Casey Central Town Centre PSP 12

Aboriginal Cultural Heritage Assessment (ACHA) - Desktop and Standard

METROPOLITAN PLANNING AUTHORITY

October 2015

AHMS

ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

ABORIGINAL CULTURAL HERITAGE ASSESSMENT - DESKTOP AND STANDARD

October 2015

SPONSOR: The METROPOLITAN PLANNING AUTHORITY

CULTURAL HERITAGE ADVISOR: Jim Wheeler

AUTHORS: Erica Walther, Jim Wheeler & John Tunn

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

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

ARCHAEOLOGICAL & HERITAGE
MANAGEMENT SOLUTIONS

SYDNEY | MELBOURNE | PERTH

AUTHOR/HERITAGE ADVISOR	Jim Wheeler
PROPONENT	Metropolitan Planning Authority
PROJECT NAME	Casey Central Town Centre PSP 12, Cranbourne North Aboriginal Cultural Heritage Assessment (ACHA)
REAL PROPERTY DESCRIPTION	part lot PS726539
DATE	26/10/2015

AHMS INTERNAL REVIEW/SIGN OFF				
WRITTEN BY	DATE	VERSION	REVIEWED	APPROVED
Erica Walther/Jim Wheeler	8/10/10	Draft 1	Jim Wheeler	NOT RELEASED
Lucy Welsh	5/12/14	Draft 2	Jim Wheeler	JW
Lucy Welsh	05/07/15	Final	Jim Wheeler	JW
John Tunn	26/10/15	Final	Cathryn Barr	CB

Copyright and Moral Rights

ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

ABN 45 088 058 388
ACN 088 058 388

www.ahms.com.au
info@ahms.com.au

SYDNEY
2/729 Elizabeth St
Waterloo NSW 2017
P 02 9555 4000
F 02 9555 7005

MELBOURNE
2/35 Hope St
Brunswick VIC 3056
P 03 9388 0622

PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

EXECUTIVE SUMMARY

The Metropolitan Planning Authority (The Sponsor) engaged Archaeological and Heritage Management Solutions (AHMS) Pty Ltd to prepare an Aboriginal Cultural Heritage Assessment (ACHA) - Desktop and Standard, for properties that included land within PSP 12, Casey Town Centre (Figure 1). The study area is approximately 60ha in area and comprises part lot PS726539 and PS726538 within the City of Casey.

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 12 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. The Boon Wurrung Foundation and the Wurundjeri Tribe Land and Compensation Cultural Heritage Council participated in the fieldwork.

Desktop Assessment

A search of the Victorian Aboriginal Heritage Register (VAHR) was undertaken in 2010 encompassing the study area which is within the South East Region which located 45 Aboriginal Places. Due to the small number of sites located the search area was extended to include a ten kilometre buffer surrounding the study area. A search of the VAHR on 5 August 2015, within this buffer, produced a total of 1121 registered places.

A review of previous Aboriginal archaeological assessment reports in and near the study area indicated areas of high archaeological potential are generally identified by the presence/absence of sandy soils, elevated landforms and/or land in proximity to water-courses. Previous investigations carried out for CHMP projects have typically identified high density and significant Aboriginal places in areas where these three landscape features intersect, e.g. elevated sandy landforms overlooking permanent water. In many instances the known archaeological record has been recorded in a sub-surface context. In these instances it appears that, in general, the archaeological record in lower lying areas is confined to the upper 500mm of the soil profile. In adjacent and elevated sand bodies, the soil profile can be much deeper and the archaeological record can remain intact to greater depths. An example of these elevated sand bodies (the Cranbourne Sands) is located in the north western corner of the study area. (Figure 5) and identified as an area of heritage sensitivity.

A review of historical and recent aerial photography indicates that the prior land-use disturbances that have occurred within the study area include an earlier phase of agricultural (grazing and ploughing) use which included clearing of native vegetation, followed by the more recent use of the land for market gardening, which has included significant modification to the original landscape and has included construction of large water storage dams, establishment of a network of reticulated watering infrastructure and establishment of garden beds.

The level and extent of prior disturbance indicates there is very little potential for *in-situ* Aboriginal sites within the study area and where encountered are likely to be sparse, highly disturbed and of very low integrity and low archaeological significance. The one exception to this statement relates to the elevated sand body (the Cranbourne Sands) located in the north western corner of the study area. The desktop assessment found that the archaeological potential of the study area ranges from nil in the areas that have been excavated for water storage dams, low across the areas of market gardening and moderate in remnant sand bodies where intact material may be preserved within deeper soil profiles

Standard Assessment

During the standard assessment, the entire study area was subject to an archaeological site inspection. Effective coverage across the study area was less than 5 % due to poor ground surface visibility. This indicates the survey was generally ineffective in identifying the extent of cultural material within the study area.

A small highly disturbed artefact scatter VAHR 7921-1545-1 comprising 6 stone artefacts identified on exposed market garden vehicle access tracks was identified during the site inspection.

The results of the desktop and standard assessment developed for this PSP were used to develop an archaeological sensitivity map of the study area. Due to the large extent of the Casey Central Town Centre PSP, 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:

- Crests = High Sensitivity;
- Areas within 200m of former water course or water body = High Sensitivity;
- Crest and within 200m of former water = Very High Sensitivity;
- Areas 200 – 400m from former water = Moderate Sensitivity;
- Areas 400 – 600m from former water = Low Sensitivity;
- Cut and Fill Disturbance = Nil Sensitivity;
- Ploughing Disturbance = Reduced Sensitivity by One Level.
- Market Gardening / Orcharding Disturbance = Low Sensitivity (includes a consideration of ploughing disturbance)

Management Recommendations

The results of the Desktop and Standard Assessment were used to develop a predictive model of archaeological sensitivity across the Casey Central Town Centre PSP area.

The predictive model and archaeological sensitivity map shown on Figure 12 is designed to inform PSP design and planning work. The sensitivity map is also designed to provide the landholder/landowners and development proponents with a guide to archaeological sensitivity within various the study area and to assist in gauging risk and making informed decisions about development design.

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 zones 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 this ACHA of the Casey Central Town Centre PSP area defined Moderate, Low and Nil levels of Aboriginal heritage sensitivity.

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 12 of this report, and wherever possible, planning decisions should:**

- Ensure development impact is focused on areas of lower heritage sensitivity (i.e. Nil to Low), and across those areas that result in the least 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 12:

Nil Sensitivity: 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.

Low Sensitivity: no design and planning recommendations. These areas are essentially archaeologically 'neutral' and are generally compatible with residential subdivision and development.

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.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Abbreviations

Abbreviation	Definition
OAAV	Office of Aboriginal Affairs Victoria
AHC	Australian Heritage Council
BP	Before Present (when referring to radiocarbon dating)
CHMP	Cultural Heritage Management Plan
AHC	Aboriginal Heritage Council
EVC	Ecological Vegetation Communities
LGA	Local Government Authority
RAP	Registered Aboriginal Party
SGD	Significant Ground Disturbance
VAHR	Victorian Aboriginal Heritage Register
BLC	Bunurong Land Council Aboriginal Corporation
BWF	Boon Wurrung Foundation
WTLCCHC	Wurundjeri Tribe Land and Compensation Cultural Heritage Council

Definitions

Term	Definition
Study area	The area or areas to be used or developed for the study
Sponsor	Metropolitan Planning Authority
Proponent	The person, persons or corporation who undertakes the study or parts of the study in accordance with the requirements of this CHMP

Part 1: Background Assessment

1 INTRODUCTION

1.1 Preamble

The Metropolitan Planning Authority (The Sponsor) engaged Archaeological and Heritage Management Solutions (AHMS) Pty Ltd to prepare an Aboriginal Cultural Heritage Assessment (ACHA) - Desktop and Standard for the proposed precinct structure plan (PSP) 'Casey Central Town Centre' (Figure 1). The study area is approximately 60ha in area and comprises part lot PS726539 within the City of Casey.

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 Casey Central Town Centre PSP area has the following areas of legislated cultural heritage sensitivity:

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

b) sand sheet including the Cranbourne Sand identified as "Qpd" on the Geological Survey of Victoria 1:250 000 map series SJ55-9 "Queenscliff".

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 Casey Central Town Centre PSP, to make design decisions that avoid or minimise further impact Aboriginal heritage values.

1.3 Cultural Heritage Advisor and Authorship

The principal authors of this report were Jim Wheeler (B.A Hons), Erica Walther (B. Arch Hons). Alison O'Connor (B. Arch Hons). Sharon Lane (Phd, B.A Hons) completed the stone artefact analysis. Laura Matarese, Lucy Welsh, John Tunn and Graham Wilson have also made contributions to the content of this report.

1.4 Acknowledgements

The authors acknowledge the assistance and valuable input provided by the Metropolitan Planning Authority, in particular Cathy Brady, Victoria Cook, Matt Stafford and Belinda Smith. Portions of the desktop assessment report were written by Andrew Long & Associates Pty Ltd in a South East Growth Areas strategic report written for the Growth Areas Authority[1] specifically to incorporate into PSP level desktop assessments.

[1] Andrew Long and Associates 2010

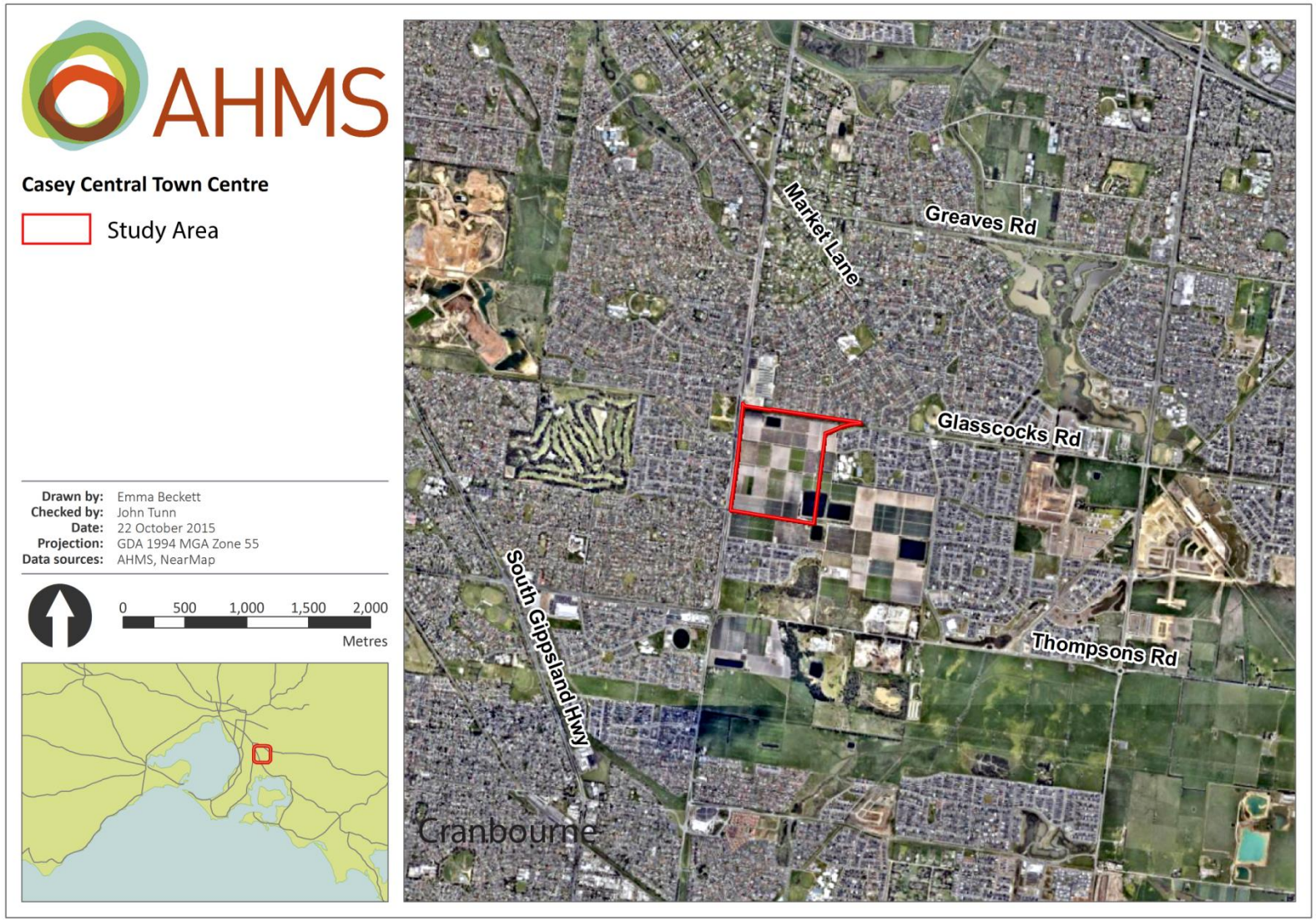

Figure 1. Location of study area

2 PROPOSAL 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 (UGZ) will remain in place during the preparation of the PSP master plan.

The Metropolitan Planning Authority (MPA), does not intend to develop each individual allotment, nor would they undertake subdivision works. The role of the MPA is to undertake master planning and design work to assist in facilitating streamlined and high quality development within the growth area activity area. Subdivision works and implementation of development projects within the activity area would be undertaken by individual landowners and/or developers.

This intent of this report is to assist the MPA in PSP design and planning for this area. These results should also be promoted as information that can be referenced by landowners and developers to develop appropriate complex CHMPs assessments for future development projects within the Casey Central Town Centre study area.

3 EXTENT OF THE STUDY AREA

For the purposes of this report, the 'Study Area' relates directly to PSP 12 'Casey Central Town Centre' (shown as lot PS726539) located within the City of Casey.

When initially commissioned to undertake this study, the boundary of the Casey Central Town Centre PSP area extended further south to the south to include all vacant land to the neighbouring housing estate. Since 2010 the extent of the PSP area has been decreased and now appears as presented in Figure 2 and 3.

Although the initial larger study area was subject to the desktop and standard level heritage assessments, this report, its findings and sensitivity ratings refer to the amended smaller study area shown in Figures 2 and 3.

The Study Area is shown in Figure 2. The proposed Precinct Structure Plan is shown in Figure 3.

