Final Report v2

Highton Basins, 122A Thornhill Road, Highton: Ecological and Cultural Heritage Due Diligence Assessment

Prepared for

Barwon Water

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- Heritage Victoria for use of the Victorian Heritage Database; and
- The Department of the Environment for use of the Australian Heritage Database.

GLOSSARY

Acronym	Description
CaLP Act	*Catchment and Land Protection Act 1994*
CHMP	Cultural Heritage Management Plan
CHS	Cultural Heritage Advisor
DELWP	Department of Environment, Land, Water and Planning (State)
DoE	Department of the Environment (Commonwealth)
DPC	Department of the Premier and Cabinet
EE Act	*Environment Effects Act 1978*
EES	Environment Effects Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESO	Environmental Significance Overlay
EVC	Ecological Vegetation Class
FFG Act	*Fauna Guarantee Act 1988*
FIS	Flora Information System
HO	Heritage Overlay
HV	Heritage Victoria
HHA	Historical Heritage Assessment
LDAD	Low Density Artefact Distribution
LGA	Local Government Area
NES	National Environmental Significance
NNTT	National Native Title Tribunal
NTGVVP	Natural Temperate Grassland of the Victorian Volcanic Plain
OAAV	Office of Aboriginal Affairs Victoria
P&E Act	*Planning and Environment Act 1987*
PMST	Protected Matters Search Tool
SGD	Significant Ground Disturbance
SHW	Seasonal Herbaceous Wetlands
SPPF	State Planning Policy Framework
T/O	Traditional Owner/s
VAHR	Victorian Aboriginal Heritage Register
VBA	Victorian Biodiversity Atlas
VFD	Victorian Fauna Database
VHI	Victorian Heritage Inventory
VHR	Victorian Heritage Register

SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd were engaged by Barwon Water to undertake an Ecological and Cultural Heritage Due Diligence Assessment for the potential residential development on land currently occupied by the Highton Basins at 122A Thornhill Road, Highton. The overall objective of the assessment was to determine the key natural and cultural heritage values within the study area and provide a summary of associated legislative and policy implications to inform the planning and design process.

Methods

The assessment was based on the findings of a desk-based review and site inspections completed by a qualified Ecologist and Cultural Heritage Advisor. Relevant literature, online-resources and numerous databases were reviewed to provide an up to date assessment of natural and cultural heritage values associated with the study area and surrounds. Preliminary site inspections were undertaken on 9 April 2015 to document potential constraints associated with future development.

Results

Natural Heritage

The study area is representative of many areas within the region as it has been significantly modified, with vegetation generally limited to modified woodland habitats and planted trees. Remnant vegetation within the study area was limited to small fragmented patches of the Grassy Woodland EVC.

While the study area comprised modified components of this EVC, this habitat has the ability to support some level of diversity for flora and common urban-adapted fauna species. However, the general scarcity of structural diversity and density within most vegetated areas represents limited niche availability to support high species diversity.

Accordingly, significant flora and fauna species are considered unlikely to be present as there is no suitable habitat in the study area or they are presumed to be extinct in the locality.

Cultural Heritage

Due to the high levels of previous land modification by the construction of the existing Highton Basins and associated infrastructure Aboriginal archaeological deposits that may once have been present are likely to have been destroyed. There are no identified areas of aboriginal archaeological likelihood within the study area.

The current use of the study area dates to the years immediately following World War II when ongoing water shortages in Geelong required additional water storage infrastructure to be constructed. The study area has some low level local heritage significance for its technical and social values but is unlikely to meet the thresholds for registration on the local Heritage Overlay.

Legislative and Policy Implications

Natural Heritage

The table below provides a summary of legislative implications associated with natural heritage values identified within the study area.

Table S1: Summary of Natural Heritage Legislation Implications

Legislation/ Policy	Implications
Environment Protection and Biodiversity Conservation Act 1999	The proposed action is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is not recommended regarding matters listed under the EPBC Act.
Flora and Fauna Guarantee Act 1988	No species listed as threatened or protected under the FFG Act were recorded within the study area, and none are considered likely to occur. As such an FFG Act permit will not be required for development of the study area.
Planning and Environment Act 1987	A Planning Permit from the City of Greater Geelong is required to remove, destroy or lop any native vegetation as part of any proposed development of the study area.
Biodiversity Assessment Guidelines	Areas of remnant native vegetation must be offset if they are proposed to be disturbed as part of the project. The offset requirement for native vegetation removal is 0.011 General Biodiversity Equivalence Units (BEU).
Wildlife Act 1975	Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*.
Catchment and Land Protection Act 1994	To meet CaLP Act requirements listed noxious weeds and animals should be appropriately controlled throughout the study area during any upgrade works to minimise their spread and overall impact on ecological values.

Cultural Heritage

The table below provides a summary of legislative implications associated with cultural heritage values identified within the study area.

Table S2: Summary of Cultural Heritage Legislation Implications

Legislation/ Policy	Notes
Environment Protection and Biodiversity Conservation Act 1999	There are no known cultural heritage sites of National Significance within the study area. Therefore a referral or further works would not be required under the EPBC Act.
Aboriginal Heritage Act 2006	There are no legislated areas of cultural heritage sensitivity within the study area; therefore a mandatory CHMP for the proposed development is not required prior to a planning permit being approved. The study area is considered to have been subjected to total ground disturbance throughout and it is unlikely that any in situ Aboriginal cultural heritage will be present; therefore it is not recommended that a voluntary CHMP is warranted.
Native Title Act 1993	The study area does not comprise Crown land and comprises private land: therefore Native Title has been extinguished.
Coroners Act 2008	There are no implications under this legislation at present. If human remains are identified either during the course of any other ground impact works, then Police must be notified immediately.

Legislation/ Policy	Notes
Planning and Environment Act 1987	There are no historical heritage places listed on the local Heritage Overlay within the study area. Although the site exhibits some local heritage significance for its technical and social values, a permit from City of Greater Geelong will not be required for any works that will impact the site.
Heritage Act 1995	There are no historical heritage places on the VHR or VHI within the study area and there are no areas of historical archaeological likelihood present. Therefore a Permit and/or Consent from Heritage Victoria will not be required prior to a planning permit being approved.

Table S3: Application requirements for a permit to remove native vegetation (*Victoria Planning Provisions* Clause 52.17 -3; DEPI 2013)

No.	Application Requirement	Response
Application requirements for all applications:		
1	The location of the site of native vegetation to be removed.	Refer to Map 2 and BIOR report (Appendix 4).
2	A description of the native vegetation to be removed, including the area of the patch of native vegetation and/or the number of any scattered trees to be removed.	Refer to Section 3.1.1 and Section 3.3
3	Maps or plans containing information set out in the Guidelines, (Department of Environment and Primary Industries, September 2013)	Refer to Map 2 and BIOR report (Appendix 4).
4	Recent dated photographs of the native vegetation to be removed.	Refer to Section 3.1
-	Topographic information, highlighting ridges, crests and hilltops, streams and waterways, slopes of more than 20 percent, drainage lines, low lying areas, saline discharge areas, and areas of existing erosion.	Refer to Section 1.3
5	The risk-based pathway of the application to remove native vegetation.	Refer to Section 3.4
6	Where the purpose of removal, destruction or lopping of native vegetation is to create defendable space, a statement is required that explains why removal, destruction or lopping of native vegetation is necessary. The statement must have regard to other available bushfire risk mitigation measures. This requirement does not apply to the creation of defendable space in conjunction with an application under the Bushfire Management Overlay.	Not applicable.
7	A copy of any property vegetation plan that applies to the site.	Not applicable.
8	Details of any other native vegetation that was permitted to be removed on the same property with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before the application to remove native vegetation is lodged.	Not applicable.
9	The strategic biodiversity score of the native vegetation to be removed.	Refer to Section 3.5 and BIOR report (Appendix 4).
10	The offset requirements should a permit be granted to remove native vegetation.	Refer to Section 3.5 and BIOR report (Appendix 4).

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1 INTRODUCTION

1.1 Background

This report presents the findings of an Ecological and Cultural Heritage Due Diligence Assessment completed to identify key constraints and opportunities associated with potential residential development of the southern section of the Highton Basins at 122A Thornhill Road, Highton.

As part of enabling development, Barwon Water is seeking to subdivide the study area into approximately 32 residential allotments, with associated infrastructure. Enabling works associated with the development will include the removal of existing utilities infrastructure including the removal of the empty concrete basin that covers the majority of the eastern half of the study area.

1.2 Scope of Assessment

The purpose of this assessment is to determine the key natural and cultural heritage values within the study area and provide a summary of associated legislative and policy implications to inform the planning and design process and ensure that the project is undertaken in a manner that is consistent with the principles of Ecologically Sustainable Development and relevant State and Commonwealth legislation.

Specifically, this assessment aims to:

- Report the findings of desk-based studies and preliminary site inspections completed by a qualified Ecologist and Cultural Heritage Advisor;
- Identify the location and significance of key natural and cultural heritage values;
- Objectively determine the occurrence, or likelihood of occurrence, of non-apparent values, such as threatened species or sub-surface artefacts;
- Summarise the implications of relevant legislation and policy on the upgrade works; and
- Provide recommendations regarding the likely approvals pathway and further studies, where required.

1.3 Study Area

The study area comprises the southern portion of the Highton Basins site at 122A Thornhill Road, Highton. The 4.3 hectare site occurs on the crest of a north-east to south-west oriented ridge, overlong the valley of an un-named creek immediately to the north. The study area is bound by residential development to the east, Thornhill Road to the south, the Geelong Ring Road reserve to the south west and Council reserve to the west and the southern edge of the northern basin to the north.

Land use adjoining the study area comprises predominately suburban moderate density residential development to the east, north and south; however the Geelong Ring Road passes the south western corner of the study area.

The study is currently zoned Public Use Zone (PUZ1) under the Greater Geelong planning Scheme. Cadastral details for the study area are:

- Part Lot 1 TP606996, Parish of Barrabool, County of Grant; and
- Part Lot 1, PS620847, Parish of Barrabool, County of Grant.

The regional context of the study area is illustrated in Map 1.

