a result of bark being removed by Aboriginal people for cultural reasons or for use in making shields, containers, canoes etc. Some trees may also have marks caused by making toe holds for climbing up trees.
Scraper	'A minimal definition of a scraper is that it is a flake with one or more margins of continuous retouch'. It also indicates the stage of reduction the flake has reached (see Holdaway and Stern 2004:227).
Silcrete	**'**a hard surface deposit composed of sand and gravel cemented by opal, chert and quartz, formed by chemical weathering and water evaporation in semi-arid climate. Extensive deposits of silcrete are found in S. Africa and Australia. Silcrete is a siliceous duricrust' (Lapidus 1990:472).
Termination	There are a number of different flake terminations (or ends of a flake) which are possible through flaking stone material. The main types of flake terminations include step, hinge, feather and plunging. Flake terminations can provide information about how the flake was removed.
Tool	A tool is an artefact which shows evidence of modification (i.e. by retouch) or without modification (i.e. show signs of usewear) (Holdaway and Stern 2004:33; 39).
Tuff	'pyroclastic rock composed mainly of volcanic ash (fragments <2mm in diameter). Tuffs may be classified as crystal tuff if they contain a large proportion of crystal fragments, vitric tuff composed mainly of glass and pumice fragments and lithic tuff, containing mainly rock fragments. A consolidated mixture of lapilli and ash is a lapilli tuff' (Lapidus 1990:519-520).
Usewear	'Evidence of distinctive patterns of wear [which is] sometimes found on the edges of artefacts that were believed to have been used for specific purposes' (Holdaway and Stern 2004:41). Several types of usewear can be observed. Holdaway and Stern (2004:41; 167) identify 'chattering' and 'edge damage' as one form of usewear.
Volcanic	'All extrusive rocks and associated high-level intrusive ones. The group is entirely magmatic and dominantly basic. Igneous lithic material generally dark in colour and may be glassy (like obsidian) or very fine-grained or glassy igneous rock produced by volcanic action at or near the Earth's surface, either extruded as lava (e.g. basalt) or expelled explosively' (Lapidus 1990:535).