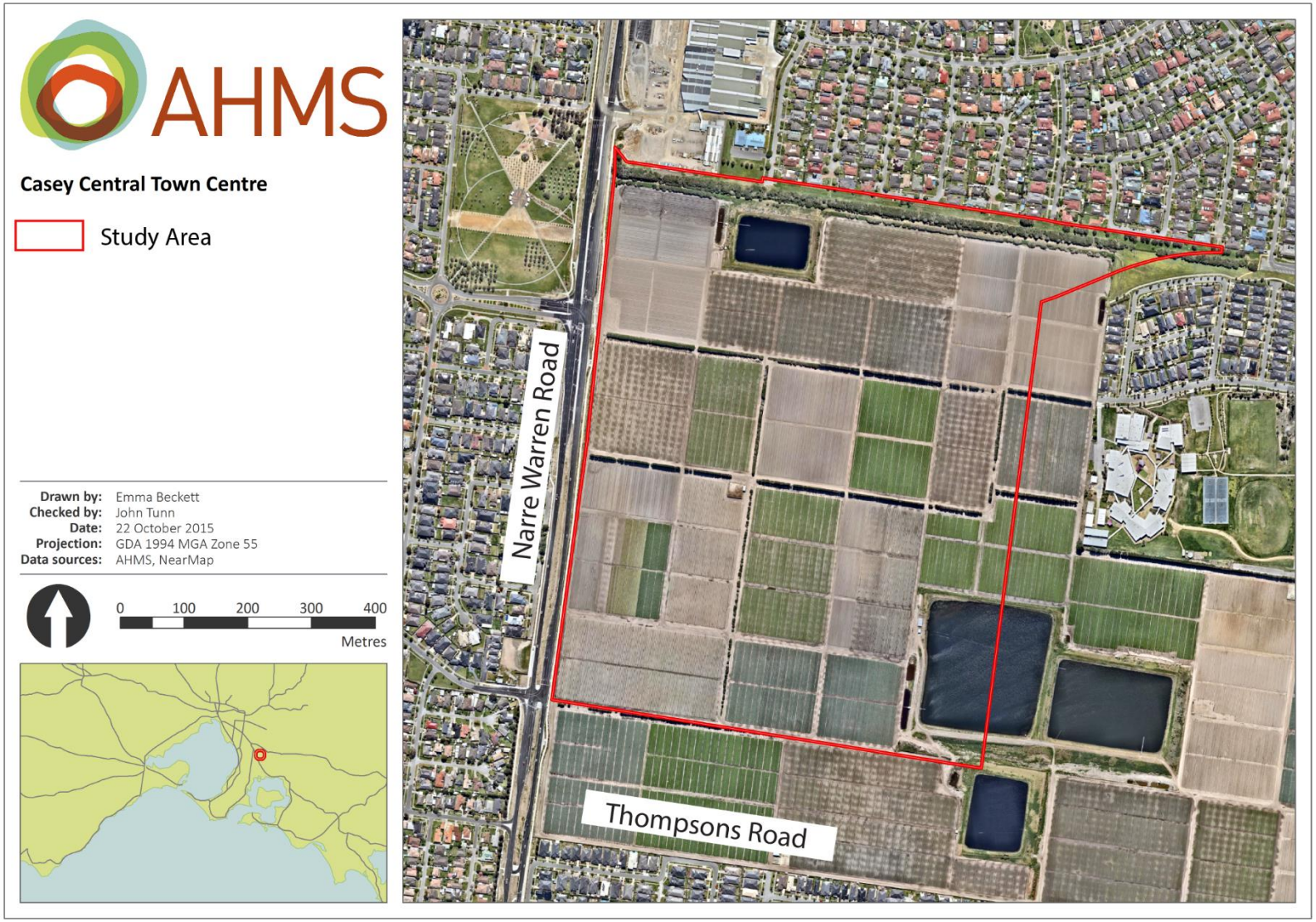

Figure 2. Location of Casey PSP study area

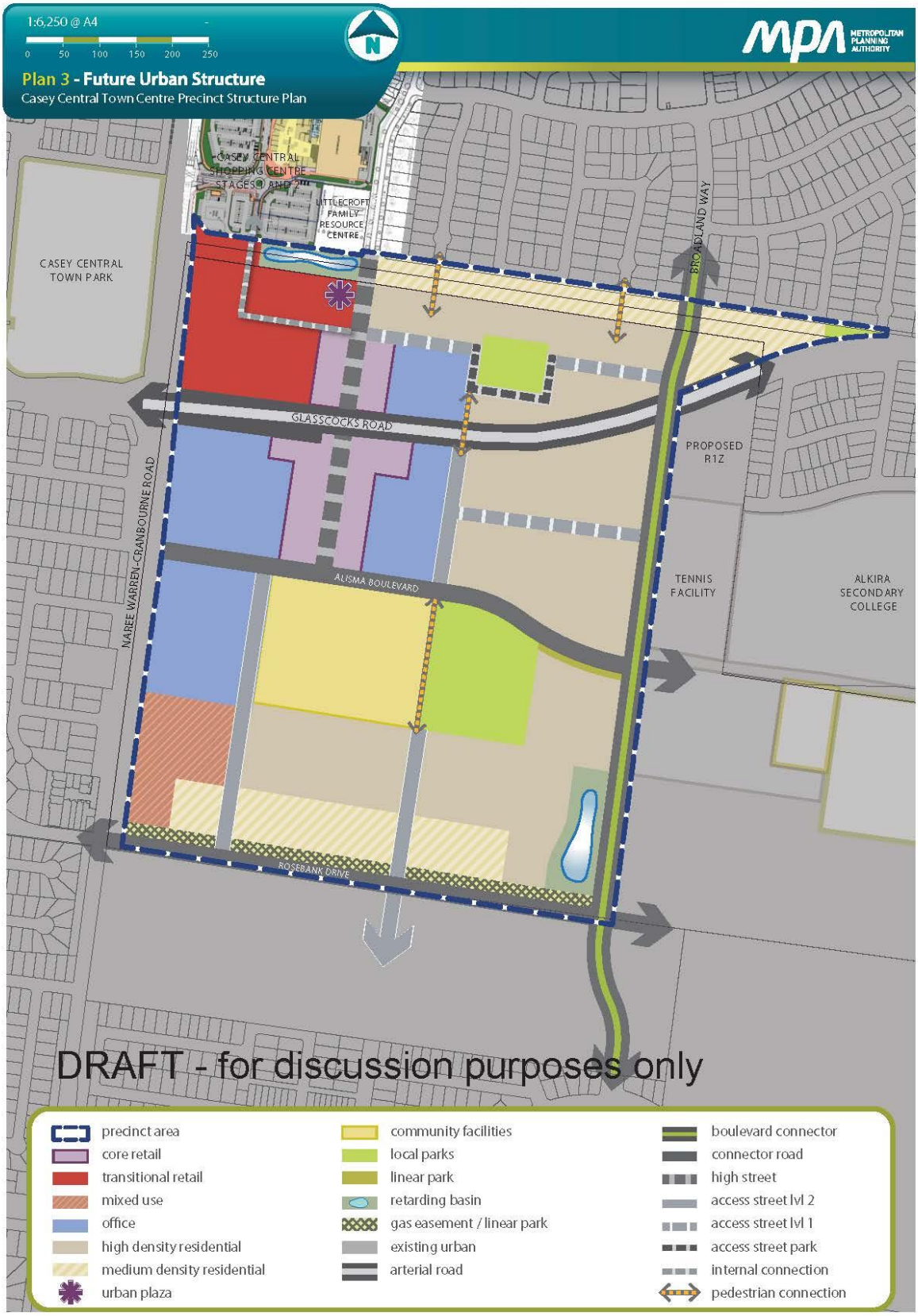

Figure 3. The proposed PSP design plan provided by Metropolitan Planning Authority.

4 DOCUMENTATION OF CONSULTATION

4.1 Development of Consultation

There were no Registered Aboriginal Parties (RAPs) for the subject land at the time notice of intent to prepare this assessment was provided to OAAV. On the advice of the OAAV we undertook a process of consultation with the RAP applicant at the time; the Wurundjeri Tribe Land and Compensation Cultural Heritage Council Inc. (WTLCCHC), as well as with the two other acknowledged Traditional Owner groups associated with the study area; the Bunurong Land Council (BLC) and the Boon Wurrung Foundation (BWF).

Our approach to the Aboriginal community consultation was to undertake all components of the study in partnership with the WTLCCHC, the BLC and the BWF. In practice, we invited representatives of the groups to participate in the site inspection. Both WTLCCHC and the BLC attended the initial site inspection. The development of Aboriginal community consultation is set out in Table 1.

Table 1: Consultation with the Aboriginal communities

Date	Action	Method
3/06/2010	Site Inspection with Bob Mullins (WTLCCHC) and Stevie Pepper (BLC)	Site Inspection

4.2 Outcomes of Consultation

The RAP applicant and Traditional Owner claimants were invited to participate in an inspection of the study area. The WTLCCHC and BLC accepted the invitation to attend and participated in the site inspection. The BWF were unable to attend on the day.

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 elevated landforms (such as low rises and sand bodies) 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, a fourth Traditional Owner group, associated with the study area, has been established (the Bunurong Land and Sea Association Inc - BLAS). The BLAS has not played an active role in the preparation of this report or in the development of the final cultural heritage management recommendations.

5 DESKTOP ASSESSMENT

5.1 Preamble

This information obtained during desktop assessment assists in determining the archaeological potential of the study area in a number of ways. For example, considering the types of natural resources that may have been available within the study area, or in the local region, can explain prior occupation in the area and the potential physical evidence of such a presence (e.g. the types of stone used for artefact making, whether trees having bark suitable for the manufacture of certain items existed/exist in the area, or whether there exists a known resource – plant, animal or otherwise - that may have attracted people to the area).

Information regarding previously recorded archaeological sites in the region can provide an indication of the nature and distribution of archaeological deposits and material that may be present, or may once have been present, in the study area and the relative potential for further archaeological places to be present. 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 current 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 chosen as the basis of desktop assessment is located within the South East Region as defined by Andrew Long and Associates[2].

The South-East Growth Corridor Study Area is an area of low elevation and relief at the interface between the southern slopes of the Great Dividing Range and the broad sweep of drained wetlands to the north of Western Port Bay, approximately 40-55 km SE of the Melbourne CBD. The landscape is characterised by sandy rises and alluvial floodplains, fringed to the north by foothills and to the south east by the Koo Wee Rup Swamp…

… The South East Growth Corridor comprises a series of discontinuous land holdings approximately defined by the suburb of Hampton Park (North West), the satellite settlements of Pakenham (north east) and Cranbourne (south west). The Study Area encompasses approximately 56 square kilometres of floodplain, sandy rises and reclaimed wetlands south east of Melbourne, fringed to the north by foothills of the Great Dividing Range[3].

A map showing the Geographic Region within the region is shown overleaf on Figure 4.

[2] 2010 Volume 5 (Draft p.23)

[3] Andrew Long and Associates 2010 Volume 5

Study Area

Figure 4. Geographic region of the study area[4]

5.3 Review of Aboriginal Places

A VAHR search of study area (i.e. the South East Region) was undertaken in 2010 and identified 45 Aboriginal Places. Due to the small number or places, the search area was extended to include a 10km radius surrounding the area and produced a total of 710 registered Aboriginal Places.

An updated search of the VAHR covering the same 10km radius was undertaken by AHMS on the 31st October 2013. The updated search revealed an additional 213 registered places.

A further updated search of the VAHR covering a similar 10km radius was undertaken by AHMS on the 5th August 2015 revealing a further 198 registered Aboriginal places. In summary, and from this date, a total of 1121 Aboriginal places are located within 10km radius of the study area.

No registered sites have been recorded within the current study area prior to standard assessment; [5]however there are 12 Aboriginal places within 200m of the study area, including ten artefact scatters and two low density artefact distributions.

This list included VAHR 7921-1545 (Narre Warren Cranbourne Rd 3), which was recorded during this current assessment in 2010 (see Appendix 1 & 2).

Table 2: Aboriginal places located within 200m of the study area.

VAHR #	Site Name	Site Type	Location
7921-0451	Dirun Djirri 3	Artefact Scatter	115m west of study area.
7921-0455	Dirun Djirri 7	Artefact Scatter	115m west of study area
7921-0690	Narre Warren Ia 2	Artefact Scatter	Immediately east of study area
7921-0691	Narre Warren As 1	Artefact Scatter	80m east of study area
7921-0973	Rosebank 1	Artefact Scatter	Immediately west of study area
7921-0974	Rosebank 2	Artefact Scatter	70m west of study area
7921-1040	Rosebank 3	Artefact Scatter	Immediately west of study area
7921-1082	Casey Central 1	Artefact Scatter	Immediately north of study area
7921-1114	Casey Central 2	Artefact Scatter	Immediately north of study area
7921-1437-1-12	Narre Warren Cranbourne Rd 1	LDAD	50-200m south of study area

[5] Note: In 2010 and prior to field assessment associated with this study there were no registered Aboriginal places within the study area.

VAHR #	Site Name	Site Type	Location
7921-1472	Narre Warren-Cranbourne Road Isolated Artefact	LDAD	Immediately north of study area
7921-1545	Narre Warren Cranbourne Rd 3	Artefact Scatter	Immediately south of study area

Five registered sites have been recorded immediately to the north of the current study area as a result of subsurface testing during the preparation of CHMP 10725[6]. In addition, four sites were located directly to the south of the current study area as a result of subsurface testing for CHMP 10168[7], and a LDAD recording (VAHR7921-1437) was registered directly to the south-west of the study area as part of CHMP10764[8] which was prepared on behalf of VicRoads to assess proposed widening of the Narre Warren Cranbourne Road.

As discussed later in this report, during the Standard Assessment undertaken for the Casey Town Centre PSP ACHA, AHMS also identified and registered a Low Density Artefact Scatter (LDAD) within the southern portion of the study area (VAHR7921-1545-1).

The distribution of previously recorded sites within the region is likely to be due to a combination of factors, namely a lack of archaeological investigation, and ground surface visibility. This may also reflect past land use being focused on larger more permanent sources of water and at resource intersection zones.

These sites and areas of cultural heritage sensitivity are shown on Figure 5.