1.3.1 Natural Heritage Context

The study area lies entirely within the Otway Plain bioregion which is characterised by coastal plains and dunes, foothills with river valleys and swamps in the lowlands (DELWP 2015a). The soils associated with the upper areas of this bioregion support Lowland Forest and Heathy Woodland ecosystems (DELWP 2015a), while the lower dunes areas contain predominantly sandy soils in which the floodplains and swamps support predominantly Grassy Woodland and Plains Grassy Woodland ecosystems (DELWP 2015a).

1.3.2 Cultural Heritage Context

The study area occurs at the eastern extent of the Barrabool Hills, overlooking the catchment of a locally-named creek (Kardinia Creek[1]) that rises approximately 2.3 km west of the study area, passes to the north west of the study area, and drains into the Barwon River approximately 2.5 km to the north east (however, the drainage line has been obscured by residential development east of Thornhill Road).

Although not a 'named' creek, within the meaning of the *Aboriginal Heritage Regulations 2007*, the waterway is likely to have provided a semi-abundant water resource for Aboriginal people prior to the arrival of European people in the region. The water resources will also have attracted a wide variety of game, including marsupials and waterbirds, which would have provided an ample food source for the small bands of Aboriginal family groups that occupied the area.

1.4 Structure of the Report

This Ecological and Cultural Heritage Due Diligence Report is structured as follows:

- Section 2: Methods - details the desk and field based methods used in surveying the existing environment;
- Section 3: Results – Natural Heritage: describes the study area and locality in terms of the existing natural heritage environment and values, based on the results of a desk-based review and field assessment. This section also provides a summary of legislative implications associated with the proposed residential development;
- Section 4: Results – Cultural Heritage: describes the study area and locality in terms of the existing cultural heritage values, based on the results of a desk-based review and field assessment. This

[1] 'Kardinia Creek' appears to be a local rather than official name for the waterway; the name does not appear on VicNames, the Register of Geographic Names, established under the *Geographic Place Names Act 1998*. Since it is not registered under the *Geographic Place Names Act 1998*, it does not form an area of cultural heritage sensitivity under the *Aboriginal Heritage Regulations 2007*. Although not an official name, for simplicity the creek will continue to be referred to as 'Kardinia Creek' for the remainder of this report.

section also provides a summary of legislative implications associated with the proposed residential development; and

- Section 5: Conclusion - presents conclusions, summarising the findings of the desk-based and field assessments and providing recommendations regarding future project approvals.

2 METHODS

2.1 Definitions

For the purpose of this report the following definitions apply:

- Study area: the area encompassing the indicative extent of direct impacts associated with the proposed development works. The study area is illustrated in Map 1.
- Project locality: The area within 5 km of the study area. This is consistent with the extent of database searches (Sections 2.3 and 2.5).

2.2 Natural Heritage

2.2.1 Nomenclature

Common and scientific names of vascular plants follow the Victorian Biodiversity Atlas (VBA) (DEPI 2014) and the Census of Vascular Plants of Victoria (Walsh and Stajsic 2007). Vegetation community names follow DELWP's Ecological Vegetation Classes (EVC) benchmarks (DELWP 2015a). The names of aquatic and terrestrial vertebrate and invertebrate fauna follow the VBA (DEPI 2014).

2.2.2 Desktop Assessment

Relevant literature, online-resources and numerous databases were reviewed to provide an assessment of flora and fauna values associated with the study area. The following information sources were reviewed:

- The DELWP Biodiversity Interactive Map (DELWP 2015b) for:
    - modelled data for location risk, remnant vegetation patches, scattered trees and habitat for rare or threatened species;
    - the extent of historic and current EVCs; and
    - the location of sites of biological significance (BioSites) within the region.
- The VBA (DEPI 2014), Flora Information System (FIS) (Viridans 2013a) and Atlas of Victorian Wildlife (AVW) (Viridans 2013b) for previously documented flora and fauna records within the project locality;
- The Federal Department of Environment (DoE) (former Department of Sustainability, Environment, Water, Population and Communities) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DoE 2015);
- The DELWP Planning Maps Online to ascertain current zoning and environmental overlays (DELWP 2015c);
- Aerial photography of the study area;
- Relevant environmental legislation and policies; and

- Previous ecological assessments within the study area.

A list of threatened flora and fauna species previously recorded, or predicted to occur within the project locality is provided in Appendix 1.

2.2.3 Site Inspection

An ecological assessment was undertaken on 9 April 2015 by a qualified Ecologist to obtain information on flora and fauna values within the study area. The inspections sought primarily to provide ground-truthing of information provided by the desktop assessment, particularly in relation to the following:

- Modelled data for remnant vegetation patches, scattered trees and habitat for rare or threatened species; and
- Potential habitat for species and ecological communities listed under the EPBC Act and FFG Act.

EVCs were determined with reference to DELWP pre-1750 and extant EVC mapping and their published descriptions (DELWP 2015a).

2.2.4 Permitted Clearing Assessment (the Guidelines)

The following describes the assessment process for the clearing of vegetation in accordance with 'Permitted clearing of native vegetation - Biodiversity assessment guidelines' (the Guidelines) (DEPI 2013).

2.2.4.1 Risk-based Pathway

The Guidelines manage the impacts on biodiversity from native vegetation removal using a risk-based approach. Two factors – extent risk and location risk – are used to determine the risk associated with an application for a permit to remove native vegetation. The location risk (A, B or C) has been determined for all areas in Victoria and is available on DELWP's Native Vegetation Information Management (NVIM) Tool (DELWP 2015d). Determination of risk-based pathway is summarised in **Table 1**.

Table 1: Risk-based pathways for applications to remove native vegetation (DEPI 2013a)

Extent		Location		
		A	B	C
Native Vegetation	< 0.5 hectares	Low	Low	High
	≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
	≥ 1 hectare	Moderate	High	High
Scattered Trees	< 15 scattered trees	Low	Moderate	High
	≥ 15 scattered trees	Moderate	High	High

Notes: For the purpose of determining the risk-based pathway of an application to remove native vegetation the extent includes any other native vegetation that was permitted to be removed on the same contiguous parcel of land with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before an application to remove native vegetation is lodged.

2.2.4.2 *Vegetation Assessment*

Native vegetation (as defined in **Table 2**) is assessed using two key parameters: extent (in hectares) and condition. Extent is determined through a site assessment. The condition score for Moderate and High Risk-based pathways must be assessed through a habitat hectare[2] assessment conducted by a qualified ecologist. The condition score for Low Risk-based pathways may be based on either modelled data available on the NVIM Tool (DELWP 2015c), or through a habitat hectare assessment. The condition score for this assessment was based on modelled data.

Table 2: Assessment of remnant native vegetation (DEPI 2013)

Category	Definition	Extent	Condition
Remnant patch of native vegetation	An area of native vegetation where at least 25 per cent of the total perennial understorey plant cover is native plants. OR An area with three or more native canopy trees where the canopy foliage cover is at least 20 per cent of the area.	Measured in hectares. Based on hectare area of the remnant patch.	Vegetation Quality Assessment Manual (DSE 2004).
Scattered tree	A native canopy tree that does not form part of a patch.	Measured in hectares. Each scattered tree is assigned an extent of 0.071 hectares (30m diameter).	Scattered trees are assigned a default condition score of 0.2.

Notes: Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'.

2.2.4.3 *Avoid and Minimise*

Avoid and minimise requirements are summarised in **Table 3**.

Table 3: Avoid, minimise and offset requirements

Risk-based Pathway	Avoid	Minimise	Offset
Low	X	X	✓
Moderate	X	✓	✓
High	✓*	✓	✓

Notes: *Where native vegetation makes a significant contribution to Victoria's biodiversity

2.2.4.4 *Offset*

Offsets are divided into two categories: General and Specific. Specific offsets are required when the removal of native vegetation has a significant impact on habitat for a rare or threatened species[3]. Otherwise, a General offset is required. Offset obligations and offset site criteria are determined in accordance with the Guidelines (DEPI 2013).

[2] A 'habitat hectare' is a unit of measurement which combines the condition and extent of native vegetation.
[3] Only species listed as 'critically endangered', 'endangered', 'vulnerable' or 'rare' on DEPI's advisory lists (DSE 2005; DSE 2013) for flora and fauna are considered a rare or threatened species.

2.2.5 Biodiversity Impact and Offset Requirements (BIOR) Report

Native vegetation (as defined in Table 2) is assessed using two key parameters: extent (in hectares) and condition. Extent is determined through a site assessment. In this instance, the condition score for Low Risk-based pathways was based on modelled data available on the NVIM Tool (DELWP 2015c). The resulting Biodiversity Impact and Offset Requirements report (BIOR) produced by DELWP is presented in Appendix 4.

2.3 Cultural Heritage

2.3.1 Literature and Database Review

Relevant literature, online-resources and heritage registers were reviewed to provide an up to date assessment of cultural heritage values associated with the study area and surrounds, including:

- The Victorian Aboriginal Heritage Register (VAHR) for documented Aboriginal heritage places within the study area;
- The Victorian Heritage Register (VHR) and Victorian Heritage Inventory (VHI) for documented historical heritage places of State significance (built heritage and archaeological) within the study area;
- The Heritage Overlay to the Greater Geelong Planning Schemes (DTPLI 2015) for documented historical heritage places of local significance;
- The DoE PMST for matters of NES within the study area (DoE 2015);
- Relevant federal and state legislation and policies, including the EPBC Act, *Aboriginal Heritage Act 2006*, *Heritage Act 1995*, *Planning and Environment Act 1987* (P&E Act) and the *Native Title Act 1993*;
- Relevant reports, documents and literature; and
- Aerial photography of the study area.

2.3.2 Site Inspection

Preliminary site inspections were undertaken by an experienced Archaeologist/Cultural Heritage Advisor on 9 April 2015 to broadly assess the likelihood of Aboriginal and/or historical cultural heritage occurring in the study area, and to document potential cultural heritage constraints associated with future upgrade works. The inspections sought primarily to provide ground-truthing of information provided by the desk-based review, particularly in relation to the following:

- The landforms in the study area as they relate to Aboriginal archaeological potential;
- The extent and location of significant ground disturbance, particularly in relation to areas of cultural heritage sensitivity as defined by the *Aboriginal Heritage Regulations 2007*;
- The extent and location of areas of Aboriginal cultural heritage likelihood (locations in the study area where Aboriginal cultural heritage is considered most likely to remain intact); and

- The likelihood of previously unrecorded historical heritage occurring, particularly archaeological sites.