[6] *Feldman et.al. 2009*

[7] *Vines 2008*

[8] *Barker et al 2012*

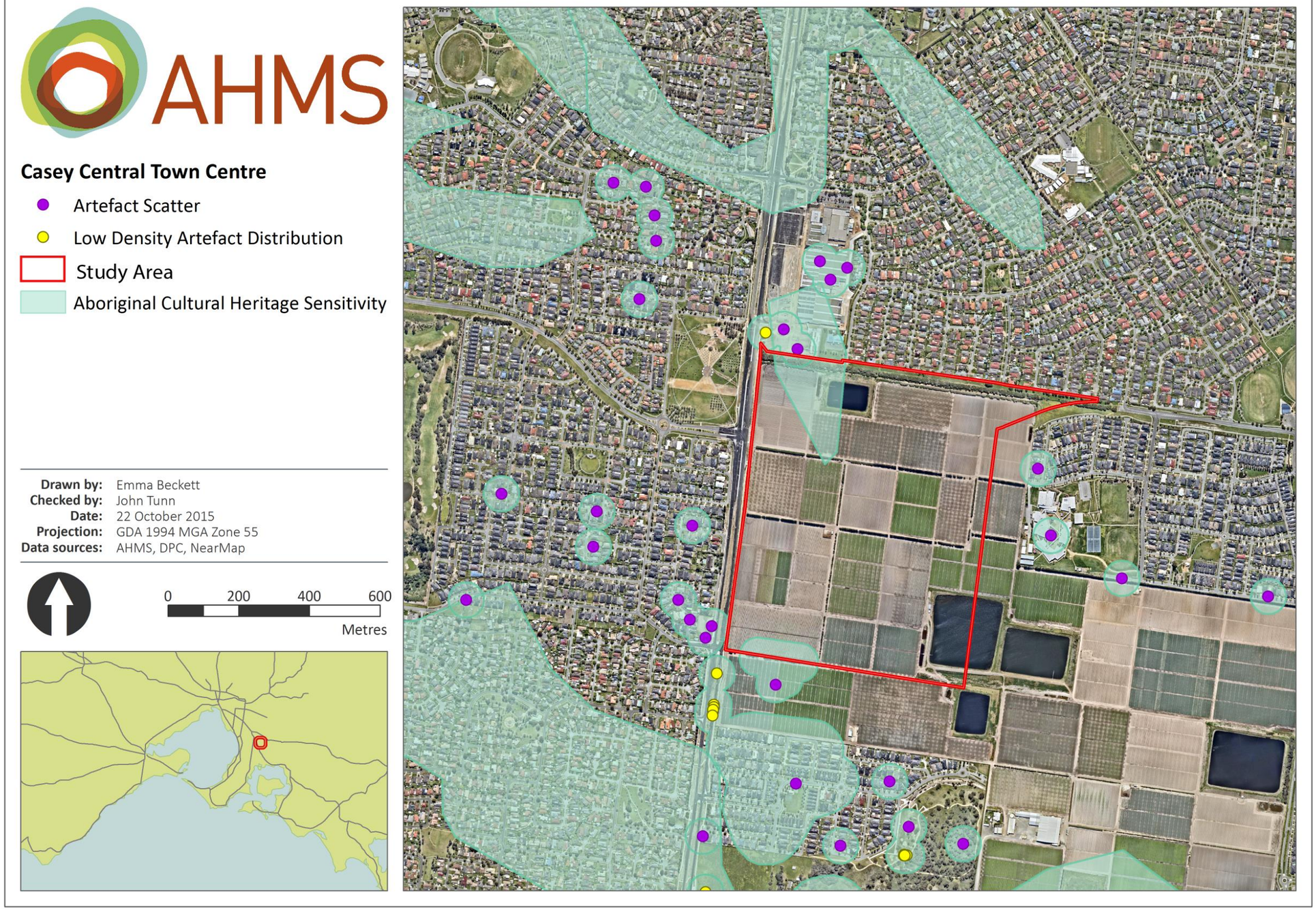

Figure 5. Registered Aboriginal places and areas of cultural heritage sensitivity in and near the study area

5.4 Review of regional archaeological context (including reports and published reports)

5.4.1 Early Occupation

The nature and antiquity of early Aboriginal occupation of south eastern Australia has been subject to ongoing debate[9]. Analysis by Munroe places Aboriginal occupation at 40,000 BP, based on the re-analysis of an artefact assemblage originally excavated in the late 1970s[10]. Mulvaney and Kamminga note the presence of archaeological materials in the region that are dated to 'at least 30,000 years'[11]. Archaeological sites within the Melbourne Metropolitan region, such as hearth remains dated by Tunn[12], and Canning et al.[13] show Aboriginal occupation of the Maribyrnong River Valley at approximately 15,000 BP with the nearby Green Gully burial dated to approximately 6,500 BP[14] .

Closer to the study area, excavations at Bend Road within the footprint of the Eastlink Freeway at South Dandenong yielded a cultural sequence dated to 30 – 35,000 years BP[15] , and 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. Although controversial these results demonstrate the potential for 'Cranbourne Sands' and other Pleistocene stable sand formations to contain deep cultural sequences of considerable antiquity[16].

Bend Road 1 (VAHR 7921-0735) consists of a high density scatter comprising 515 artefacts and extends a previously registered Aboriginal place located within the Eastlink Reserve. A well stratified cultural sequence is associated with both Holocene and Pleistocene occupation. The component of the Aboriginal place located within Long ***et al's*** study area has been dated to the early-mid Holocene (~7,500 – 11,780 years ago).

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

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

---

[9] 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.

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

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

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

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

[10] Munroe op cit., p 33

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

[12] Tunn 2006, op cit.

[13] Canning, S., D. Griffin. V. Flynn & P. Ricardi. 2010. Recent archaeological excavations of Pleistocene deposits at Brimbank Park, Keilor, Victoria. Archaeological Heritage vol 2 (1), pp. 25-35

[14] Tunn 2006, op cit.

[15] 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

[16] ibid

Optically Stimulated Luminescence [OSL] dating). Long et al also argued that the 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[17].

Other studies of sand bodies in the south-eastern region of Melbourne have identified the potential for deep sandy deposits to contain evidence of multiple occupation phases from the Pleistocene to the most recent period. OSL dating of artefact-bearing sands have been undertaken by ERM at Carrum Downs, which identified a basal age of c. 19 000 years ago in association with a large silcrete artefact, and c.10,000 year old date for a quartz dominated industry[18].

Furthermore, geomorphological assessments of local sand sheet deposits (mapped as Qpd Cranbourne Sands on GSV 1:250 000 map sheets) by Jim Bowler have indicated the potential for Pleistocene aged archaeological material within sand bodies that extend beyond 800mm depth[19].

More recently, AHMS undertook test excavations at First Avenue, Chelsea Heights as part of a Cultural Heritage Management Plan in support of residential subdivision[20]. 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. Sand deposits were dated via OSL methods and indicate that the stone artefacts may have been deposited between 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, which may exist below Holocene swamp 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 fibers 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[21]. In general, however, there is evidence of a shift from large core

[17] Long, A., J. de Lange, D. Matthews, S. Thomas & J. Bowler. 2010. Keysborough Industrial Estate – II (Lot 1 Bend Rd and Lots 9, 10 & 11 Perry Rd) Keysborough. CHMP 10639.

[18] Burch, J., O. Nicolson., A. Parmington & J. Mitchell. 2008. Stage 2 Commercial Subdivision Development, 100 Colemans Road, Carrum Downs, Victoria. CHMP # 10216.

[19] Barker, A., J. Turnbull & D. Thomas. 2012. Narrewarren - Cranbourne Road Duplication, CHMP #10764

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

[21] 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.

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

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 retouch known as 'backing' 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.

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[22].

5.5 Regional Studies

This section reviews key regional archaeological investigations to assist in understanding likely archaeological patterning within and near the activity 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 activity area is situated within Landscape Unit 2. 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.

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

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

Artefact types present within these scatters consisted of flaked pieces and flakes with less than 2% of the assemblages comprising formal tools[23].

Smith assessed the following landforms as having archaeological potential within her study area:

- "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"[24].
- All areas still retaining remnants of the river red gum forests[25] (Landscape Unit 3);
- 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[26].

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[27].

[23] Smith, L. 1989. Berwick-Pakenham Corridor: Aboriginal Archaeology: 47

[24] Smith op cit: 73

[25] Smith op cit: 74

[26] Smith op cit: 74

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

5.5.2 du Cros & Rhodes 1998

du Cros and Rhodes[28] 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"[29] .

- **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 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"[30].

- **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"[31] .

- **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"[32].

[28] 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.

[29] 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

[30] Feldman & Long op. cit: 3

[31] Ibid

[32] Ibid

- **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"[33] .

- **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"[34].

5.5.4 Local Studies

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 2km of the study area, is provided below.

A total of twenty-seven small scale archaeological assessments have been previously undertaken within 2km of the centre of the study area (Table 3). These comprise survey, excavation, monitoring and desktop assessments of the surrounding landscape. Aboriginal places investigated are typically low density surface or sub-surface artefact scatters located on rises and/or near water sources such as wetlands/swamps, creeks and freshwater springs.

[33] Ibid

[34] Feldman & Long, op cit.

Table 3: Previous relevant local archaeological assessments that have been undertaken within 2km of the study area

Report	Assessment Type	Aboriginal Heritage	Assessment Conclusions
Marshall 1997 (720)	Test Excavation	None	Areas of archaeological sensitivity as identified by Sciuso (1996).
Sciusco 1996 (989)	Survey	None	Areas of high archaeological sensitivity include areas in which mature river red or manna stringy bark gums occur, ridges & hilltops.
Debney 1999 (1558)	Desktop	N/A Desktop Assessment	Areas considered archaeologically sensitive include undeveloped pastoralised land, stands of native vegetation, all sections of Cardinia Creek frontage, Cranbourne sand dunes and hummocks & elevated landforms.
Terra Culture 2003 (1817)	Salvage Excavation	VAHR 7921-0507	Sub-surface site was located on a small rise, all artefacts derived from the plough-soil.
Webb & Marshall 2000 (1818)	Survey	None	Study area was likely former swampland, therefore no areas of archaeological potential.
Marshall & Webb 2001 (1904)	Survey	None	Predicted site types in the region include stone artefacts (isolated and scatters), and scarred trees.
Bell 2003 (1914)	Survey	VAHR 7921-0526, 7921-0527, 7921-0528, 7921-0529	Four isolated artefacts were located in area of high ground surface visibility from past disturbance.
Haley & Weaver 2001 (2183)	Survey	None	Distance to water identified as primary site prediction factor.
Murphy 2002 (2292)	Survey	None	Area of high potential identified on the fringe of a former wetland.
Webb & Chamberlain 2002 (2229)	Survey	VAHR 7921-0462	One isolated surface artefact was identified in an area of good ground surface visibility, not considered to be in situ.
Rhodes 2002 (2394)	Survey	None	Study area was predominantly disturbed. Some sub-surface potential identified in relatively undisturbed areas. Monitoring was recommended in these areas.
Murphy & Amoroso 2003 (2431)	Test Excavation	VAHR 7921-0498, 7921-0192, 7921-0497	Aboriginal places (two isolated artefacts and one low density scatter) identified within proximity to former wetland.
Chamberlain 2003 (2528)	Survey	None	Low archaeological potential, monitoring recommended.

Report	Assessment Type	Aboriginal Heritage	Assessment Conclusions
Hyett & Myers 2004 (2899)	Survey	VAHR 7921-0652	One surface Aboriginal place (2 artefacts) was recommended to be investigated through sub-surface testing.
Bell 2004 (2901)	Test Excavation	VAHR 7921-0507	Investigation of a site identified accidentally through construction works.
Murphy 2004 (2971)	Survey	None	Poor ground surface visibility. No areas of archaeological potential.
Bell 2005 (2987)	Salvage Excavation	VAHR 7921-0655	Pre-existing site on a hill crest and upper slope overlooking a freshwater spring was salvaged. Artefact assemblage (42) was considered too small to provide meaningful information.
TerraCulture 2005 (3018)	Test Excavation	VAHR 7921-0652	Low density dispersed artefact scatter expanded through test excavation, located over gently sloping land.
Hyett 2005 (3052)	Test Excavation	VAHR 7921-0652	Expanded and confirmed the interpretation of the site made by Terraculture (above).
Bell 2005 (3067)	Test Excavation	VAHR 7921-0682 & 7921-0683	Two sub-surface sites identified on the low-lying alluvial plain (2 artefacts) and a rise (11 artefacts).
Bell 2003 (3074)	Desktop	None	A single low rise in a low-lying landscape was identified. Field investigations recommended prior to development.
Matthews 2005 (3293)	Test Excavation	VAHR 7921-0720	Site density and complexity reduces with distance to water.
Bell 2006a (3537)	Site Monitoring	VAHR 7921-0655	Additional investigations of Eden Rise Aboriginal place through monitoring resulted in the recovery of two additional artefacts.
Bell 2006b (3667)	Desktop	None	Distance to water identified as primary site prediction factor.
Hyett 2007 (3858)	Desktop	None	High archaeological sensitivity on Cranbourne Sands landforms.
Murphy & Dugay-Grist 2007 (4091)	Survey	None	Predicted low density artefact scatters would be the most common site type.
Murphy & Dugay-Grist 2008 (4118)	Test Excavation	None	All deposits were disturbed, reducing the archaeological potential.

5.6 Review of Local Studies (Cultural Heritage Management Plans)

In 2010, Andrew Long and Associates also undertook a detailed review of relevant studies within the region and local area. The summary prepared by Andrew Long and Associates is selectively quoted and cited in the following sections.

The following summaries by Andrew Long & Associated refer to 'Terrain Units'[35], which are defined and explained in subsequent sections of this desktop assessment report. Summaries of relevant local studies within these terrain units are included below.

5.6.1 Casey Central (Feldman et al. 2009)

Feldman *et al.*[36] prepared a CHMP for c. 10.6 ha of land west of Narre Warren Road and south of Glasscocks Road proposed for a retail development. The area was characterised by generally flat land with a sandy rise located in the south. At the time of the assessment a shopping centre and associated carpark was located in the north east corner of the subject land. The area had previously been subject to vegetation clearing, infrastructure installation and activities associated with the construction of the extant shopping centre and associated carpark[37].

The field survey involved pedestrian survey and was undertaken by five people, walking 5 m apart, over one day. The entire area (excepting the already developed north east corner) was subject to survey. Due to a consistent grass cover, surface visibility across the area was low, <1% in the southern half of the property and <5 – 10% in the north[38]. Patches of exposure were present in the north west. No Aboriginal cultural material was identified as a result of the survey, however, two areas of varying Aboriginal archaeological potential were identified[39]: the rise was determined to be of moderate potential; the area between the extant shopping precinct and the rise was determined to be of low-moderate potential. The remainder of the area, due to its previous modifications and topography, was determined to be of low potential.

The subsurface testing program employed two approaches: shovel test pits (0.16 m² pits) were utilised to establish the presence/absence of cultural material (50 shovel test pits) and to define the boundary of any Aboriginal place identified (24 shovel test pits); 1 m² pits were manually excavated to establish stratigraphy prior to the initiation of the complex assessment (two pits) and to establish the nature and significance of Aboriginal places (one pit). All excavated material was fully sieved.

The subsurface testing established that subsurface soils on the rise comprised grey-brown loamy sand to c. 40 cm overlying grey-brown firm sand to c. 85 cm which overlay orange sandy clay with coffee rock inclusions to c. 130 cm where orange-brown compact clay with coffee rock inclusions appeared. On the flat land north of the rise, beneath the humic topsoils, a medium-brown clayey silt extended to c. 40 cm where a medium-brown cemented clayey silt occurred overlying a mottled clay base with coffee rock inclusions at c. 50 cm.

The testing identified a total of 30 stone artefacts 30-75 cm below the ground surface with:

[35] *Andrew Long and Associates 2010 Volume 5 Section 2.3 and Section 8*

[36] Feldman et al. (2009)

[37] Feldman et al. (2009: 34, 37)

[38] Feldman et al. (2009: 41-44)

[39] Feldman et al. (2009: 45)

- 18 stone artefacts identified in shovel test pits; and
- 12 stone artefacts identified in two 1 m² manual excavation pits.

The subsurface testing identified five new Aboriginal places (7921-1082, 7921-1114 - 1117), all subsurface stone artefact occurrences.

Aboriginal place 7921-1082 is located on the rise in the south of the property and is a low density subsurface stone artefact occurrence. The 24 stone artefacts in this place were identified between 5-75 cm below the surface with 11 of the artefacts identified between 5-40 cm in dark grey sandy silt and the remaining 13 artefacts between 70-80 cm in mid-grey firm silty sand.

Aboriginal place 7921-1114 is located on the rise in the south of the property and is a low density subsurface stone artefact occurrence. The place comprises two stone artefacts identified between 20-30 cm at the interface between dark brown humic sandy silt and a lighter sand deposit.

Aboriginal place 7921-1115 comprised a single stone artefact identified between 35-40 cm below the surface on the flat land. Evidence of ground disturbance was present in this area.

Aboriginal place 7921-1116 comprised a single stone artefact identified at 24 cm below the surface in a light grey-brown compact sandy silt deposit on the flat land. Evidence of ground disturbance was present in this area.

Aboriginal place 7921-1117 comprises two stone artefacts identified between 25-35 cm below the surface in a light grey friable sandy silt deposit on the flat land. Evidence of ground disturbance was present in this area.

No discussion of stone artefact density is provided, however calculations based on all excavated pits (regardless of the presence/absence of cultural material) and the total number of stone artefacts identified (considered as 30[40]), suggested an artefact density across the area of c. 2 artefacts pm².

Given the limited number of stone artefacts present, a breakdown of raw material is presented rather than any analysis, although artefact type for Aboriginal places 7921-1114 – 1117 are provided and include one silcrete microlith, two silcrete flake fragments and three quartzite flake fragments (2009, 51, 60-64).[41] Raw material was dominated by quartz (50%) with silcrete (33.3%), quartzite (10%), fine-grain siliceous (3.3%) and volcanic (3.3%) also represented. In shovel test pit A4 marked depth division between raw material can be seen with silcrete occurring between 30-45 cm below the surface and quartz occurring at depths greater than 70 cm. Given the low frequency of artefacts, however, this pattern cannot be confirmed elsewhere.

5.6.2 Princes Highway, Officer (Parmington 2008)

Parmington [42]completed a CHMP for two adjoining properties on the Princes Highway, Officer/Pakenham, which were traversed by a linear ridgeline (Terrain Pattern 1) oriented in an east-west direction. The region is characterised by undulating topography that ranges between 40 and 75 metres above sea level in elevation. To the north of the ridgeline the land slopes away to a valley and floodplain below then up

[40] The number of artefacts in total and per Aboriginal place is inconsistent throughout the CHMP.

[41] No artefact catalogue or listing of artefact type is provided other than in the Aboriginal place descriptions. However, the description of Aboriginal place 7921-1082, comprising c. 80% of the total assemblage, does not provide any reference artefact type so cannot be discussed here.

[42] Parmington (2008)

again on to a second minor ridgeline located further to the north. Prior to survey, five Aboriginal Cultural Heritage Places were located within 2.5km of the activity area. While no surface artefacts were identified during the survey, assessment of landform and the fact that heritage sites had been previously identified led to the recommendation for sub-surface investigations to proceed. The sub-surface testing program targeted areas of high archaeological potential, such as ridgelines and elevated ground in close proximity to permanent and ephemeral watercourses. The objective of the sub-surface testing program was to determine the nature, extent and significance of any Aboriginal Cultural Heritage Places sites located within the activity area. Two sites were identified during excavation, both of which were associated with the ridgeline running through the property (Parmington[43]).

The results of the sub surface testing program undertaken at 625 Princes Highway and 707 Princes Highway Officer determined that the highest concentration of Aboriginal stone artefacts occurred on the minor ridgeline in the vicinity water. These results are consistent with the environmental context and patterning of previously recorded sites in the surrounding region, where the largest artefact scatter sites are generally found closest to creek lines and catchments and on the high rises close to water and former swamp margins.

5.6.3 Cranbourne East (Light 2009a&b)[44]

A 47 ha residential subdivision in Cranbourne East (1555 Sth Gippsland Highway) was investigated for Aboriginal Cultural Heritage Places by Light[45]. The entire testing area is located within Terrain Pattern 3, but to the immediate west of the South East Study Area. The evaluation comprised a desktop assessment, field survey and two phases of subsurface testing, including: Phase 1 - shovel test pits and Phase 2 - 1 x 1 m test pits. These testing components were designed to respond to the following aims:

- to fully define the actual archaeological sensitivity of the activity area;
- to determine the presence / absence of archaeological subsurface deposits, and;
- to collect data on the nature and significance of any deposits identified.

The investigation identified eight Aboriginal Cultural Heritage Places (7922-1041 and 7921-1048). In total, these ACHPs comprise 162 stone artefacts. All of the ACHPs recorded as a result of this assessment comprise stone artefacts in a subsurface context within the sandy rises, limited to the mid-upper slopes and the tops of the rises and dune and two comprise additional surface artefacts (7921-1044 and 7921-1045). The results of the evaluation have demonstrated that the upper slopes and tops of the sandy rises and dune are sensitive for Aboriginal archaeological deposits and the remainder of the activity area is considered to be of negligible sensitivity. The results of the evaluation conform to previous predictive models presented for the region.

Light[46] also undertook a CHMP of a 61 ha property at 50 Berwick-Cranbourne Road, Cranbourne East, which is located within Terrain Pattern 3 and immediately adjacent to (northwards) 1555 Sth Gippsland Highway. A desktop assessment, field survey, and sub-surface testing (shovel test pits, mechanical transects and 1 x 1 m test pit) identified ten Aboriginal Cultural Heritage Places within the survey area.

[43] Parmington (2008: 97-99)

[44] *Andrew Long and Associates 2010 Volume 5 Section 11 (Draft p. 76-77)*

[45] Light (2009a)

[46] Light (2009b)

Eight of the ACHPs recorded as a result of this assessment all comprise stone artefacts in a subsurface context within the sandy rises, limited to the mid-upper slopes and the tops of the rises and two comprise surface artefacts only. Aboriginal activity appears to have focused on the higher hills and sand rises which provided dry vantage points adjacent to the swamps/wetlands which occurred on the low-lying land surrounding them.

5.6.4 Clyde and C21 PSP Desktop Assessment (Murphy & Kennedy 2009)

Murphy and Kennedy[47] completed a Desktop assessment the C21 Business Park and Clyde North PSPs. The report consisted of a desktop assessment and survey for both Historic and Aboriginal archaeology. Ground surface visibility during the survey severely hampered the effectiveness of the survey. As a result, no new Aboriginal archaeological sites were located[48].

Land within 200m of Cardinia Creek and associated with the Koo Wee Rup Plains were considered to be of high archaeological potential compared with areas greater than 200m from Cardinia Creek[49].

5.6.5 1435 Thompsons Rd Cranbourne (Vines 2007 & 2008)

In a two stage project, Vines[50] completed subsurface testing for a residential subdivision immediately south of the current study area. The landforms within the proposed subdivision included sandy rise, slope, and low-lying former swampland. Six sites were located within the activity area and as a result of subsurface testing (VAHR 7921-0863 & 0864) and (VAHR7921-0861, 0862, 0868 & 0869) and in relatively undisturbed contexts.

VAHR 7921-0863 & 0864 were located on relatively low lying landforms similar to the current study area. VAHR7921-0861, 0862, 0868 & 0869 were identified during stage 2 of investigations - these sites were all located on an elevated sandy rise landform. In all cases the majority of artefacts were located between 300 and 500mm below the ground surface at the base of the 'bioturbation zone' while layers between 600mm and 1000mm appear largely sterile.

5.6.6 Casey Central Shopping Centre CHMP (2009)

Feldman, Mathews and Chandler[51] completed a CHMP for the far northern portion of the Casey Central Town Centre PSP (directly to the north of the current study area extent). The approved activity includes expansion of the existing Casey shopping centre to the south. A survey was undertaken as part of the standard assessment. No artefacts were located on the surface, in all likelihood, due to poor ground surface visibility. Auger probing was implemented during the standard assessment. This confirmed isolated sandy dune deposits overlying a Baxter Sandstone profile[52].

The Complex testing phase consisted of a series of test pits (1m x 1m) and shovel test pits (40x40cm) across the study area. Five previously unrecorded sites were located as a result of the subsurface testing. Four sites were considered to be of low significance, one site was assessed as being of moderate

[47] 2009

[48] Murphy & Kennedy 2009:40

[49] Murphy & Kennedy 2009:40-1

[50] Vines 2008

[51] 2009

[52] Feldman et.al. 2009:45

significance[53]. Two sites were located on a sandy rise landform while three sites were located on a plain landform. Salvage of the larger site (7921-1082, Casey Central 1) was recommended[54].

5.7 Conclusion

As a result, a significant volume of research in the Berwick, Cranbourne and Clyde regions, a large number of CHMPs have been undertaken in the geographic region over recent years between 2007 and 2015.

A total of 18 CHMPs have been undertaken within approximately 2km of the study area (Table 4**)**. A synthesis of these investigations and any implications for the study area are provided below. These investigations have reported on the detection of sites of different size, nature and complexity in relation to different landscape elements and represents a significant body of work and enhanced understanding of the archaeological record of the area.

These studies were undertaken on a range of landforms and include a range of elevated sandy features, (referred to as either Cranbourne sands, sandy rises or dunes) low-lying flat areas or floodplains relating to the Koo Wee Rup plain, ridgelines and reclaimed swamp and/or gently sloping silty landforms.

Predictive statements made within the CHMPs have tended to identify areas of high archaeological potential through the presence/absence of elevated landforms, sandy soils, and/or land in proximity to water-courses. In practice, CHMPs that progress to complex assessment have typically identified high density and highly significant Aboriginal places in areas where these three landscape features intersect, e.g. Elevated sandy landforms overlooking Cardinia Creek (e.g.CHMP 10045).

Apart from these rare, and generally higher density sites, the archaeological signature of the area suggests that low density scatters, or isolated artefacts, may be found on all landforms regardless of disturbance levels (e.g. CHMPs 10285, 11530) and in surface and sub surface contexts. Significant amounts of test excavation have also been undertaken during these studies and where completed, Aboriginal cultural material on lower landforms appears to be confined to the upper 500-600mm with the soil profile largely sterile below that level. Aboriginal cultural material on more raised sandy landforms have the potential to remain intact at greater depths. Furthermore, the presence of a sandy rise or ridge crest on the edge of the swamp does not unequivocally relate to the presence of Aboriginal cultural heritage in that area (e.g. CHMPs 10110, 10649, 11199). Generally, however, areas of former swamp are considered to have the lowest potential for archaeology to be present.

[53] Feldman et.al. 2009:68

[54] Feldman et.al. 2009:69

Table 4: Previously completed relevant CHMPs that have been undertaken within 2km of the centre of the study area

CHMP #	Assessment Type	Author	Year	Assessment Conclusions
10045	Complex	Murphy & Rymer	2008	Areas of potential archaeological sensitivity identified were watercourses. Three artefact scatters identified, one on an escarpment overlooking Cardinia Creek, two low density scatters in relation to a tributary.
10084	Complex	Fiddian & M Lawler	2007	Sub surface testing identified two new artefact scatters (VAHR 7921-0691 & 0692) and two isolated artefacts (VAHR 7921-0689 & 0690). All material confined to top 320mm.
10110	Complex	Murphy & Dugay-Grist	2008	Activity area comprised a swamp and rise, no Aboriginal places identified, suggesting activity area not occupied.
10215	Complex	Nicolson & Burch	2008	No Aboriginal cultural heritage identified.
10227	Complex	Murphy	2008	A rise landform was identified as disturbed. No Aboriginal cultural heritage identified.
10285	Complex	Mathews & Long	2008	One isolated artefact was identified in a disturbed context (VAHR 7921-0918)
10552	Standard	Stone	2008	The entire activity area comprised swamp deposits, as a result a complex assessment was not deemed necessary.
10649	Complex	Veres	2009	A rise was identified as having archaeological potential, however complex assessment found no Aboriginal cultural heritage.
10725	Complex	Feldman	2009	Two Aboriginal places identified on a sandy rise, three on the plain.
10755	Complex	Stone & Defteros	2009	The activity area comprised swampland and an adjacent ridgeline, with one previously recorded surface Aboriginal place. Complex assessment found there was no sub-surface component to this place.

10764	Complex	Barker et al.	2012	Geomorphic assessment of Cranbourne Sands identified potential for Pleistocene dated deposits below 800mm. OSL dating of sand associated with artefacts at 1000mm depth resulted in 3000 – 5000 year old age.
11005	Complex	Adams et al.	2010	Watercourses and sand bodies on swamp margins identified as areas of potential. One Aboriginal place (VAHR 7921-1184) identified.
11051	Complex	Day	2010	Cranbourne sands were identified as being incorrectly mapped within the activity area. Two stone artefacts were identified in silty soils overlying Baxter sandstone.
11199	Complex	Barker	2011	Activity area comprised a swamp and adjacent elevated landform, no Aboriginal places identified.
11298	Complex	Light	2010	No areas of archaeological potential (elevated landforms or watercourses) were identified.
11530	Complex	Chandler & Muhlen-Schulte	2011	One low density Aboriginal place was identified on the flat landform.
12040	Standard	Riccardi	2012	No Aboriginal places or areas of potential were identified during the standard assessment, therefore no complex assessment was considered necessary.
12196	Complex	O'Reilly & Skews	2012	Activity area comprised flat land and no Aboriginal places.
13155	Desktop	Macculloch & Marshall	2014	Activity area comprised flat low-lying swamp deposits with no archaeological potential, therefore no standard or complex assessments

5.7.1 Previous Studies within the Study Area

No previous studies have been conducted within the Study Area.

5.8 Aboriginal Ethnohistory

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'.[55]

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[56]. 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'[57].

Aboriginal people of Port Phillip also readily exploited the fresh and salt-water animal resources of the region. Thomas[58] 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 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 Maribyrnong River in the vicinity of Keilor[59]. 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[60]. Gaughwin details an instance where at a gathering of Bun

[55] Presland, G. 'An Archaeological Survey of Melbourne Metropolitan Park', Victoria Archaeological Reports 15, 1983, 35.

[56] Goulding, M, Aboriginal Occupation of the Melbourne Area, District 2: a report to the Land Conservation Council, Land Conservation Council, Melbourne, 1988, p. 21.

[57] Presland op. cit., *p.* 35.

[58] Presland op. cit., *p.* 32

[59] Presland op. cit., *p.* 33

[60] Presland op. cit., *p.* 34.

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[61].

5.9 Review of Thomas Journals to Identify Aboriginal Use and Occupation in the Local Area

The previous section summarised a generalised ethnographic history of the south east Growth Area prepared by Andrew Long & Associates. 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 use in the local 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 near the Casey Town Centre study area.

Thomas' journey commenced at Tuerong on 4 February 1840 and ended at Dandenong on 17 March of that year.[62] 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 6**). O'Connor's Station was located 5 kilometres south-east of Casey Town Centre, which is indicated on an undated plan prepared by William Thomas (see Figure 6).