2.4 Assessment Qualifications and Limitations

2.4.1 Natural Heritage

Data and information held within the ecological databases and mapping programs reviewed in the desk-based assessment (e.g. VBA, EPBC Act PMST, Biodiversity Interactive Maps etc.) are unlikely to represent all flora and fauna observations within the study area. It is therefore important to acknowledge that a lack of documented records does not necessarily indicate that a species or community is absent; rather it may reflect a lack of previous survey effort or data confirmation.

The short duration of the survey meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the field assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers may also be absent. Targeted flora or fauna surveys and detailed habitat hectare assessments were also not undertaken, as this was beyond the preliminary scope. Nevertheless, given the modified state of the study area, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered adequate to provide an accurate and indicative assessment of the ecological values within the study area.

2.4.2 Cultural Heritage

The cultural heritage information used to inform this cultural heritage due diligence assessment is limited to that obtained through desktop assessment and a site visit.

The level of assessment undertaken for this site visit is not considered to meet the requirements for a formal archaeological survey in accordance with Heritage Victoria and Office of Aboriginal Affairs guidelines (HV 2008; Duncan et al. 2008; OAAV 2010).

This report is an opportunity to provide a historical context for understanding the study area and to identify potential areas that may contain Aboriginal or historical sites and to identify relevant legislative implications (Section 4.3). Aboriginal cultural heritage may occur anywhere in the landscape and it is important to note that the assessment of likelihood is based on the balance of probability; it is our opinion based on an assessment of landforms and the extent of previous ground disturbance, compared to the general archaeological character of the region as assessed via desktop review. It is not a categorical statement that Aboriginal cultural heritage will not be present.

3 RESULTS – NATURAL HERITAGE

3.1 Existing Conditions

The study area supports three broad vegetation and habitat types; Modified woodland, planted trees and man-made structures. These are discussed in further detail below.

3.1.1 Modified Woodland

3.1.1.1 Vegetation Condition

Modified woodland habitat within the study area was considered to be a derived grassland of the Grassy Woodland EVC (EVC 175) within the Otway Plains bioregion. This comprised several patches of indigenous grasses including; Kangaroo Grass *Themeda triandra*, Wallaby-grasses *Rytidosperma* spp. and Spear-grasses *Austrostipa* spp. which met the cover threshold (≥25%) as defined by the the Guidelines (DEPI 2013) (Plates 1 and 2; Map 2). The distribution of Grassy Woodland observed during the site assessment is broadly consistent with extant DELWP mapping which shows fragmented occurrences of this EVC within the study area (DELWP 2015b).

There were no remnant canopy trees or mid-storey species present within the study area. The site has been significantly disturbed as a result of the development of the water basin and previous historical land uses. The majority of vegetation within the study area was predominantly dominated by introduced pasture grasses, including; Yorkshire Fog *Holcus lanatus*, Cocksfoot *Dactylis glomerata*, Wild Oat *Avena* spp., Toowoomba Canary Grass *Phalaris aquatica* and Paspalum *Paspalum dilatatum*.

Plate 1: Modified woodland along the eastern wall of the water basin directly opposite residential housing.

Plate 2: Modified woodland amongst planted trees along western boundary of the study area.

3.1.1.2 Fauna Habitat

Modified woodland within the study area provides low quality habitat to native fauna given the key over-storey and mid-storey layers are absent from this EVC within the study area.

Species which are likely to utilising grassy components of this modified EVC during the assessment included; Australian Magpie *Gymnorhina tibicen*, Little Raven *Corvus mellori*, Masked Lapwing *Vanellus miles* and Magpie-lark *Grallina cyanoleuca*.

3.1.2 Planted Vegetation

3.1.2.1 Vegetation Condition

Planted vegetation was sporadically located throughout the study area (Map 2). Planted vegetation comprising a range of non-indigenous native trees and ornamental introduced species were planted along access tracks and around site building (Plates 3 and 4).

Plate 3: Planted vegetation surrounding site buildings.

Plate 4: Planted vegetation along access tracks.

3.1.2.2 Fauna Habitat

Planted Vegetation is likely to provide low quality habitat for immature plantings and moderate quality habitat for mature plantings within the study area.

These areas provide foraging, roosting and nesting habitat for mobile generalist fauna including common gregarious birds and microbats. When flowering, this vegetation may provide temporary foraging habitat for nomadic nectivorous birds.

Common bird species adapted to modified landscapes which are likely to utilise this habitat include; Red Wattlebird *Anthochaera carunculata*, Noisy Miner *Manorina melanocephala*, Superb Fairy-wren *Malurus cyaneus*, Grey Fantail *Rhipidura albiscarpa*, White-plumed Honeyeater *Lichenostomus penicillatus*, Grey Shrike-thrush *Colluricincla harmonica* and introduced bird species Common Blackbird *Turdus merula* and Common Starling *Sturnus vulgaris*.

3.1.3 Artificial Structure

At the time of the assessment, the water basin was dry, comprising predominantly exotic grasses and herbaceous weed species around the perimeter and within cracks on the basin floor (Plates 5 and 6). No remnant vegetation was present within the basin area.

Plate 5: Introduced vegetation within the basin.

Plate 6: Introduced vegetation along the basin wall

3.1.3.1 Fauna Habitat

The large man-made structure (water basin) is likely to provide low quality habitat for native fauna. While locally common frog and bird species may use this man-made structure on an occasional basis after extended rainfall, the dependence on a clean permanent water source is likely to limit the suitability for native fauna to use the basin for breeding or foraging purposes. No locally common fauna species were observed using this habitat during the assessment.

3.2 Significance Assessment

Flora

The VBA and FIS contain records of two nationally significant and 14 State significant flora species previously recorded within five kilometres of the study area (DEPI 2014; Viridans 2013a) (Appendix 1). The PMST nominated an additional nine nationally significant species which have not been recorded in the locality but have the potential to occur (DoE 2015).

Based on habitat present within the study area, landscape context and the proximity of previous records, national and State significant flora species are considered unlikely to occur within the study area (Appendix 1).

Fauna

The VBA and AVW contain records of 12 nationally significant, 19 State significant and nine regionally significant fauna species previously recorded within five kilometres of the study area (DEPI 2014; Viridans 2013b) (Appendix 1). The PMST nominated an additional seven nationally significant species which have not been recorded in the locality but have the potential to occur (DoE 2015). While the PMST lists additional fauna species (i.e. Whales, Albatross and Terns), these species have not been included in Appendix 1 as there is no suitable habitat and/or they are highly unlikely to be impacted by the proposed works.

Based on habitat present within the study area, landscape context and the proximity of previous records, national, State and regionally significant fauna species are considered unlikely to occur within the study area (Appendix 1).

3.3 PERMITTED CLEARING ASSESSMENT

3.4 Risk-based Pathway

The study area is within Location A, with 0.224 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Low Risk-based pathway. A summary of proposed vegetation losses is presented in Table 4.

3.5 Offset Targets

The offset requirement for native vegetation removal is 0.011 General Biodiversity Equivalence Units (BEU). The Biodiversity Impact and Offset Requirements (BIOR) Report, containing details of the offset requirements and other relevant information, is presented in Appendix 4. A summary of offsets for proposed vegetation losses is presented in Table 4.

Table 4: Permitted Clearing Assessment (the Guidelines)

Risk	Risk-based pathway	Low
Vegetation to be removed	Total Extent	0.224
	Remnant Patch (ha)	0.224
	Scattered Trees (no.)	0
	Location Risk	A
	Strategic Biodiversity Score	0.128
Offset requirements	General Offsets Required (BEU)	0.011
	Specific Offsets Required (BEU)	Not applicable
	Vicinity (catchment / LGA)	City of Greater Geelong / Corangamite CMA
	Minimum Strategic Biodiversity Score*	0.102

Note: BEU = Biodiversity Equivalence Units

3.6 Natural Heritage Legislative and Policy Implications

3.6.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a Commonwealth process for the assessment of proposed actions (i.e. project, development, undertaking, activity, or series of activities) likely to have a significant impact on matters of National Environment Significance (NES), or those that are undertaken on Commonwealth Land.

3.6.1.1 Implications

The proposed action is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is not recommended regarding matters listed under the EPBC Act.

3.6.2 Flora and Fauna Guarantee Act 1988

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' protected flora species, vegetation communities and fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

3.6.2.1 Implications

No species listed as threatened or protected under the FFG Act were recorded within the study area, and none are considered likely to occur. As such an FFG Act permit will not be required for development of the study area.

3.6.3 Planning and Environment Act 1987

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17, which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation on a site of more than 0.4 hectares, unless an exemption under clause 52.17-7 of the Victorian Planning Schemes applies or a subdivision is proposed with lots less than 0.4 hectares[4].

Local Planning Schemes

The study area is located within the City of Greater Geelong municipality and is zoned Public Use Zone (PUZ1). No planning overlays apply.

A Planning Permit from City of Greater Geelong is required to remove, destroy or lop any native vegetation as part of any proposed development of the study area.

Permitted clearing of native vegetation - Biodiversity assessment guidelines

In December 2013 the Victorian Government integrated the 'Permitted clearing of native vegetation - Biodiversity assessment guidelines' (the Guidelines) (DEPI 2013) into the Victorian Planning Provisions, replacing the *Victoria's Native Vegetation Management – A Framework for Action* (The Framework) (NRE 2002). The primary objective of the regulations is "no net loss in the contribution made by native vegetation to Victoria's biodiversity". The State Planning Policy Framework and the decision guidelines at Clause 52.17

[4] In accordance with the Victorian Civil and Administrative Tribunal's (VCAT) decision Villawood v Greater Bendigo CC (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

(Native Vegetation) of Particular Provisions and Clause 12.01 require Planning and Responsible Authorities to have regard for the Guidelines.

Areas of remnant native vegetation, Scattered Trees and habitat for rare or threatened species must be offset if they are proposed to be disturbed as part of the project. The offset requirement for native vegetation removal is 0.011 General Biodiversity Equivalence Units (BEU).

3.6.4 Wildlife Act 1975 and Wildlife Regulations 2002 (Victoria)

The *Wildlife Act 1975* (and associated Wildlife Regulations 2002) is the primary legislation in Victoria providing for protection and management of wildlife. Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*.

3.6.4.1 Implications

Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*.

3.6.5 Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. Landowners are responsible for the control of any infestation of noxious weeds and pest fauna species to minimise their spread and impact on ecological values.