[61] Goulding op. cit., 19. See also Presland op. cit., *p.* 34

[62] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840

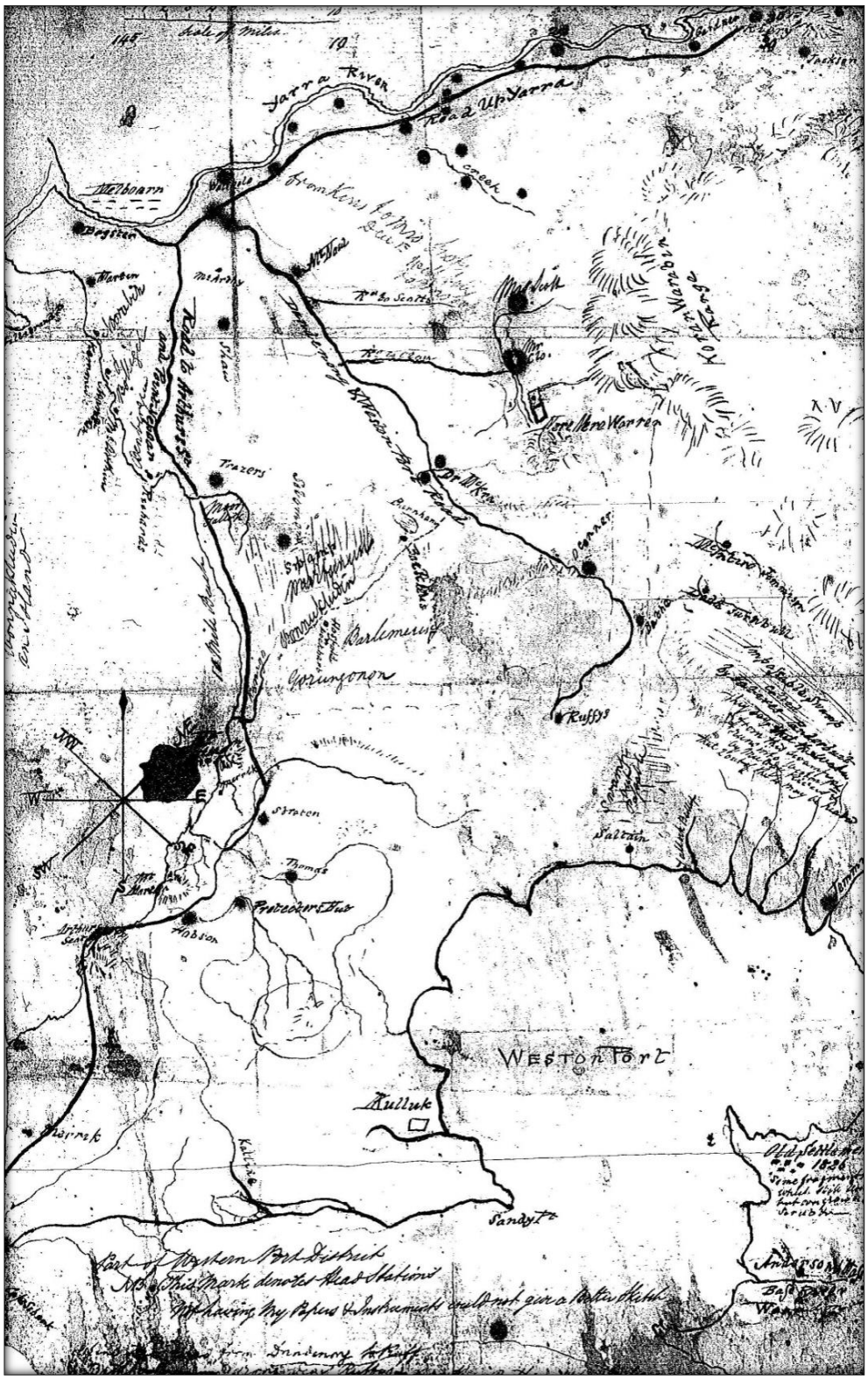

Figure 6. Undated plan (William Thomas) showing the road from Ruffy's Mayune Station to O'Connors Station and thence to Dandenong.[63]. This shows the natural characteristics of the study area landscape during the early contact period.

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

5.9.1 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.[64] 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.[65]

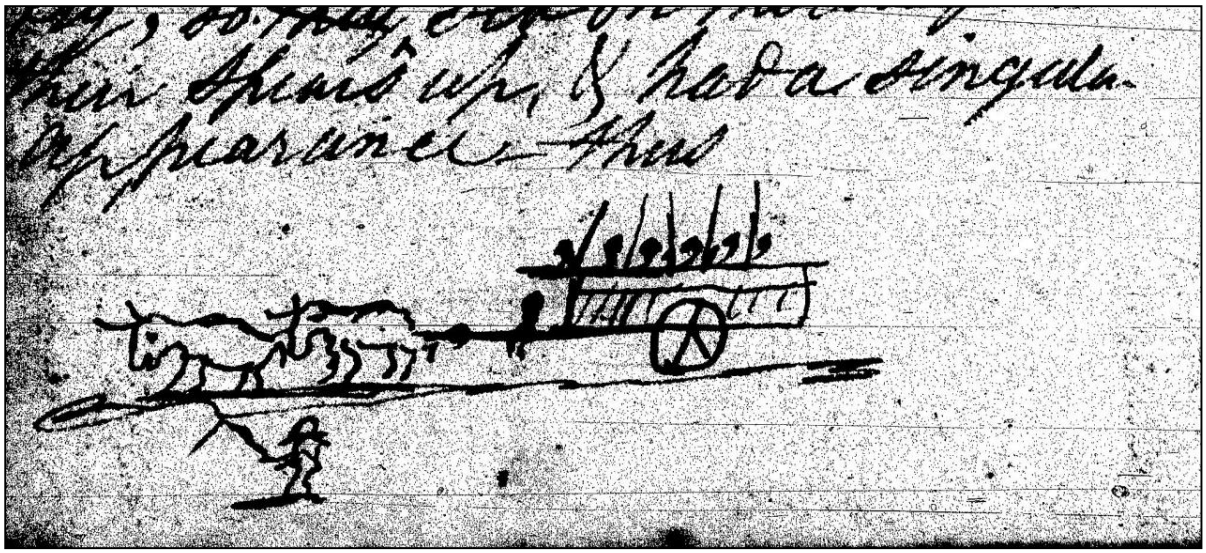

Figure 7. Thomas sketch of Bun wurrung travelling by dray.[66]

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 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.

5.9.2 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.

[64] Sullivan (1981)

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

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

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[67]. 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'[68]. These tools were often employed in the production of other elements of material culture, including clothing and ornaments made from animal skin and bone[69].

5.9.3 Hunting and Gathering

Thomas' Journal described the *Bun wurrung* catching a variety of animals, fish and gathering roots. In February 1840, the Tobinerk Camp was in good spirits. The *Bun wurrung* had caught two kangaroos, four large *wandals* ("like hares") and plenty of eels and gum. 'Opposums', bears and *beart* (like hares) were also regularly hunted.

In addition, roots were gathered.[70] Thomas describes large amounts of eels caught and distributed by elder men to the families.

While encamped at *Lannen Badgen, the Bun wurrung* failed to catch eels but caught some duck and native bears in abundance. The "natives caught a very large Guanna" and did not eat it and "said no good one for fat". At the Tobinerk camp, women go eel spearing after sunrise. The women would return with plenty of eels, four bears, two opposums, a quart or two of "currants" and a quart of "rasberries". The *Bun wurrung* also hunted lyre birds.[71]

Thomas's account of the *Bun wurrung* hunting and gathering practices described mostly women's activities. The men were most likely away during the time Thomas kept his journal, as he mentions that the women were bewailing the loss of their husbands. Thomas also writes that two hours after sunset some of the women whose husbands were absent moved about 50 yards from his tent and gave a shout in one voice five times in the direction of their husbands. Thomas describes the Aboriginal women as "All quiet – Lubras industrious". In February 1840, Thomas reported that "women kill kangaroos without assistance" at Tobinerek. Apart from kangaroos, the women returned with eels and gum. It is unknown whether women were hunting kangaroos due to the absence of men or if this was a regular female hunting practice.

Thomas describes the daily practices of the *Bun wurrung* that he witnesses, "The Lubras all stop at home this day plenty food – they have enough to supply them, are reconciled all together and the Lubras who have kept their miam at a little distance come up with the rest and made miam". "The Lubras all but 3 leave early for kangaroos and opossums, the youth and old men only present when I read in the forenoon - the Lubras return early by 3 o'clock - 3 kangaroos and 9 opossums". To celebrate the return of the men, the women present them with necklaces made of reeds.

[67] Presland op. cit., pp. 35-7

[68] Presland op. cit., p. 37

[69] Presland op. cit., p. 37

[70] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840

[71] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840

5.9.4 Burial Practice

Thomas documented many aspects of traditional culture during the journey such as a particular burial practice observed on the northern shore of Western Port, during which the body was covered by approximately fifty lengths of timber laid horizontally to a height of 3 feet with the ground all around burnt.[72] Thomas was also privy to a number of aspects of *Bun wurrung* ritual and ceremony. These were recorded in some detail when he was permitted to witness the ceremony.

At the Kunnong campsite, Thomas was placed in charge of two old men, women and children. A child born on the 12th dies and Thomas persuaded them to let him bury it in a box. Thomas was permitted to witness "A most singular ceremony". Thomas describes the ceremony in detail which included the cutting of hair, burial of the hair, sticks, birds' wings, the women lying down covered by blankets and so on. At sun rise the woman whose infant had died went to the grave and lit a fire[73].

5.9.5 Frontier Violence and Early Settler Relations

Thomas went to the beach and mudflats accompanied by one of the Aborigines from the encampment at Jamieson's hut – this person was armed with a double-barrelled shot gun. Thomas asked if the Aborigines ever travelled to French Island. His informant told him that before white men came, he and a number of named individuals (known to Thomas) cut a lot of bark and made boats and travelled to French Island. A lot of birds but no kangaroos or possums –"he said they were plenty frightened". He then pointed to the mountains and said that *"all the Blacks from Willsons Promontory & Perrong (?) to Kirkbillessce all this country where we now were were dead – not one left – Two Fold Black fellows [Gunnai/Kurnai] long time ago killed many many (?) all dead"*.

In February 1840, Thomas' group decided that they would go Bullen Bullen (lyre-bird hunting) for five days. One of the women later told Thomas that "they were going to kill wild Black fellows & that *Moloco simaluk murrambinna cogella* putting her hand to the thick part of the leg & the (?) part of arm – I immediately shew'd anger. An Old Man being present I turn'd to him told him One Great Father made us all, Black fellows 2 Fold Bay, Black fellows Westen Port, Black fellows Barrubal, Black fellows Goldborn, White Man this country, White Man that country".[74] Thomas indicated that he would go with them and that they would have to spear him before they speared the Two Fold Blacks. The *Bun wurrung* insisted that they did not intend to kill Black fellows. Ross volunteered to go with them so that Thomas could be informed of their movements and to be convinced that no slaughter took place.

Thomas also recorded evidence of earlier European aggression against the *Bun wurrung*. When questioning a young woman regarding some old scars that Thomas had assumed were spear wounds, he was informed that: *Long time ago me Pckaninny - White Man plenty shoot my all Blackfellows.*[75] The wounds she carried Thomas surmised were the result of buck shot.

Thomas also describes the mixed relations on the frontier, which often included cycles of violence and reconciliation. For instance, the dogs owned by the *Bun wurrung* killed five or six young chickens just hatched at Jamieson's hut. In retaliation Jamieson shot dead the wrong dog and wounded another. A burial ceremony was conducted by the Aboriginal dog owner. Jamieson apologised and paid the owner compensation.

[72] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840: entry 19 February 1840

[73] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840

[74] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840

[75] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840: entry 9 February 1840

Thomas also wrote about the Bun wurrung swimming techniques which he found curious and bizarre. Thomas described the Aboriginal swimming technique as “they do not swim like a white man or so fast, like swans or ducks they work their hand open under their bellies & not spreading out like we swim, you cannot see their legs”. Thomas also observed that they never dived but walked into the water.

It was also clear that many early European settlers were openly hostile to a continued Aboriginal presence in the area. Thomas noted with disdain, after being refused permission to camp on a property close to Dandenong, that "this is the 12th Station where we have been ill received".[76] Within four years of European settlement the *Bun wurrung* had already established etiquette regarding camping on pastoral leases: “The Blacks are very careful where they Encamp to avoid giving offence - they encamps at a nook of the Creek quite out of the way of Cattle &c, & at least half or 3/4 of a mile from the huts”.[77]

Thomas noted that firing of the landscape was a source of conflict between the Bun wurrung and the squatters. Of most concern to the squatters was the firing of areas that were used to graze stock. During traditional hunting, a firestick was usually carried in order to drive game. According to Thomas’ journal, Aborigines argue that firing the bush is something they have always done for hunting possums, wombats and other animals. The *Bun wurrung* promised not to set any more fires and the party went out without firesticks and returned with plenty of roots[78].

5.9.6 Summary

Some important key points can be drawn from our review of Thomas’ journals:

- Over the course of the journey, camping sites were always located near a creek or water source. The duration of stay varied considerably and appeared to be related to how abundant water and other food sources were;
- Women were actively involved in hunting, including bringing back Kangaroos that appear to have been killed with digging sticks;
- Firing of the landscape was a frequent occurrence and was primarily used to corral game;
- The *Bun wurrung* had a rich spiritual life and formal burial rituals; and
- Frontier relations were complex, with good relations between the *Bun wurrung* and some early European settlers, but there is also clear evidence of hostility and violence directed at the *Bun wurrung* from many other settlers.

[76] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840: entry 17 March 1840

[77] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840: entry 17 March 1840

[78] Thomas Journal 1840 ZML MSS 214 Item 2 (28) Journal January to May 1840

5.10 Environmental context (landforms & geomorphology)

Archaeological assessment reports 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)'. 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. 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 . 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. As a result, current drainage patterns across the study area is generally broad and informal.

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

5.10.2 Published Geological Information

Published geological information relating to the study area details two different geological units associated with the study area. These units are outlined below and shown on Figure 8.

The dominant unit is **Baxter Sandstone (Nxx)** - a sedimentary unit (non-marine) of fluvial origin comprising sandstone, conglomerate, siltstone and ironstone. However, in the north west of the study area is a finger of more recent aeolian deposits described as **Unnamed Dune Deposit (Qd1)** –a more recent sedimentary (non-marine) aeolian dune deposits conprising sand, calcareous sand and clay. These dune deposits are commonly known as the 'Cranbourne Sands' and have a high archaeological potential (see previous discussion in section 5.4.1 of this report).

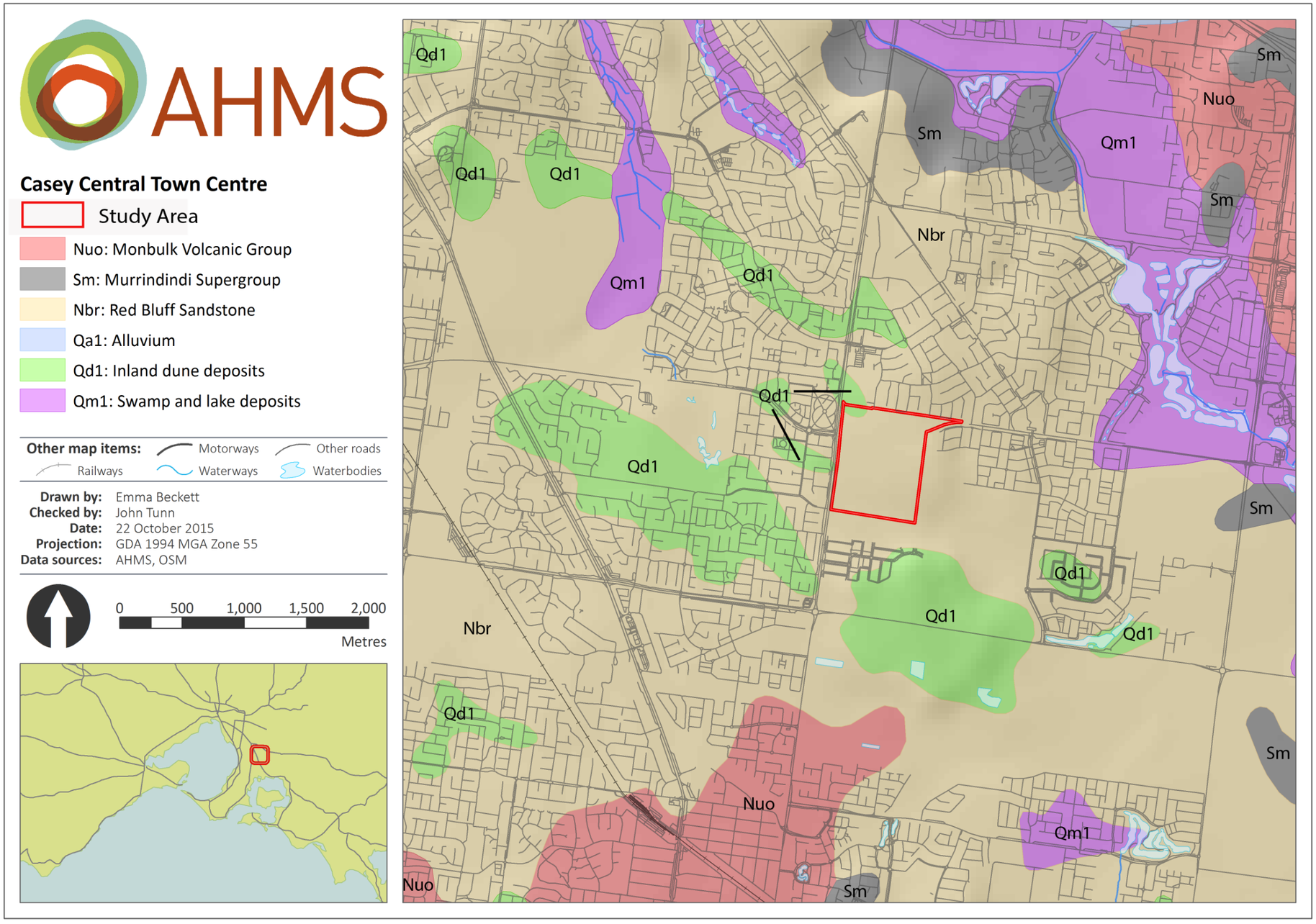

Figure 8. Geological units within the study area[79]

[79] Ibid.

5.10.3 Hydrology

Due to artificial drainage, channelling, and dam construction, the current pattern of hydrology has been largely modified and formalised. Within the study area dams have been excavated to capture water flows, preventing the natural flow of water to continue through natural water courses and swamps.

Koo Wee Rup Swamp was the dominant landform feature across the region prior to the the construction of formal channels and drains during the 19-20th century. Successful European settlement of the district post-contact was heavily reliant on attempts to clear and reclaim the swamp. This, in effect, altered the natural environmental and hydrological regime until original water resources landscape became largely unrecognisable.

No current or former drainage channels or swamps have been noted within the current study area.

5.10.4 1750 Ecological Vegetation Classes

Published information on vegetation and biodiversity is included on the Victorian Resources Online website (VRO). 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 VRO 1750 Vegetation Communities (EVC) Map relevant to the study area (refer to Figure 9).

The EVC within the current study area is:

897 Plains Grassland/Plains Grassy Woodland Mosaic

Comparison of the 1750 (modelled) and 2005 (current) EVC extent indicates that the majority of the Plains Grassland/Plains Grassy Woodland Mosaic has been removed, however isolated pockets are extant. This is considered to be incorrect as the entire southern portion of the current study area is currently market garden and any remnant vegetation has therefore been removed as part of this process.

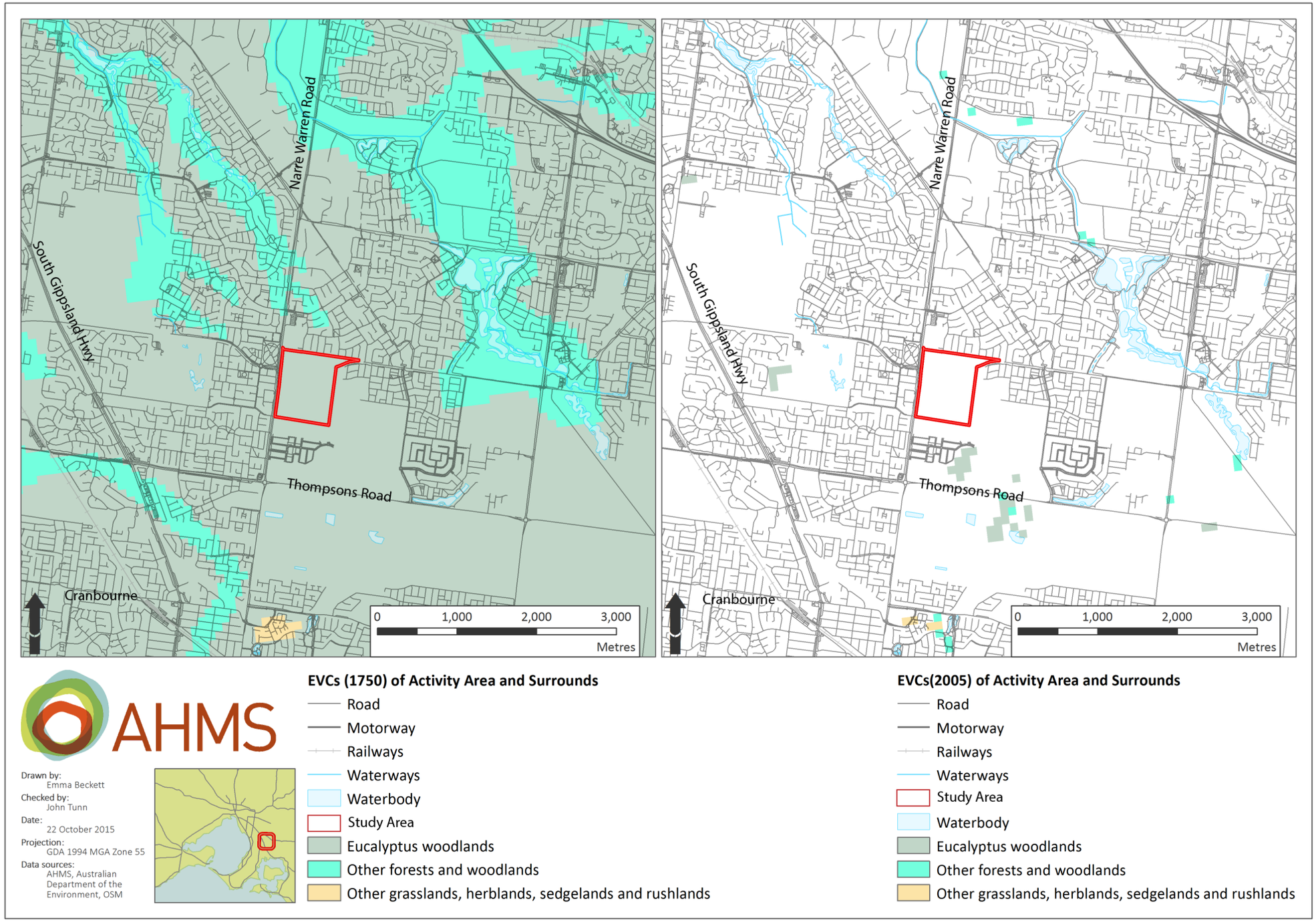

Figure 9. Ecological Vegetation Communities (EVC's) identified within the study area from 1750 (right) and current modelled extent of remnant EVC's (left) Study area outlined red. Source: Department of Environment & Primary Industries, Victorian Resources Online www.depi.govt.au/dpi/vro

5.11 Landuse history

An analysis of historical aerial photography indicates that the subject land was part of an agricultural pastoral landscape as recently as the 1970s. Historical aerial photograph indicates disturbance up to that period included land clearance, grazing, field cultivation and the construction of various tracks, farm houses, sheds and farm dams.

Recent high resolution aerial photography indicates the entire study area is now occupied by an operational market garden (Figure 10) which has resulted in extensive disturbance to the soil profile during construction of garden beds, access tracks and large water storage reservoirs. The entire study area has been heavily disturbed by these intense horticultural activities. The extent to which the more sensitive 'Cranbourne Sands' landform in the north of the study area has been impacted is not fully known, although a substantial level of disturbance is predicted.

5.12 Desktop Assessment Conclusions and Predictive Model

The desktop assessment described in the preceding chapters of this ACHA has been used to identify the prevailing patterns of prior Aboriginal occupation within the broader region and in the local area surrounding the study area. Analysis of historical aerial photographs, 19th century maps and plans and early accounts of Aboriginal settlement allowed us to identify original environmental characteristics of the area. This was useful in identifying areas of past ground disturbance that may have affected the integrity and significance of archaeological deposits. It also assisted in identifying the likely archaeological potential of the study area.

In developing this model it also important to recognise the distinct landforms within the study area, their relative archaeological sensitivity and how this sensitivity may have been compromised by past land use. As previously stated the study area has two distinct landforms:

A low lying broad fluvial landform and a more recent aeolian and sand body commonly known as the 'Cranbourne Sands' and associated with a high archaeological potential (see previous discussion in section 5.4.1 of this report).

Further, and with reference to previous assessment nearby, when encountered in a sub-surface context, the archaeological record on the low lying areas appears to be confined to the upper 500-600mm and is largely sterile below that level.

In adjacent and elevated sand bodies, the soil profile can be much deeper and the archaeological record can remain intact to greater depths. An example of these elevated sand bodies (the Cranbourne Sands) is located in the north western corner of the study area. (Figure 5) and identified as an area of heritage sensitivity.

Drawing on the desktop research and archaeological survey work, we make the following predictions:

- Stone artefact deposits are likely to be found at varying densities across most landforms within the study area where they are preserved.
- Higher density artefact scatters and sub-surface deposits are likely to be located on crest landforms, where they are preserved.
- The density and complexity of artefact scatters and sub-surface deposits is likely to decrease with distance from water sources.
- Scarred trees may be present within areas containing mature remnant native trees of sufficient age; and
- Isolated finds may be found anywhere across the study area.

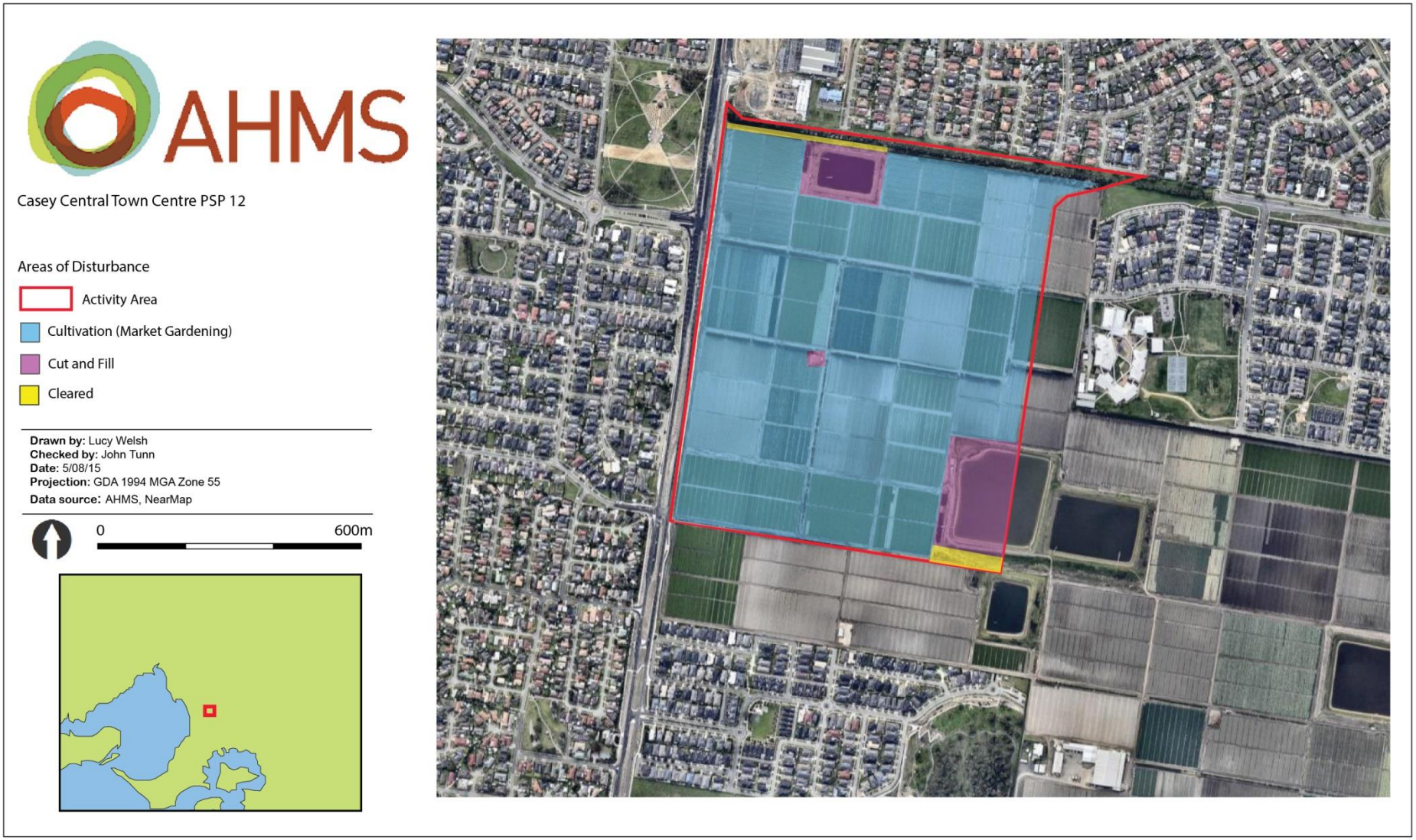

Figure 10. Plan of the study area showing areas of high disturbance Basemap Source: Google Earth Pro 2010.

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 Casey Central Town Centre PSP planning area. Details of the standard assessment are provided in Appendix 1.

6.2 Predictive Modelling Aims

Due to the large area covered by the Casey Central Town Centre PSP, AHMS developed a map presenting the study area's relative archaeological potential. The purpose of the predictive model and the resultant map of archaeological potential was to:

- Provide the MPA, individual landowners within the PSP and Aboriginal community stakeholders with information about areas of Aboriginal archaeological sensitivity to feed into their 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 predicted integrity, density and research value of archaeological deposits across the study area.

6.2.1 Factors included in the Model

The following is a list of variables that contribute to archaeological potential within the Casey Central Town Centre PSP area. The variables are ranked in order of importance.

Crest Landforms.

Previous investigations in the area have shown that crest landforms often contain a higher density and frequency of archaeological deposits. 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 ArcGIS.

Proximity to former 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. 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. Analysis of topographic maps, historic aerial photos and observations during the survey have been used to determine the likely extent of wetlands and waterlogged areas that existed before European settlement.

Areas of cut and fill disturbance

Are considered unlikely to contain Aboriginal archaeological deposits because topsoil units (ie. artefact bearing soil units) have been removed. These areas include dams and the construction of building platforms for houses and sheds. They are considered to have nil archaeological sensitivity.

Areas of market gardening and orcharding

Are considered to have a low level of archaeological sensitivity because topsoil units have been heavily disturbed by deep ploughing, levelling and re-grading during the establishment of garden beds and excavation and trenching during the establishment of sub-surface watering systems. These areas may contain Aboriginal cultural deposits but they are likely to have a very low level of integrity and a very low level of scientific significance.