3.6.5.1 Implications

No weeds listed as noxious under the CaLP Act were recorded during the assessment; however, Chilean Needle Grass *Nassella neesiana* is prevalent throughout the region and measures must be implemented during construction to ensure CaLP Act listed flora species are not spread. Similarly, there is evidence that the study area is currently occupied by several pest fauna species listed under the CaLP Act (European Rabbits *Oryctolagus cuninculus*).

4 RESULTS – CULTURAL HERITAGE

4.1 Aboriginal Context

The following section reviews the Aboriginal context of the study area and includes: an examination of historical and ethnohistorical sources, previously recorded Aboriginal archaeological site types and locations in the geographic region of the study area and, archaeological studies undertaken in the locality. Together, these sources of information can be used to formulate a predictive site statement concerning what types of sites are most likely to occur in the study area, and where these are most likely to occur.

4.1.1 Archaeological Research

Archaeological evidence suggests that Aboriginal peoples had occupied all of Australia's environmental zones by 40,000 years BP. Pleistocene archaeology of the Port Phillip Bay and Hinterland area documents human occupation dating back at least 40,000 years. The oldest dated archaeological site in Victoria occurs at Keilor in Melbourne. Charcoal from a hearth excavated in 1973 has been dated to 31,000 years BP (Flood 1995: 286). More recently research at the Bend Road site in Melbourne's southeast has dates extending back to 30–35,000 BP (Hewitt and Allen 2010). However, the majority of the site is associated with the late Holocene backed artefact period – the site has now yielded hundreds of asymmetric points and geometric microlith forms. The site points to more common resource orientation patterns relevant to many greater Melbourne Aboriginal Places. Notably, the site is located on an undulating sand promontory jutting out into the northern end of Carrum Swamp. Such land was likely subject to irregular inundation and periodic drying, as such, "Aboriginal use of this resource was also likely to have been seasonal. Ethnographic accounts suggest that birds, eggs, fish, yabbies, shellfish, eels and edible swamp plants, together with the focus the swamp provided for foraging terrestrial marsupials, would have made the area an important resource for Aborigines, especially in spring" (Hewitt and Allen 2010: 3).

The archaeological record of the Greater Melbourne area includes a rich record of artefact scatters, scarred trees and stone arrangements that documents Aboriginal life dating from the Pleistocene through to the immediate pre-European past. Most of these sites point to important relationships between sites and landscapes and resources within the immediate area.

4.1.2 Aboriginal History and Ethnohistory

East Kulin Nation

At the time of European contact the study area occurred in the region occupies by the *Wada wurrung* language group. there were two separate language groups in the region surrounding the study area; the *Woi wurrung* and the *Bun* (*Boon*) *wurrung*. These groups were collectively occupying the area south of the Great Dividing Range, from Werribee River to the height of the Dandenong Ranges (Presland 2010: 12). This group also shares a cultural and linguistic affinity with the *Woi wurrung, Bun* (*Boon*) *wurrung, Ngurai-illam wurrung*, *Djadja wurrung*, *Wada wurrung* and *Duang wurrung* language groups. Together they are known as the East Kulin Nation (Clark 1990: 369; Presland 2010: 12), which occupies the south central Victorian region (Howitt 2001).

The East Kulin groups shared similarities in speech, burial practices, initiation, kinship marriage ties and religious beliefs including common beliefs regarding Dreaming figures such as the creation ancestors *Bunjil* (eaglehawk) and *Waa* (crow) (Presland 2010: 15). The Kulin clans believed that the living world was divided into two halves or moieties, named *Bunjil* and *Waa.* All the Kulin groups have a patrilineal descent system (Howitt 2001: 126). Marriage partners were sought from within the East Kulin Nation but outside of their own clan (Presland 2010: 15). Wives were taken from the opposite moiety and membership in the moiety had religious, economic and social implications and obligations that transcended local allegiances and clans (Barwick 1984). All four of the clans that make up the *Woi Wurrung* belong to the *Waa* moiety, except the *Gunung willam balluk*, which in turn is identified with *Bunjil* (Presland 2010: 25).

Figure 1: Language boundary of the East Kulin Nation (Clark 1990: 364)

The *Wadawurrung* people occupied the area that is bounded to the east by the Werribee River, to the south by Port Phillip Bay and Bass Strait, to the west by various watercourses and roadways including Painkallac Creek at Aireys Inlet, Salt Creek at Woorndoo Upper and Fiery Creek to the west of Beaufort and the ridgeline of the Great Dividing Range to the north (J. Young, pers. comm. 7 May 2013).

Linguistically, the *Wadawurrung* were most similar to the *Djadja wurrung* to the north and the *Woi wurrung*, *Bun wurrung* and *Daung wurrung* to the east (Clark 1990: 276). Collectively these five groups form the Kulin Nation, who shared similarities in language, customs, and some traditions. It appears that the *Wadawurrung* were genetically related to the other four Kulin groups, but diverged enough in terms of language, their

burial practices and distinctive facial and body markings at corroborees (Clark 1990: 276-277) to be a separate tribal group.

Their traditional land includes both coastal and inland environments, and thus the *Wadawurrung* interacted with neighbouring clans along their western boundary (*Gulidjan* and *Djargurd wurrung*), whose speech was essentially the same, as well as various clans belonging to other Eastern Kulin groups, such as the *Woi wurrung* (Wurundjeri), and the Bun wurrung to the east, the *Dja Dja wurrung* to the north.

The *Wadawurrung* and their eastern and northern neighbours shared a patrilineal form of moiety system. The Kulin social world was divided into either one of two moieties; the *Waa* (crow) or B*unjil* (eaglehawk) moieties (Clark 1990: 276). Marriage was always across the moieties, with a *Waa* person having to marry a *Bunjil* person, preferably from a distant clan group (Barwick 1984: 104-105). In some instances, members of the *Wadawurrung* clans intermarried with the matrilineal clans of the *Gulidjan, Djab wurrung*, and the *Djargurd wurrung,* although in many instances, these practices ended in inter-clan hostility.

Land Tenure

The *Wadawurrung* were divided into 25 or 26 clans, each of which was responsible for a specific area of land within the wider *Wadawurrung* territory, with group sizes between 40 to 60 people. According to Clark (1990: 311) and Presland (2010: 28-29), each of these clans occupied a distinctive geographical area and belonged to one of the two moieties. *Wadawurrung* groups that belong to the *Waa* moiety include the *Beerekwart balug* (Mount Emu), *Bengalat balug* (Indented Head), *Carninje balug* (Emu Hill station, Lintons Creek), *Corrin corringer balug* (Carranbulluc), *Moner balug* (Trawalla station, Mount Emu Creek), and the *Tooloora balug* (Mount Warrenheip, Lal Lal Creek, west branch of Moorabool River).

Clans of the *Bunjil* moiety include the *Burrumbeet balug* (Lakes Burrumbeet and Learmonth), *Keyeet balug* (Mount Buninyong), *Marpeang balug* (Blackwood, Myrniong, Bacchus Marsh), *Moijerre balug* (Mount Emu Creek), *Peerickelmoon balug* (near Mount Misery), *Wadawurrung balug* (Barrabool Hills), and the *Wongerrer balug* (head of Woady Yallock Creek).

Clans of unknown moiety association include the *Barere barere balug* (Colac and Mount Bute stations), *Borogundidj* (Yarrowee River), *Carringum balug* (Carngham), *Corrac balug* (Commeralghip station and Kuruc-a-ruc Creek), *Gerarlture* (west of Lake Modewarre), *Neerer balug* (between Geelong and the You Yangs), *Pakeheneek balug* (Mount Widderin), *Woodealloke gundidj* (Wardy Yallock River, south of Kuruc-a-ruc Creek), *Worinyaloke balug* (west side of Little River), and the *Yaawangi* (You Yang Hills).

Nowadays, descendants of a *Wadawurrung* woman named 'Queen Mary' and her son John Robinson (*aka* Robertson), and are identified as members of the Wathaurung Aboriginal Corporation (WAC).

Resources

The mainstays of the Aboriginal diet were plants and roots. One of the most important foods was called Murnong (*Microseris lanceolata*), a tuber that resembled a dandelion, also known as Yam Daisy or Native Dandelion. Other roots that were also cooked by boiling them in hot water include potatoes (Milkmaids: *Burchardia umbellata*), tarook (Blushing bindweed) and puewon (Bulbine lily). In a similar fashion to other Kulin clans, especially the *Wurundjeri*, the *Wadawurrung* used sharp sticks *(karni)* to dig roots out, separate bulbs and aerated the soil. Other commonly utilised plants and fruits included watercress (Boyungkaal: *Nasturtium officinal*), Warrigal Cabbage (New Zealand Spinach, Captain Cook's Lettuce: *Terragonia*

tetragoniodes) and native raspberry (*Rubus parvifolius*), all of which can be eaten either fresh or used as a flavour enhancer. Other plants consumed all over Australia were also utilised by the *Wadawurrung*, including aquatic plants such as the water ribbons (*Triglochin procera*) (Gott and Conran 1991: 9).

The coastal and riverine *Wadawurrung* clans had access to a wide variety of fish, including mullet, whiting, flounder, flathead, salmon, trevally, tommy-rough and many other species were speared and netted, particularly along tidal flats and in estuaries. Shellfish and seafood were also exploited including abalone (*Haliotis* sp.), turbot (gastropod) and pipi shell (*Paphies australis*) (Barwon Bluff Marine Sanctuary 2012). Finally, all mammals present were probably target species for hunting. Birds and eggs were also taken, along with lizards and insects.

When the *Wadawurrung* were migrating to the north where there are fewer freshwater streams, women used to collect water from freshwater wells. These wells are natural depressions on rocks, of which there are still some in use, one located near the Werribee River (about a mile from its mouth), and one more located on Big Rock in the You Yangs (Presland 2010: 62-63).

Presumably the *Wadawurrung* along with the *Girai wurrung* clans gathered at Lake Bolac with local *Djab wurrung* clans in early Autumn to take advantage of the annual migratory season of eels (*Anguilla australis*) (Clark 1990: 276).

Conflict

It has been reported that during the 1830s the *Wadawurrung* were 'at enmity' with both the *Dgargurd wurrung* and the *Gulidjan* clans as a result of disputes related to marriage arrangements (Robinson journal 7.04.1840, in Clark 1990:275). This 'war' was the result of *Djargurd wurrung* and *Wadawurrung* men competing for *Gulidjan* women. During the early years of the Buntingdale mission, it was reported that the *Wadawurrung* and the *Djargurd wurrung* clashed several times as they competed for superiority within the mission (Clark 1990: 275).