Areas of 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 because the top 20 – 30cm of topsoil has been disturbed by ploughing. It is noted, however, that in deeper soils there is potential for more intact archaeological deposits to survive beneath the plough zone.

6.2.2 Predictive Sensitivity and Future PSP Planning

Desktop and standard assessment and ArcGIS software was used to model and map predictions about archaeological potential across the study area. This allowed us to produce a map that presents areas of varying archaeological sensitivity graded from Moderate to Nil. The modelling and mapping is based on a probabilistic approach, where the two main traits (proximity to water and crest landform) were used to determine the combined level of potential. Areas of prior disturbance have reduced sensitivity based on the degree and type of prior disturbance. The model traits are as follows:

- Crests = High Sensitivity;
- Areas within 200m of former water course or water body = High Sensitivity;
- Crest and within 200m of former water = Very High Sensitivity;
- Areas 200 – 400m from former water = Moderate Sensitivity;
- Areas 400 – 600m from former water = Low Sensitivity;
- Cut and Fill Disturbance = Nil Sensitivity;
- Ploughing Disturbance = Reduced Sensitivity by One Level.
- Market Gardening / Orcharding Disturbance = Low Sensitivity (includes a consideration of ploughing disturbance)

Figure 11 shows the results of the GIS predictive model with areas of moderate (orange) low (pink) and nil potential (white).

The accuracy of the modelling and mapping presented in this report is considered reasonably robust and underpinned by a large body of previous archaeological assessment undertaken in the south east growth Therefore, the sensitivity mapping could be used to usefully inform PSP design decisions in the initial stages of structure planning, particularly in regards to proposed configuration of open space networks, study centre and key infrastructure such as main roads that need to be established early in the PSP planning and design process.

Any future complex assessment should be designed in a way that tests this model and its conclusions Where necessary the model and sensitivity mapping should then be updated or refined 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.

AHMS also advise that this approach would result in the best and most informed outcome if undertaken during the preparation of a single CHMP that investigates the whole study area rather than during smaller individual precinct specific CHMPs. A single CHMP has the advantage of applying a greater level of consistency in method and approach to any further testing of the model and sensitivity mapping. Moreover, a single study can also result in final management recommendations that better consider the full nature and extent of prior disturbance and any associated Aboriginal cultural heritage materials across the study area and can influence final PSP layout in the most informed manner. Individual CHMPs, potentially undertaken over a long period of time, by their very nature are limited in their ability to inform decision-makers on the relative merits of particular developments and their most appropriate location across the study area.

The extent of landform testing and sample effort should be established on a case by case basis (whether a single of smaller CHMP) 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.

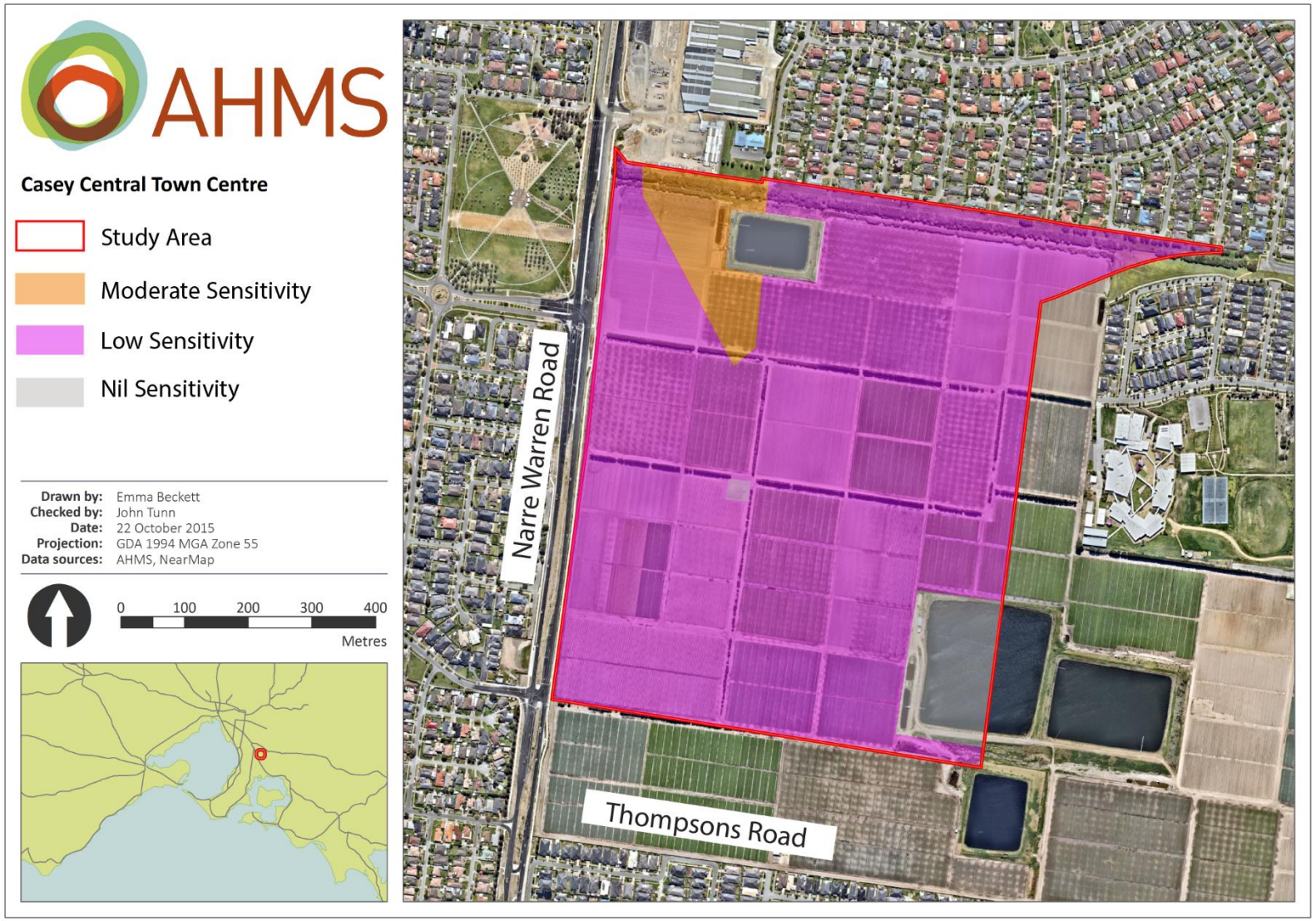

Figure 11. GIS Archaeological sensitivity map based on the predictive model developed during the desktop assessment. Study Area boundary outlined in red.

7 MANAGEMENT RECOMMENDATIONS

7.1 Preamble

The results of the Desktop and Standard Assessment were used to develop a predictive model of archaeological sensitivity across the Casey Central Town Centre PSP area.

The predictive model and archaeological sensitivity map shown on Figure 12 is designed to inform PSP design and planning work. The sensitivity map is also designed to provide the landholder/landowners and development proponents with a guide to archaeological sensitivity within various the study area and to assist in gauging risk and making informed decisions about development design.

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 zones 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 this ACHA of the Casey Central Town Centre PSP area defined Moderate, Low and Nil levels of Aboriginal heritage sensitivity.

7.2 Recommendations

The following recommendations are made in the context of developing the Casey Central Town Centre 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 12 of this report, and wherever possible, planning decisions should:**

- Ensure development impact is focused on areas of lower heritage sensitivity (i.e. Nil to Low), and across those areas that result in the least 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 12:

Nil Sensitivity: 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.

Low Sensitivity: no design and planning recommendations. These areas are essentially archaeologically 'neutral' and are generally compatible with residential subdivision and development.

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.

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 12), 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 13 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 12 and significant sampling efficiencies by using a common approach that can be utilized by all the landowners and proponents within the study area.

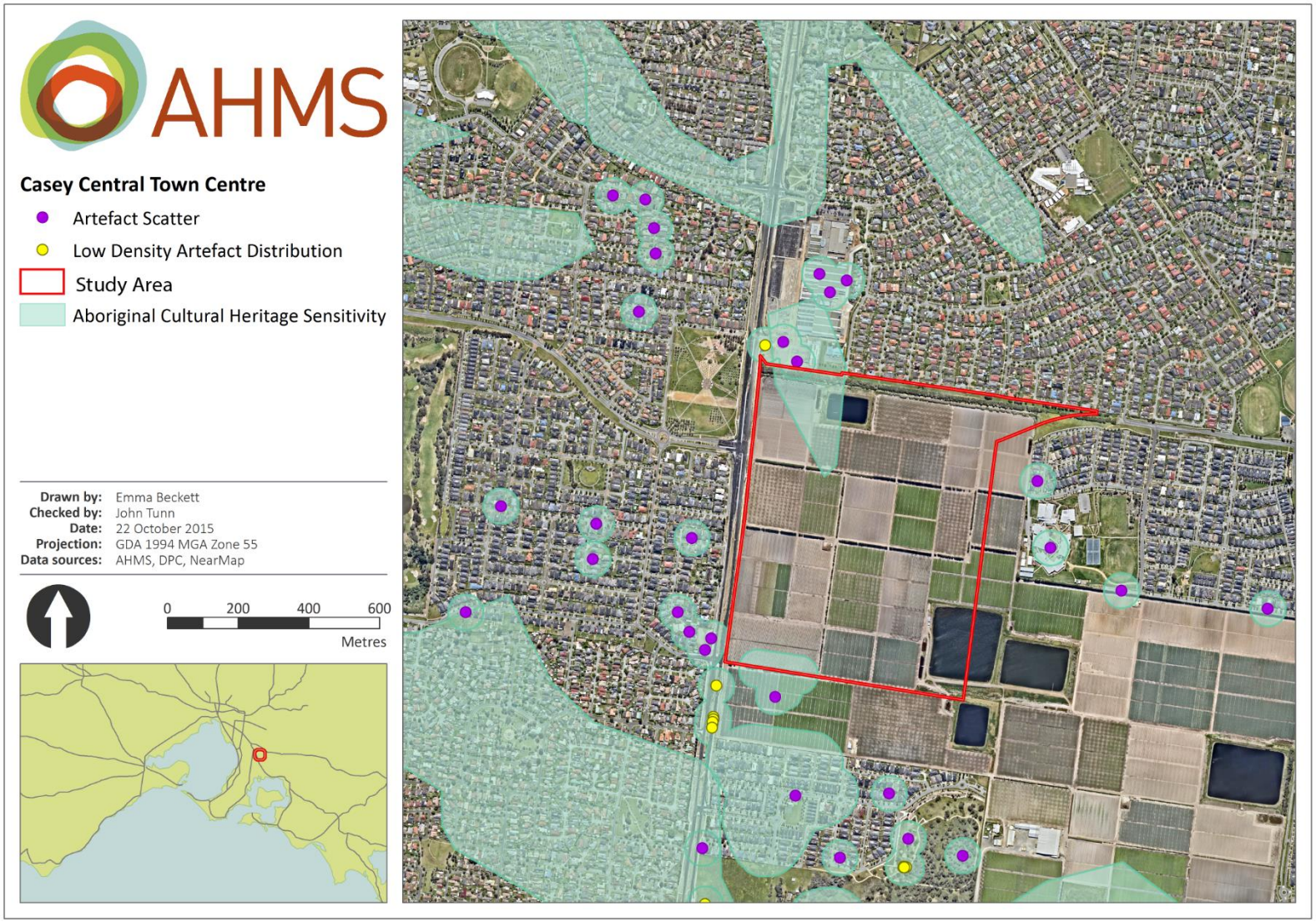

Figure 12. Current areas of CHS within the study area.

REFERENCES

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

Adams, C, Dugay-Grist, L & McAlister, R (2010) 308 Centre Road, Narre Warren South: Proposed Residential Sub DivisionCHMP #11005.

Allen, J., G. Hewitt and J. de Lange, (2008) 'Report on Bend Road Archaeological Investigations: Bend Road 1 Phases 1 to 3'.

Andrew Long and Associates, (April 2010) 'Strategic Approach to Aboriginal Heritage Management for Melbourne's Growth Areas' (Volume 1 of 5): Project Overview. Draft Report prepared for the Metropolitan Planning Authority.

Andrew Long and Associates (April 2010) '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 Metropolitan Planning Authority.

Barker, M. (2009) Watsons Creek Rehabilitation Scheme, Grant Road, Baxter. Cultural Heritage Management Plan #10616. Unpublished report by Heritage Insight for Melbourne Water.

Barker, M. (2011) Proposed Residential Subdivision, 146-352 Golf Links Road, Narre Warren, Victoria: Desktop, Standard and Complex Assessments – CHMP #11199. Heritage Insight.

Barker, A., J. Turnbull & D. Thomas. (2012). Narre Warren - Cranbourne Road Duplication, CHMP #10764

Bell, J. (2003a) An Archaeological Assessment Golden Grove Estate, Narre Warren South. OAAV #1914

Bell, J (2003b) Monash University (Berwick Campus). OAAV #3074

Bell, J (2004) Eden Rise Estate Archaeological Sub-Surface Testing. OAAV #2901

Bell, J (2005a) Eden Rise Estate Salvage Excavation Aav Site 7921-0655 OAAV #2987

Bell, J (2005b) Monash University (Berwick Campus) Archaeological Sub-Surface Testing OAAV #3067

Bell, J (2006a) Eden Rise Estate: Monitoring Of Aav Site 7921-0655 OAAV #3537

Bell, J (2006b) Archaeological Desktop Investigation Lots 1 & 4, Homestead Road Berwick OAAV #3667

Burch, J., O. Nicolson., A. Parmington & J. Mitchell. (2008). Stage 2 Commercial Subdivision Development, 100 Colemans Road, Carrum Downs, Victoria. CHMP # 10216

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

Canning, S., D. Griffin, V. Flynn & P. Ricardi. (2010). Recent archaeological excavations of Pleistocene deposits at Brimbank Park, Keilor, Victoria. *Archaeological Heritage* vol 2 (1), pp. 25-35

Chamberlain, M. (2003) An Archaeological Survey Narre Warren - Cranbourne Road, Narre Warren South OAAV #2528

Chandler, J. & Roark Muhlen-Schulte, (2011). Wetlands Development, Monash University, Berwick Campus. CHMP #11530

Day, C. (2010) PSP NO. 16 – Cranbourne North (Stage 2) – Crn Thompsons & Clyde Road – CHMP #11051. Golder Associates

Debney, T. 1999 Desktop Assessment of Pipeline Between Cardinia Reservoir and Pearcedale, Victoria. Biosis Research.

Debney, T., J. Fiddian, H. Cekalovic, A. Orr, M. Lawler, T. Meara, R. Regal, and K. Houghton (2009) 'Desalination Project Transfer Pipeline and Power Utilities Corridor, Wonthaggi to Cranbourne, Victoria: Cultural Heritage Management Plan'**.**

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

Feldman et al. (2009) 'Casey Central Shopping Centre, City of Casey, Cultural Heritage Management Plan'.

Feldman, R and Long, A. (2006) Melbourne 2030 Casey Cardinia Growth Area. Aboriginal Archaeological Desktop Report OAAV #3883

Gallus, A. (1976) 'The Middle and Early Upper Pleistocene Stone Industries at the Dry Creek archaeological sites near Keilor, Australia'. The Artefact (n.s.) 1(2).