Shortly after the first contact with the Europeans, the clan populations diminished rapidly. Contact between the *Wadawurrung* and European people first occurred in 1802, when Matthew Flinders and his party made their way to the nearby You Yangs. By 1803 contact between European explorers and *Wadawurrung* people had turned violent on at least one occasion, whereby one or two *Wadawurrung* were killed and several others were injured (Clark 1990: 277). Violent encounters between Aboriginal people and settlers continued through the late 1830s and early 1840s. By 1841 some of the clans had rapidly declined and by 1849 one report estimated that the number of Aborigines in the Geelong region had been reduced to 25% of their 1836 population. Restricted access to resources, disease, inter-tribe hostility and European extermination were cited as the main causes (Clark 1990: 308).

Religion

The basic unit of *Wadawurrung* social organisation was the clan, a group based on kinship through the male line with a shared religious identity (Barwick 1984: 105-6). The clan was a land-owning unit whose territory was defined by ritual responsibilities (Barwick 1984: 106). The common spiritual identities resulted in the larger tribal groups also being intimately interconnected. The basis of the *Wadawurrung* religious identity is totemism, which is likened to the Dreamtime – the time of creation when the ancestral being roamed the land, creating people and naming the animals and plants.

Wadawurrung society is divided into two groups, called moieties, each with specific Totemic Beings belonging to it. Every person belongs to one or the other moiety (*Bunjil* the eaglehawk or *Waa* the crow) (Barwick 1984: 105-6). Clan moiety in *Wadawurrung* society is patrilineal. For the members of this unit, the clan, the totem is a symbol of membership of the unit. It is recognised for the members of this clan and those of other clans. This totem has strong territorial and mythological ties associated with it, and it is believed that it can warn them of approaching danger.

Ritual and Magic

The *Wadawurrung* beliefs system is shared with the other Kulin clans; however, the ethnographic information regarding the *Wadawurrung* is scarce. All Kulin groups believe in black magic and the curative powers of medicine-men or witchdoctors. A peculiar practice by the *Wadawurrung* was to put the rough cones of the She-oak (*Casuarina quadrivalvis*) into a man's fire, so that the smoke might blow into his eyes and blind him (Howitt 2001: 366).

In terms of disposal of the dead, the *Wadawurrung* from the Barrabool Hills (the Wathawurrung balug) and those from around Port Phillip practiced the inhumation of their dead as a symbol of respect. This practice is in sharp contrast to that of neighbouring clans from the *Woi wurrung* (such as the *Gunung willam balug*) who practice cremation (Howitt 2001: 458). Different disposal practices are one of the cultural differences between the *Wadawurrung* and their neighbours that set them apart, as mentioned earlier (Clark 1990: 276-277).

However, being part of the larger Kulin sub-group, the *Wadawurrung* share some ritual practices, included cannibalism. Cannibalistic practices have been documented, including the ceremonial consumption of human flesh and/or blood, not only from enemies, but also from relatives. The connotations of these two practices are different, with the former being more a sign of revenge, and the latter mostly ceremonial. In 1837 some members of the *Wadawurrung* killed an old man and a child and brought with them on the ends of their spears portions of their flesh, which they ate with great exultation (Howitt 2001: 752).

European Settlement

From the 1830s, European settlement of the coast, as well as settlement of the inland by explorers and overlanders from NSW, resulted in Aboriginal people experiencing displacement from their lands and massive changes in their way of life. The encroachment onto Aboriginal land by pastoralists resulted in numerous conflicts, reduction in the availability of food resources and the introduction of new diseases. Despite the upheavals, Aboriginal people tried to maintain some of their traditions, with some ceremonies such as initiations and occasionally corroborees observed by settlers. In many places Aboriginal people became part of the new colonial life, finding work as shepherds, stockriders, shearers, bark cutters and domestic servants.

By the 1850s the *Wadawurrung* had suffered a massive decrease in numbers (Clark 1990: 298). Between 1837 and 1852 the *Wadawurrung* population went from 275 to 30 people, a decline of 90% as the result of disease and conflict. Many of the clans were also driven away from the heavily settled areas of Geelong and Melbourne to the north and west. Widespread conflict led to a system of official protectorates (1835-1849), reserves and rations depots aimed at providing protection and supplies to displaced Aboriginal people. In 1839 the Aboriginal Protectorate Scheme was introduced in Victoria. Four Assistant Protectors were

appointed under a Chief Protector, George Augustus Robinson. The role of the protectorates was to provide food, shelter and medical supplies, record cultural and population information and to indoctrinate Aboriginal peoples in to the western European cultural and economic systems. Aboriginal reserves and stations were established across Victoria and Aboriginal peoples were encouraged to move to them (Clark 1990: 311-329). *Wadawurrung* clans moved to the reserves and stations set up at Wesleyan Mission Station and Buntingdale Station (Clark 1990: 293). The Protectorate was largely unsuccessful and was disbanded in 1849.

The Central Board for the Protection of the Aborigines was founded in 1860 to provide an administrative structure to manage Aboriginal people in Victoria. This involved local reserves and local guardians who operated Honorary Correspondent Depots, distributing food and clothing to local Aboriginal people (Clark 1990: 301). By the end of 1861 three reserves were established for the *Wadawurrung*; Steiglitz, Karngun, and Mt. Duneed (Clark 1990: 300). In addition a rations station was established at Stockyard Hill in 1860, which operated until 1874. Between 1901 and 1906, all three reserves were handed back to the Department of Lands as they were no longer required due to the decrease in Aboriginal population (Clark 1990: 307).

While many Aboriginal people lived on the missions and government stations, a significant number of people worked and lived on farms and pastoral stations. Some Aboriginal people farmed the land on smallholdings, or worked in industries such as fishing, goldmining and logging. People outside the reserves sometimes gathered together in camp sites on the outskirts of towns. They were also involved in sports such as cricket, football and athletics.

Today the descendants of the *Wadawurrung* are represented by the RAP for the activity area, the Wathaurung Aboriginal Corporation.

4.1.3 Oral History

Consultation with the Registered Aboriginal Party (RAP), the Wurundjeri Tribe Land and Compensation Cultural Heritage Council Inc (the Wurundjeri) was not part of the scope of works for this assessment. Consequently no oral histories relating to the study area were collected for this report.

4.1.4 Registered Aboriginal Heritage Places

A search of the Victorian Aboriginal Heritage Register (VAHR) was conducted on 8 April 2014 for sites within a 2 km radius of the study area. Searching an area with this radius ensured that a relevant and representative sample of information was obtained.

The search identified a total of 30 registered Aboriginal sites within a 2 km radius of the study area (Appendix 2). None of these sites are located within the study area. All sites in the search area comprise stone artefact sites, with the majority (n=29; 97%) being artefact scatters (including isolated artefacts), and the remainder being a low density artefact distributions (LDADs), comprising 33 artefacts. These sites consist of a total of 62 site components based on two site component types (Table); It should also be noted that due to changing conventions for the recording of archaeological sites over time, some of the sites listed as 'artefact scatters' may in fact represent 'isolated artefacts', as early recording forms made no distinction between the two site types. Furthermore, isolated artefacts are today recorded as a form of LDADs.

Table 5: Summary of Previously Identified Aboriginal Place types within 2 km of the Study Area

Site Type	Aboriginal Places		Site Components (ACHRIS)	
	Quantity	Percentage (%)	Quantity	Percentage (%)
Artefact Scatters	29	97	29	47
Low Density Artefact Scatters	1	3	33	53
Total	**30**	**100**	**62**	**100**

The two closest sites to the study area are:

- VAHR 7721-0804 (Geelong Bypass 33), which is located 100 m south of the study area, in the middle of the Ring Road alignment on the eastern side of Pigdons Road. The site comprises three subsurface stone (silcrete) artefacts in an area measuring 20 x 1.2 m at a depth of 0.5 m. The site was located on a gentle incline on what would have been the reverse slope of the ridge on which the study area is located. (The ridge was cut through for the Ring Road and this site is likely to have been destroyed during the road construction, see Plate 7).
- VAHR 7721-0805 (Geelong Bypass 34), which is located 285 m north west of the study area, in the Ring Road alignment, adjacent to the Wandana Drive underpass. The site comprises a single stone (silcrete) artefact on the northern side of Kardinia Creek which passes the north west corner of the study area. (A new bridge was constructed across the creek for the Ring Road and this site is likely to have been destroyed during the road construction, see Plate 8).

There are no Aboriginal Historical References within 2 km of the study area (Appendix 2).

Plate 7: Cutting through the ridge crest for the Ring Road, south west of the study area, looking west

Plate 8: Slope into the Kardinia Creek valley with the bridge across the creek, looking north

In addition, the Heritage Overlay of the Greater Geelong Planning Schemes were examined. No Aboriginal heritage places listed on the Heritage Overlay are present within the study area.

Areas of Cultural Heritage Sensitivity

There are no areas of cultural heritage sensitivity under the *Aboriginal Heritage Regulations 2007* within the study area.

4.1.5 Previous Aboriginal Archaeological Investigations

Localised and regional archaeological investigations have established the general character of Aboriginal sites located within the same geographic region as the study area. This information, together with an environmental context, histories of land use and, historical and ethnohistorical sources, can be used to form the basis for a site prediction statement.

Localised and regional archaeological investigations have established the general character of Aboriginal sites located within the same geographic region as the activity area. This information, together with an environmental context, histories of land use and, historical and ethnohistorical sources, can be used to form the basis for a site prediction statement. The most relevant studies undertaken in the immediate area are discussed below, and a full list of archaeological reports is provided in Appendix 2.

The most relevant report to the study area is an archaeological survey and limited subsurface testing program conducted by Webb et al. (2007) for the construction of Section 3 of the Geelong Ring Road, between the Hamilton Highway, Fyansford, and the Princes Highway at Waurn Ponds. The assessment identified a total of 15 Aboriginal Places within the road alignment, two of which occur in close proximity to the current study area.