Goulding, M. (1988) Aboriginal Occupation of the Melbourne Area, District 2: a report to the Land Conservation Council, Land Conservation Council, Melbourne, p. *21*

Haley, M. & Weaver, F. (2001) Proposed Residential Subdivision: Clyde Road, Berwick, Victoria: A Survey For Aboriginal & Historic Archaeological Sites. OAAV #2183

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

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

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

Hyett, J. (2005) Aboriginal Archaeological Subsurface Testing, 74a Hancock Drive, Berwick OAAV #3052

Hyett, J. (2007) River Gum Creek, Hampton Park, Cultural Heritage Desktop Assessment OAAV #3858

Hyett, J & Myers, S (2004) An Archaeological Assessment 396-430 Centre Road Berwick OAAV #2899

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

Light, A. (2010). Clyde Road Upgrade, Berwick – CHMP #11298. Ochre Imprints

Light, A. (2009)a '1555 Sth Gippsland Hwy, 5 Adrian St, 6 Adrian St & 7 Nelson St (Residential Subdivision) Cranbourne East'.

Light, A. (2009)b '50 Berwick-Cranbourne Road, Cranbourne East (Residential Subdivision): Aboriginal Cultural Heritage Management Plan'.

Long, A., J. de Lange, D. Matthews, S. Thomas & J. Bowler. (2010). Keysborough Industrial Estate – II (Lot 1 Bend Rd and Lots 9, 10 & 11 Perry Rd) Keysborough. CHMP 10639

Macculloch, J. & B. Marshall, (2014). 96-166 Centre Road, Narre Warren Residential Subdivision CHMP #13155

Marshall.B & Webb.C (2001) An Aboriginal Heritage Impact Assessment Of The Proposed Widening Of The Narre Warren-Cranbourne Road, Narre WarrenOAAV #1904

Marshall, B.(1997) Subsurface Archaeological Investigations At Berwick South, OAAV #720

Matthews, L. (2005) Archaeological Subsurface Testing Of A Proposed Development Site, Narre Warren- Cranbourne Road, Narre Warren, Victoria. OAAV #3293

Mathews, D. & Long, A. (2008). Lot 29a, Thornley Drive, Berwick. CHMP #10285

Mulvaney, J and Kamminga, J, (1999) 'Prehistory of Australia', Smithsonian Institution Press, Washington D.C. 1999, pp. 230-255

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

Murphy, A. (2002) Bryn Mawr Estate, Berwick, Cultural Heritage Assessment OAAV #2292

Murphy, A. (2004) Centre, Ward & Homestead Roads, Berwick OAAV #2971

Murphy, A. & Amorosi, L. (2003) Bryn Mawr Estate, Berwick Sub-Surface Testing & Monitoring Program. OAAV #2431

Murphy, A & Dugay-Grist, L. (2007). 62-30 Golf Links Road, Berwick. OAAV #4091

Murphy,A & Dugay-Grist, L. (2008). Narre Warren-Cranbourne Road Narre Warren South.OAAV #4118

Murphy, A. & Laurinda Dugay-Grist. (2008). 2 - 30 Golf Links Road, Berwick Residential Subdivision CHMP #10110

Murphy, A & Kennedy, S. (2009) Clyde North & C21 Precinct Structure Plan Desktop Cultural Heritage Assessment. Report to MPA and Tract Consultants on behalf of Australand Holdings Ltd by Tardis Enterprises Pty Ltd

Murphy, A. and T. Rymer (2008)a 'Sewer Rising Main, Officer South, Cultural Heritage Management Plan'.

Murphy, A. and T. Rymer (2008)b 'Edenbrook Residential Estate, Henry Road Pakenham, Cultural Heritage Management Plan'.

Nicholson, O and J. Burch (2008). 55 Kangan Drive, Berwick, Victoria – CHMP #10215. ERM

O'Reilly, S & Sarah Skews. (2012). 1a Galloway Drive, Narre Warren South. CHMP #12196

Parmington, A. (2008) '625 Princes Highway, Officer and 707 Princes Highway Pakenham, Victoria: Cultural Heritage Management Plan'.

Presland, G. (1983) 'An Archaeological Survey of Melbourne Metropolitan Park', Victoria Archaeological Reports 15, 1983, 35

Rhodes, D. (2002) An Archaeological Survey Of A Road Intersection Narre Warren - Cranbourne Road, Narre Warren South. OAAV #2394

Riccardi, P. (2012) 193 Golf Links Road, Narre Warren – Subdivision CHMP #12040

Sciusco, L. (1996). An Archaeological Survey For A Local Structure Plan, Berwick, Victoria. OAAV #989

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

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

Smith, L.J. (1991) 'Berwick-Pakenham Corridor. Aboriginal Archaeology'. Victoria Archaeological Reports 45.

Stone, T. (2008) Proposed Berwick Select Entry School Stage 1, Berwick – CHMP #10552

Stone, T. and G. Defteros (2009) Proposed Berwick Select Entry School Stage 2, Berwick – CHMP #10755

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

Terra Culture (2003). A Salvage Excavation Of Aboriginal Archaeological Site Eden Rise 1. OAAV #1817

Terra Culture. (2005). Archaeological Sub-Surface Testing 396 Centre Road Berwick. OAAV #3018

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

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

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

Veres, M. (2009).Narre Warren Fire Station, 292-298 Cranbourne Road, Narre Warren South CHMP #10649

Vines, G. (2008). 1435 Thompsons Road, Cranbourne, Victoria: Cultural Heritage Management Plan for proposed residential subdivision – CHMP #10022

Webb.C & Marshall.B (2000). An Aboriginal Archaeological Survey Of A Proposed Residential Subdivision: Greaves & Clyde Roads, Berwick OAAV #1818

Webb, C. & Chamberlain, M. (2002). An Archaeological Survey of a Proposed Residential Subdivision: Pound Road, Narre Warren South. OAAV #2229

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

Appendix 1 - STANDARD ASSESSMENT

Site Inspection Details

The following sections describe the results of a survey undertaken by AHMS on 3rd June 2010.

The principal aim of the survey by AHMS was to confirm and map disturbance levels identified during the desktop assessment and identify and record any surface Aboriginal artefacts present. The inspection aimed to identify areas of archaeological potential, landforms, vegetation patterns, geomorphic units, and areas of disturbance.

Table 5: Personnel in attendance during the site inspection

Personnel	Organisation	Dates present
Jim Wheeler	AHMS	3/6/2010
Erica Walther	AHMS	3/6/2010
Bobbie Mullins	WTLCCHC	3/6/2010
Stevie Pepper	Bunurong	3/6/2010

Methods

The archaeological survey was designed to survey all accessible parts of the study area.

The standard assessment involved a four stage approach:

1. An analysis of topographic maps and aerial photographs of the study area 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 (i.e. erosion scours). These areas were targeted during the survey because they provided an opportunity to identify surface artefact scatters and to investigate exposed soil profiles.

2. The second step taken was an initial informal survey around the property in order to identify mature/old growth native trees and areas of ground surface visibility. This assisted in scoping out the approach to survey in each area.

3. Following the initial scoping work, surveying was conducted on foot. The survey used the information obtained from analysis of aerial photographs and topographic maps (Stage 1), as well as the initial scoping work (Stage 2), 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. The team inspected all areas with ground surface visibility and all mature native trees.

4. Surface artefact scatters found during the survey would then be recorded in detail using a pro-forma developed for field recording. The location and extent of each Aboriginal place would be recorded with a Garmin handheld GPS device. Field notes were made and photographs taken to document landscape configuration, soil profiles, soil disturbance, ground visibility and vegetation types. Areas of soil exposure were also inspected for evidence of archaeological material.

Results

Survey Coverage

At the time of the survey, the majority of PSP 12 was under crop (Figure 13). Ground surface visibility and exposure was limited to sections of vehicle tracks, gaps between garden beds and dam embankments.

Effective coverage across the study area was less than 5 % due to poor ground surface visibility. This indicates the survey was generally ineffective in identifying the extent of cultural material within the study area.

Figure 13. PSP 12 showing extensive market gardening and artificial drainage corridor.

Landscape characteristics

The study area has been significantly modified to convert former pastoral farming land into an intensive market garden. The original landscape comprised gently undulating slopes and more elevated broad crests in the north.

Native vegetation has been completely removed from the study area in order to prepare the landscape for market gardening.

Evidence of past disturbance

Standard assessment was used as an opportunity to ground truth and confirm the extent and nature of past ground disturbance identified during desktop assessment.

The site inspection supported and corroborated those conclusions with the following specific disturbances observed across the study area:

- **The entire study area is currently used for market gardening. Establishment of the garden would have entailed significant excavation work and sub-surface disturbance to at least 500-700mm depth;**
- **Large dams and dam storage walls have been constructed at three locations within the study area. Construction of these dams would have entailed significant excavation work and sub-surface disturbance to at least 2-3 m depth;**
- **An extensive sub-ground watering system was identified across the entire study area. Installation of the system would have entailed significant excavation work and sub-surface disturbance to at least 500-700mm depth;**
- **Numerous vehicle tracks have been constructed throughout the study area; and**
- **There has been extensive re-shaping of the study area through cut and fill and re-grading to establish desired gradients and through the construction of water storage reservoirs. This has resulted in significant modification of the original landscape and extensive disturbance of the soil profile.**

Aboriginal cultural heritage

One low density artefact scatter was identified during the site inspection. The low density artefact scatter (VAHR 7921-1545-1) consisted of six artefacts distributed across surface soils exposed across a series of vehicular access tracks in the southern portion of the study area (extent of the surface scatter is shown overleaf on Figure 15.

Mature indigenous tree species

No mature trees exhibiting Aboriginal scarring were identified within the study area.

Caves, rock shelters and cave entrances

No caves, rock shelters, or cave entrances were identified within the study area.

Aboriginal cultural heritage in the study area

One low density artefact scatter was identified during the investigations undertaken during the course of this Heritage Assessment. A summary of the extent, nature and significance of VAHR 7921-1545-1 is included below.

VAHR 7921-1545-1

Table 6: Details of VAHR 7921-1545-1

Detail	Description
Primary Grid ref:	Easting: 350788.000 Northing: 5784144.000
Location:	Casey Town Centre PSP
Landform:	Vehicular Access Track
Artefacts:	6
Average Artefact density per m²:	>1
Place extent:	Isolated/dispersed artefacts
Place condition:	Poor
Place type	Low Density Artefact Scatter
Scientific significance:	Very Low

Figure 14. Photograph of artefact exposure (VAHR 7921-1545-1) on disturbed market garden access track.

Nature

VAHR 7921-1545-1 likely reflects casual discard, occasional short stay use or the remains of a low density scatter that has been widely dispersed by extensive market gardening of the study area. The scatter was located on a highly disturbed market garden vehicle access track surface. The artefacts are not in primary deposition and have little to no integrity.

Table 7: Artefact Attributes - VAHR 7921-1545-1

Material	Form	Corte %	Retouch/ usewear %	Platform	Term	Length - (mm)	Width - (mm)	Thickness (mm)	Max Dim (mm)
Silcrete	Flake - Distal	None	None		Feather		13	2	17
Silcrete	Flake - Complete	None	None	Plain	Step	15	11	4	20
Silcrete	Flake - Longitudinal Split	None	None	Plain	Feather	13		5	16
Quartz	Flake - Complete	None	None	Crushed	Feather	23	10	5	29
Silcrete	Flake - Complete	None	None	Plain	Step	22	14	4	30
Silcrete	Flake - Complete	None	None	Plain	Feather	27	15	4	28

Extent

VAHR 7921-1545-1 has been registered as an artefact scatter. The extent of the scatter on a section of exposed market garden vehicle access tracks is shown on Figure 15

Figure 15. Extent of artefact exposure (VAHR 7921-1545-1) on disturbed market garden access track.

Scientific significance

VAHR 7921-1545-1 comprises a small low density scatter of surface artefacts exposed on a section of vehicle access tracks within the market garden. The artefacts were not in primary deposition and have little to no vertical or horizontal integrity. Low densities of surface artefacts found on disturbed exposed soil surfaces are common locally and across the region. The artefacts have very little potential to provide meaningful research information because their original provenance is unknown and they form a sample that is too small to overcome small sample biases. As a result, the Aboriginal place is assessed as having a very low level of scientific significance at a local level.

Figure 16. Photograph of one of the surface artefacts that forms part of VAHR 7921-1545-1.

Conclusions

The poor ground visibility across the majority of the study area indicates the site inspection was generally ineffective. However, the results of the survey confirmed the predictions made in the predictive modelling developed as part of the desktop assessment regarding the level and extent of prior disturbance.

A number of conclusions regarding archaeological patterning and potential were made drawing on the results of desktop assessment and site inspection work:

1. There has been extensive modification of the entire study area as part of the market gardening operation. This has included reshaping the original topography through cut, fill and regrading to obtain required gradients for drainage, establishment of garden beds and a grid of access tracks, installation of a grid of sub-ground watering and reticulation infrastructure and construction of large water storage reservoirs. While the likelihood of discovering Aboriginal cultural heritage in the area is not extinguished, these activities will have disturbed or destroyed any Aboriginal cultural heritage deposits within the study area;

2. Recent statistical analysis of pooled data obtained from complex assessments across five large activity areas in Clyde has demonstrated that cut, fill and soil reworking associated with the market gardening has disturbed and largely removed any archaeological traces of past Aboriginal occupation. This is likely related to soil churning and sieving processes that result in the removal of artefacts, along with other gravels and rocks from the soil profile, during the establishment of the market garden;

3. We can conclude that it is likely that artefacts that may have originally existed across the landscape have been removed during the development of the market garden and, where

present, Aboriginal cultural deposits are highly unlikely to be *in-situ* or provide any meaningful archaeological research value or potential.

4. Although the defined sensitive 'Cranbourne Sands' landform to the north of the study area has been extensively disturbed and modified, it is possible that more intact deposits may be preserved at deeper levels. Here, artefacts that may have originally existed at deeper levels may have avoided impact during the development of the market garden and, where present, may be *in-situ* and able to provide meaningful archaeological research value.

5. As a result:

    a) The 'Cranbourne Sands' landform to the north of the study area, and where not impacted by excavation associated with dam construction, has been assigned a '**Moderate'** sensitivity;

    b) The area comprising the market garden beds and access tracks and where not impacted by excavation associated with dam construction, has been assigned a '**Low'** sensitivity; and,.

    c) The area impacted by excavation associated with dam construction/water storage, has been assigned a '**Nil'** sensitivity.

Appendix 2 Gazetteer of Aboriginal places

Name	VAHR Number	GDA 94 Zone 55	Aboriginal Place Type	Summary
Narre Warren Cranbourne Rd 3	7921-1545-1	Easting: 350788.0 Northing: 5784144.0	Artefact Scatter	Six surface stone artefacts identified on a disturbed access track surface

Appendix 3 Planning Scheme 37.07 (Urban Growth Zone)

37.07 **URBAN GROWTH ZONE**

08/05/2012
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**

08/05/2012
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

18/06/2008
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 4 - Glossary of technical terms

Term	Description
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, SiO2. It crystallizes in the trigonal system, commonly forming hexagonal prisms. For cryptocrystalline varieties of silica see Chalcedony.

Term	Description
	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).