The majority of archaeological surveys in this area have been conducted at Waurn Ponds, south of the current study area. TerraCulture (2003) an archaeological survey and limited subsurface testing on land west of Rossack Drive at Waurn Ponds. The investigation identified two Aboriginal Places, VAHR 7721-0576 and -0604, discussed above. VAHR 7721-0576 was found largely between Rossack Drive and the current activity area, and comprised a total of 28 surface and subsurface artefacts over an area estimated to be 200 x 50 m. VAHR 7721-0604 comprises two subsurface artefacts only, but the site card and investigation report indicates a site extent much larger than the two artefacts occupy, and area measuring 150 x 100 m. The primary grid coordinate (PGC) listed for each site is also at odds with the extent indicated in the investigation report.

Toscano (2013a) prepared a CHMP for a proposed Victoria Police and State Emergency Service complex adjacent to the eastern side of Rossack Drive, on the northern side of Waurn Ponds Creek, 120 m east of the current activity area. The CHMP identified one Aboriginal Place, VAHR 7721-1232 (Rossack Drive), which is a low density artefact distribution consisting of 33 subsurface artefacts (discussed above). The soil deposits in which the artefacts were found also contained modern materials such as glass and ceramics, indicating that the deposits are not in situ. The follow up salvage excavation conducted by Nichols (2014) identified a further 451 stone artefacts made from a variety of raw materials, with quartz having the highest percentage, followed by silcrete, an much lower proportions of quartzite, chert, basalt, coastal flint and crystal quartz. Despite the number of artefacts present, the salvage confirmed that the activity area has been disturbed, probably by the construction of Rossack Drive. In an adjacent block of land, immediately adjacent to Waurn Ponds Creek, Toscano (2013b) prepared a CHMP for a proposed sewer pipeline to service the proposed police and SES complex discussed above. The subsurface soil profile varied, showing either brown silt over brown clay, brown silt over light grey silt over brown clay or simply a vegetation layer over clay. Despite proximity to the creek edge, no Aboriginal cultural heritage was identified.

A little further east Marshall et al. (2008) prepared a CHMP for the proposed Waurn Ponds Shopping Centre, which also backed onto Waurn Ponds Creek. Five new artefact scatters were registered during the course of

the assessment, but only two of them were within the bounds of the activity area, VAHR 7721-0869 and -0895. Site VAHR 7721-0869 consisted of both surface and subsurface material, with a total of 23 artefacts. Site VAHR 7721-0895 consisted of 10 artefacts. The assemblage was dominated by flakes and the majority of the artefacts were silcrete. Both places were found on slight rises overlooking a tributary of Waurn Ponds Creek. The subsequent archaeological salvage by Marshall (2010) involved using a grader to expose windrows for inspection. Soils were shown to be a dark brown sandy silt to a depth of 100 to 400 mm overlying blocky clay around the perimeter of the investigation area, and pale grey/white sand in the centre of the salvage area, to a depth of 600-700 mm overlying mostly grey block clay. The salvage recovered a total of eight artefacts from the sand within VAHR 7721-0869 and 10 artefacts were recovered from VAHR 7721-0895. The salvage concluded that both sites had been subject to disturbance, but this was limited to minor activities such as vegetation clearance, cropping and grazing, or bioturbation from rabbit burrows.

Marshall and Toscano (2009) prepared a CHMP for a proposed retirement village on land bordering the Waurn Ponds Shopping Centre and the Waurn Ponds Creek. The salient landform of the study area made the area archaeologically sensitive for Aboriginal cultural heritage. The study area is part of the valley associated with the Waurn Ponds Creek, and an unnamed minor tributary of Waurn Ponds Creek dissects the northern part of the study area. The desktop assessment identified 31 previously recorded Aboriginal sites within 2 km of the study area. All of these sites are artefact scatters, and most of the scatters are of low density. The complex assessment identified four artefact scatters: VAHR 7721-0908/0910. The four sites consisted of low density stone artefact scatters. All of these sites were found on high ground (low rises) associated with a minor tributary of the Waurn Ponds Creek with the exception of one, which was approximately 300 m from the creek and revealed a different stratigraphy than the other pits in which artefacts were found.

4.1.6 Results of the Inspection

Landforms

The study area is located on the crest of a south-west to north-east oriented ridge that forms an outlier for the more extensive Barrabool Hills to the west. The study area is relatively flat in the south west corner but then slopes gently to the east (the end of the ridge) and to the north west (into the valley of the un-named creek. Therefore two principle landforms occur: ridge crest and gentle upper slope. However, due to the nature of the existing infrastructure, the original landscape has been highly modified with extensive machinery-derived landscaping and construction (see below).

Previous (Significant) Ground Disturbance

The term Significant Ground Disturbance (SGD) is defined under r.4 of the *Aboriginal Heritage Regulations 2007*. SGD is used to determine whether a CHMP is triggered for an activity. Under the *Aboriginal Heritage Act 2006*, a CHMP is required where a study area (or parts thereof) is located within an identified area of cultural heritage sensitivity and the activity is a high impact activity. The portions of an area of cultural heritage sensitivity that have been subject to SGD are no longer considered to be areas of cultural heritage sensitivity. This may have a direct bearing on whether a mandatory CHMP is required.

Since no areas of cultural heritage sensitivity, as mapped under the *Aboriginal Heritage Regulations 2007*, occur in the study area, SGD has no direct relevance to this study. However, previous disturbance can inform the likelihood (or otherwise) of Aboriginal cultural heritage being present in the study area.

The following instances of previous land disturbance was noted during the inspection (Map 4):

- A large concrete storage basin has been constructed along the eastern half of the study area, occupying most of the area (Plate). The basin is approximately 6 m deep and occupies the slope landform to the east. Along its eastern side, the basin appears to be consistent with the level of the surrounding land. It is enclosed on the northern, eastern and western sides by an extensive bund wall (Plate 9), up to 6 m high and ranging in width between approximately 40 m at the base and 6-7 m at the apex (Map 4). Historical photos from the 1940s and 50s during the construction of the basin confirms mechanical modification consistent with the definition of SGD (Figure 2). At the northern end, the bund wall has been extended to enclose the second basin (outside the current study area).

Figure 2: Excavaton of the Highton Basin during the late 1940s (*Source*: Edmonds 2005: 172)

- Along the western edge of the basin, there is a 3 m wide concrete apron, sloping westwards into a concrete drain that runs along the entire western edge of the basin (Plate 10). The area between the western side of the basin and the access roads has been modified so that the southern half has a consistent gentle slope to drain water into the concrete drain (Plate 11). The northern section (between the fork in the access tracks) is relatively flat. It has been modified along its eastern and western edges to taper off into the drain to the east and the western access track to the west (Plate 12).

- The land in the north west corner of the study area is located on the slope (with a north west aspect) that forms the side of the Kardinia Creek valley. The slope itself is natural, but the ground appears to have been extensively modified for tracks, buildings and underground infrastructure as per items below (Plate 13).
- A number of small buildings have been constructed in the western half of the study area, including:
    - the 'Old Meter Station', located near the main entry gate adjacent to Thornhill Road, covering an area of 3 x 2.5 m (Plate 14);
    - the disinfection plant, including the vehicle wash down bay, which covers an area of approximately 12 x 10 m (Plate 15); and
    - the Highton Pump Station Building, covering an area of approximately 42 x 20 m, located in the north west corner of the study area (Plate 16). This includes an area around the building itself that has clearly been excavated into the ground surface, and also includes the carpark on the north side, which has been built to provide a level surface; and
    - several smaller structures associated with underground pipes (Plates 17 and 18).
- Underground pipes, which are present throughout the western half of the study area and have been installed in extensive trenches. The depth of the pipes varies, but in almost all cases, the depth has gone through the (potentially) culturally sensitive topsoils and well into the basal clay units. The general layout of the piping is shown in Map 4; these include:
    - the mains from Waurn Ponds as shown by the above ground valve (Plates 19 and 20);
    - the mains to Geelong; and
    - various smaller pipes.

It is considered likely that 100% of the study area has been disturbed by previous land modification and construction works.

Plate 9: Concrete storage basin covering the eastern half of the study area, looking north west

Plate 10: Concrete apron and drain along the western side of the basin, with modified grassed area to the west, looking north

Plate 11: Levelled, but gently sloping modified landscape along western side of basin, looking south

Plate 12: Level area (to right), truncated by the cutting of the access track down to the Pump Station, looking north

Plate 13: Sloping land on the creek valley in the north western section of the study area, looking south

Plate 14: The 'Old meter Station' building adjacent the entrance gate on Thornhill Road, looking south

Plate 15: Disinfection Station and wash down area, looking south

Plate 16: The pump station in the north west section of the study area, looking east

Plate 17: Maintenance sheds, looking south east

Plate 18: Valve covers for the mains pipelines along the western boundary of the study area, looking north towards the creek slope

Plate 19: Above ground mains valve near entrance gate on Thornhill Road, looking south west

Plate 20: One of several concrete access pipes over the water pipe network

4.1.7 Aboriginal Cultural Heritage and Areas of Aboriginal Cultural Heritage Likelihood

There are no mature native trees present within the study area. There are no caves, cave entrances or rock shelters present within the study area.

Previously Unrecorded Aboriginal Places

No previously unrecorded Aboriginal Heritage Places were identified during the inspection.

Areas of Aboriginal Likelihood

Earthworks in the study area have clearly been extensive. Although the study area occurs on the crest of a ridge overlooking Kardinia Creek to the north, which in normal situations would suggest potential for

Aboriginal cultural heritage to be present, the extent of previous ground disturbance throughout indicates that, on the basis of probability, the presence of any in situ Aboriginal cultural heritage is unlikely[5].

4.1.8 Aboriginal Archaeological Site Prediction Statement

The following site prediction statement[6] has been formulated from the review of previous assessments. For further information on site types, see OAAV 2015).

The review of the previously recorded Aboriginal archaeological sites, previous archaeological investigations, together with a rapid site inspection, indicates that the most likely site types in the local region are stone artefact scatters or low density artefact distributions. Furthermore, the proximity of the study area to landforms on which stone artefact scatters and LDADs have previously been found, means that these sites would generally be considered likely to occur within previously undisturbed landforms similar to those found in the study area. However, the large amount of significant ground disturbance that has occurred within the study area means that any sites that may have once been present, are likely to have since been removed by development works.

4.1.9 Aboriginal Heritage Desktop Assessment – Summary of the Results and Conclusions

The desktop assessment has determined that although there are two Aboriginal sites located close to the study area, in landforms suggestive of those within the study area, the previous development works to the study area are likely to have removed or destroyed Aboriginal cultural heritage that may have once been present.

4.2 Historical Context

The section reviews the historical context of the study area and includes an examination of historical and ethnohistorical sources, previously recorded historical archaeological site types and locations in the geographic region of the study area, and previous archaeological studies undertaken in the area. Together, these sources of information can be used to formulate a predictive site model concerning what types of sites are most likely to occur in the study area, and where these are most likely to occur.

4.2.1 Land Use History

Regional History

The history of European exploration and occupation of the region dates from the beginning of the 19th century, although prior 1835, when Victoria was formally settled, European exploration or occupation in the area was sparse. The first European person in the region was probably Matthew Flinders when he walked from the north east coast of Corio Bay to the You Yangs in 1802 (Brownhill 1955).

[5] Likely is an assessment of site types with a 50% or more likelihood of occurring; Unlikely is an assessment of site types with less than 50% likelihood of occurring.

[6] The term "site prediction statement" is sometimes referred to as "site prediction model". Ecology and Heritage Partners Pty Ltd prefers the term "statement" as it is more accurate; "statistical modelling" is a rigorous and comprehensive process using empirical data.

A year later, in 1803, a convict named William Buckley escaped from the established settlement at Sorrento, and lived with Wada wurrung communities for the next 32 years (Athanasiadis and Jacobs 2007: 14).

In 1824, Hamilton Hume and William Hovell traversed the region, naming Kennedy's Creek (later Hovell Creek) after camping near where the memorial now stands (LHF 2004: 18-19). According to Brownhill (1955: 4) Hume and Hovell were told by the local Aboriginal people that the bay was called 'Jilong' (Geelong) and the land was called 'Corayo' (Corio).

In 1835 John Batman explored the region for the Port Phillip Association (PPA) from Tasmania. After exploring parts of the Bellarine Peninsula they sailed across Corio Bay and landed at the mouth of Hovells Creek. Batman's party was followed soon after by John Helder Wedge, a PPA surveyor, who declared it suitable for sheep and cattle grazing (LHF 2004: 18-19). Batman's and Wedge's glowing accounts of the area encouraged formal settlement of Victoria in 1835, and the PPA to take up land within the region. Large numbers of sheep were shipped from Van Diemen's Land to the extensive grazing lands around Port Phillip.

Pastoral squatters soon arrived in the region forming large sheep and cattle pastoral runs, these runs dominated the region through the 1850s. The activity area is located in this rural environment.

Following Batman's Treaty in 1835 European graziers settled the area and Geelong was established in 1836. In 1837 Governor Bourke 'instructed the Surveyor General of New South Wales to lay out the township of Geelong, between the Barwon River and Corio Bay By the following year, sheep stations had been established within a 40 km radius of the town (Clark 1990: 291). The town of Geelong officially came into existence on 26 October 1838, though the first sale of town lots was not held until February 1839. Large parcels of land were purchased from the Crown from 1840 onwards (Broome 1984; Bonwick 1983).

By 1842 most of the available land within the then (then) Barrabool Shire was occupied, with squatters now moving further south to areas previously deemed unappealing, predominantly scrub land (Pescott 1985: 28). Much of the land within the area was bought by speculators and subsequently sold or leased to settlers and pastoralists. This created an area between the Barwon River and Waurn Ponds chain of ponds that was predominantly agricultural.

The Barwon River was named in 1835 by surveyor John Wedge and was originally spelt Barwourne. The name is derived from the Aboriginal word meaning "great, wide or deep water", although some other sources claim it was the Wandouro word for magpie or perhaps after "Kondak Barrwon", one of the Wathaurung chiefs (Dedman *et al*. 1987: 12). Wedge also named Buckleys Falls after William Buckley, the escaped convict, who took Wedge to see the Wathaurung people in 1834. According to Buckley, the spot was called "Woorongo" (Dedman *et al*. 1987: 45). Buckley is reputed to have lived in a cave in the area but the location has not been identified (DCE 1990).

The first settlement in the area was Fyansford, which grew around the Moorabool River bridge. The town was first proclaimed in 1861. One of the reasons for the settlement location was the fact that the river above Buckley Falls was the nearest fresh water source available until Captain Fyans had the breakwater built (DCE 1990). Fyan's Breakwater was constructed using convict labour between 1839 and 1841 (Roberts 1993: 7).

By 1855 a mill had been constructed on the right (south) bank of the Barwon above Buckleys Falls. The mill was known as Highett's Mill (more properly the Barrabool Water Mill). The mill was a five story bluestone building powered by a 43-foot undershot wheel. The mill became a starch factory in 1888 and then a jam

factory. The ruins of the mill were flattened during the 1980s (Dedman *et al*. 1987: 20). In 1878 a paper mill was established on the left (north) bank at Buckleys Falls. The mill ceased operation in 1922 and the machinery and buildings were sold in 1929 (Dedman *et al*. 1987: 19-20). A water race was constructed on the north bank to feed both mills.

The Buckleys Falls area also played a vital part in supplying water to the Geelong region. In 1927, which was a very dry year, the Geelong Waterworks and Sewerage Trust (GWST) augmented the Geelong water supply by drawing water from the river at Buckleys Falls (Dedman *et al*. 1987: 20; Roberts 1993: 9). Just above the Devils Pool (Bunyip Pool) a curved stone weir, built of stone and concrete, was erected across the river. Six sluice-ways across the middle portion of the weir carry the low summer river flows. Adjacent to the weir, on the south side of the river, a pumping station was constructed. A group of three electric motors was installed, mounted on concrete engine beds, and were provided with current from a State Electricity Commission (SEC) substation, which was built some distance up the hill above. The pumping station pumped water into the Montpellier basins, located on the hills north of the study area in Highton, for about two years. The pumping station became redundant when a more reliable water supply became available from the Ballarat system. The machinery was sold, the buildings dismantled.

Barwon Water Overview

The following information is extracted from Barwon Water (2015).

In the 1830s, when Europeans first settled in the Geelong region, the Barwon River was identified as a possible source of drinking water. Unfortunately, its quality was less than satisfactory. The river was influenced by tidal activity and was brackish and muddy upstream as far as Buckley Falls. The situation improved when a breakwater was built by convict labour in 1841. Moreover, as a result of the growing population, the Barwon River and Corio Bay became polluted by industrial and domestic sewage by the 1850s.

Geelong's first reticulated water supply went online on 11 September 1873, from Stony Creek Reservoir in the Brisbane Ranges. The first connected property was the Geelong Infirmary and Benevolent Asylum, now the site of the Geelong Hospital.

In 1908, the Victorian Government handed over its water supply role to the Geelong Municipal Waterworks Trust (GMWT) for £265,000. Two years later, the Trust's role expanded to include the collection and disposal of sewage and the GWST (the Trust) was formed.

On November 10, 1909, the Colac Waterworks Trust was constituted and immediately set about designing and implementing the Olangolah water supply scheme to serve Colac. The scheme was completed in July, 1911, at a cost of £43,000.

Meanwhile, the Geelong system continued to expand to meet the needs of a growing population. In 1916 the first home was connected to the sewerage system, and the system commenced operation in 1917. In 1923, the Colac Sewerage Authority was established and Colac became the first Victorian country town to be sewered in 1927.

Geelong's water resources were greatly enhanced in 1929 when the State Rivers and Water Supply Commission (SRWSC) began supplying the Bellarine Peninsula with water from the Barwon River. The system

incorporated an earthen channel from the Barwon River near Forrest to a new storage reservoir at Wurdee Boluc and an earthen channel to Waurn Ponds.

With continued industrial and residential growth during the 1950s, the Victorian Government handed control of the Barwon headworks to the Trust. Wurdee Boluc Reservoir was enlarged in 1956 and a new reservoir, West Barwon, was built near Forrest in 1964. In the same year, the first trade waste agreements were signed that meant factories were no longer allowed to discharge waste into the Barwon River. In 1968, machines were built at Black Rock to break up sewage before discharge to sea.

In the 1960s the Colac water system expanded north to supply Beeac and Cressy. In 1973, West Gellibrand Reservoir (on the Gellibrand River) and Lal Lal Reservoir (on the West Moorabool River) were opened to serve the expanding Colac and Geelong regions respectively.

Construction of groundwater bores at Barwon Downs, south-west of Colac, began in the 1980s. Small sewage treatment plants were commissioned in Anglesea, Winchelsea and Portarlington. The shoreline outfall at Black Rock was replaced by a screening plant and ocean outfall in 1989. In the same year the Colac District Water Board merged with the Otway Coast Water Board, and later became the Otway Region Water Authority.

The Wurdee Boluc water treatment plant was commissioned in 1990 and the reservoir enlarged to 40,000 million litres. In the 1990s sewage treatment plants were built in Aireys Inlet, Bannockburn, Lorne and Apollo Bay. The Barwon Region Water Authority (Barwon Water) was constituted on 1 February 1994. The Black Rock sewage treatment plant was significantly upgraded in 1996 to include biological treatment of sewage, and the first agreement to provide recycled water (to a flower farm) was signed in 1997. Barwon Water and the Otway Region Water Authority merged in July, 1997. In 2001, the Moorabool water treatment plant was commissioned to treat water from the Moorabool system.

Site History

In November 1942 a special meeting of commissioners was held to discuss improvement of the water supply to Geelong and surrounding districts and, consequently, in April 1943 a 'Supplementary Water Supply' plan proposed doubling the water taken from the Bellarine Peninsula for Geelong, and constructing new mains and a new service basin at Highton (Edmonds 2005: 155). Post-war water supply restrictions meant that new watersheds need to be incorporated into the system to solve the threat of almost continuous supply restrictions. Between 1946 and 1949 a new 30-inch (75 mm) main from Waurn Ponds to the planned service delivery basin at Highton, and another main from Highton to the centre of Geelong, at a total cost of around £78,000 (Edmonds 2005: 162).

Although both the Trust and the SRWSC agreed on the necessity of the proposed Highton service basin, disagreement in the proposed capacity of the basin and the main from Waurn Ponds resulted in stalled negotiations. The Trust had wanted a basin of 30 million litres but the government would only approve a basin of 6 million litres. The issue was finally resolved in May 1949, and construction of the Highton service basin commenced in August 1949 with preliminary earthworks contracted at a cost of £6,364. The remainder of the works was completed by the Trust's own day labour force; the basin was officially commissioned on 30 June 1950 (Edmonds 2015: 162-170; Figure 3).

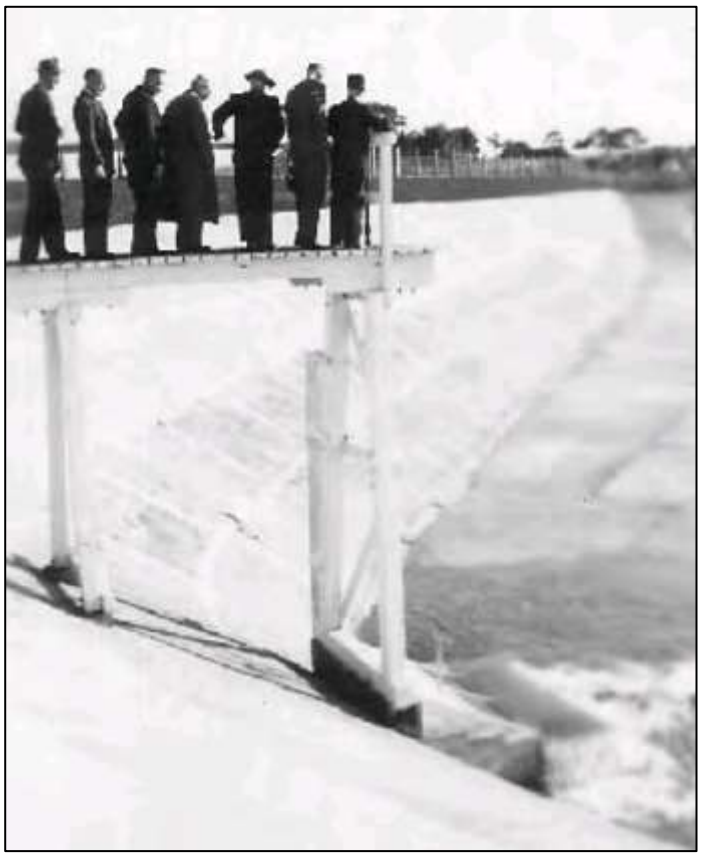


Figure 3: Commissioning of the Highton Basin in 1950 (*Source*: Edmonds 2005: 171)

4.2.2 Registered Historical Heritage Places

A range of historical heritage registers were consulted. A search of the registers for historical places within 2 km of the study area identified a total of 10 registered sites. A list of the relevant historical heritage sites in the search area appears in Appendix 3. The following heritage registers were consulted:

Victorian Heritage Register

The Victorian Heritage Register (VHR), established by the Victorian *Heritage Act 1995*, provides the highest level of statutory protection for historical sites in Victoria. Only the State's most significant historical sites are listed on the VHR.

A search of the VHR was conducted for sites located within 2 km of the study area. There are no sites listed on the VHR within 2 km of the study area (Map 5; Appendix 3).

Victorian Heritage Inventory

The Victorian Heritage Inventory (VHI), established by the Victorian *Heritage Act 1995*, provides the statutory protection for all historical archaeological sites, areas or relics, and private collections of relics, in Victoria. Sites listed on the VHI are not of State significance but are usually of regional or local significance.

A search of the VHI was conducted for sites within 2 km of the study area. One historical archaeological site was identified in the search area (Map 5; Appendix 3), but no sites are located within the study area itself.

Victorian War Heritage Inventory

The Victorian War Heritage Inventory (VWHI) was established in 2011 as a means to catalogue Victoria's war history such as war memorials, avenues of honour, memorial buildings, former defence sites and places of commemoration. Places listed on the VWHI do not currently have discrete statutory protection, however many are concurrently listed on the VHR, VHI, or local planning schemes.

A search of the VWHI was undertaken for sites located within or adjacent to the study area. There are no sites registered on the VWHI within 2 km of the study area.

Local Council Heritage Overlay

The study area is located within the City of Greater Geelong and is governed by the Greater Geelong Planning Scheme. Planning schemes set out policies and provisions for the use, development and protection of land.

The Heritage Overlay (HO) of the Greater Geelong Planning Scheme was examined for sites within a 2 km radius of the study area. A total of nine sites were identified in the search area (Map 5; Appendix 3). None are located within the study area itself.

National Trust Register

The National Trust of Australia (Victoria) is an independent, not-for-profit organisation that classifies a number of heritage places. Listing on the National Trust Register (NTR) does not impose any statutory protection, however often National Trust listings are supported by the local council Planning Scheme.

A search of the NTR was conducted for sites within 2 km of the study area. One site was listed on the NTR within the search area, none of which were located in the study area itself.

Commonwealth Registers

The Department of the Environment (DoE) maintains three principal heritage registers under the *Environment Protection and Biodiversity Conservation Act 1999*, including:

- The National Heritage List (NHL), a register of exceptional natural, Aboriginal and historical heritage places which contribute to Australia's national identity;
- The Commonwealth also maintains the Commonwealth Heritage List (CHL), a register of natural, Aboriginal or historical heritage places located on Commonwealth land which have Commonwealth heritage values; and
- The World Heritage List (WHL) lists cultural and natural heritage places which are considered by the World Heritage Council to have outstanding universal value.

A place can be listed on one or all lists, and placement on any one list gives the place statutory protection under the EPBC Act.

DoE also maintains the Register of the National Estate (RNE) which is a list of natural, Indigenous and historic heritage places throughout Australia. Following amendments to the *Australian Heritage Council Act 2003*,

the RNE was frozen on 19 February 2007, and no new places have been added or removed since then. The RNE ceased as a statutory register in February 2012, although items listed on the RNE may continue to be considered during approvals processes. Many items on the RNE have been listed on the NHL or CHL. They may also be registered on State or local heritage registers. In these cases, those items are protected under the relevant Commonwealth or State heritage legislation. However, items that are only listed on the RNE no longer have statutory heritage protection.

Listings on the NHL, CHL, WHL and RNE are accessed via the Australian Heritage Database (AHD), managed by DoE.

DoE also maintains the Commonwealth Historic Shipwreck Database (HSD). Under the Commonwealth *Historic Shipwrecks Act 1976*, all shipwrecks in Commonwealth waters that were lost 75 years or more ago are protected. For Victoria, the majority of these are also reflected as listings on the VHR.

A search of the AHD and HSD was conducted for sites within 2 km of the study area. No sites were identified in the search area (Map 5; Appendix 3).

4.2.3 Previous Historical Archaeological Investigations

Regional and localised archaeological investigations have established the general character of historical archaeological sites located within the same geographic region as the study area in the form of heritage studies conducted for the Local Government Areas (LGA). These studies often define the historical character of the LGA or for a specific township, predominantly for built heritage but also for archaeological heritage. This information can be used to form the basis for a site prediction statement.

A review of the Heritage Victoria reports database indicates that there are no historical archaeological investigation reports of specific relevance to the study area. A summary of all archaeological reports relevant to the geographical region of the study area is provided in Appendix 3.

4.2.4 Historical Heritage Sites and Areas of Historical Archaeological Likelihood

Two historical heritage sites were identified during the site inspection, only one of which was in the study area itself:

Previously Recorded Sites

There are no previously recorded historical heritage places within the study area.

Previously Unrecorded Sites

No previously unrecorded historical Heritage Places were identified during the inspection. The site does not demonstrate heritage significance at the State level and would not meet the thresholds for registering on the VHR.

The site has some heritage significance at a local level (Greater Geelong) as it was developed in the immediate Post-War period to alleviate water shortages that were prevalent in the Geelong region during that period. The site demonstrates an ongoing use and progressive development, utilising changing standards and technology in water storage and delivery. However, the site does not appear to have been

recommended for listing on the Heritage Overlay of the Greater Geelong Planning Scheme in the various Geelong heritage studies and it is considered unlikely that the site would meet the thresholds for such listing.

Areas of Historical Archaeological Likelihood

No areas of historical archaeological likelihood, that would meet the thresholds for listing on the VHI, were identified during the inspection.

4.2.5 Historical Heritage Desktop Assessment – Summary of the Results and Conclusions

No historical archaeological sites have previously been recorded and no areas of archaeological likelihood were identified during the inspection. The site itself has some local historical significance for its role in improving water supply and delivery in the Post-War period. However, previous heritage studies in the City of Greater Geelong have not recognised or recommended addition of the site to the local Heritage Overlay and it is not considered that the site should be listed.

4.3 Cultural Heritage Legislative and Policy Implications

4.3.1 *Aboriginal Heritage Act 2006* (Victorian)

The *Aboriginal Heritage Act 2006* protects Aboriginal heritage in Victoria. If certain high impact activities are undertaken as stated in the *Aboriginal Heritage Regulations 2007* (revised 2009) then preparation of an Aboriginal Cultural Heritage Management Plan (CHMP) may be required to be approved by the OAAV or the Registered Aboriginal Party (RAP) prior to lodging a planning permit.

Triggers for mandatory preparation of a CHMP include whether certain criteria are met under the Regulations, required by the Minister, or if the activity requires an Environmental Effects Statement (EES) under Sections 46 to 49 of the *Environmental Effects Act 1978*.

The Regulations require a mandatory CHMP if:

1) All or part of the proposed activity is a high impact activity; and
2) All or part of the activity area (study area) is an area of cultural heritage sensitivity (subject to whether the entire area of cultural heritage sensitivity has been subject to *significant ground disturbance*).

4.3.1.1 Implications

The following considerations are made with respect to the mandatory preparation of a CHMP:

- The proposed activity ***is*** a high impact activity under the *Aboriginal Heritage Regulations 2007* (r. 46).
- However, the study area ***is not*** located within an area of cultural heritage sensitivity.

Therefore a mandatory Aboriginal CHMP is required for this activity.

Furthermore, it is considered unlikely that Aboriginal heritage will be found in the study area. This conclusion is derived from the lack of unmodified land in the study area. Consequently the preparation of a voluntary CHMP is not considered to be warranted.

4.3.2 *Native Title Act 1993* (Commonwealth)

Native Title describes the rights and interests of Aboriginal and Torres Strait Islander people in land and waters, according to their traditional laws and customs. In Australia, Aboriginal and Torres Strait Islander people's rights and interests in land were recognised in 1992 when the High Court delivered its historic judgment in the case of Mabo v the State of Queensland. This decision overturned the legal fiction that Australia upon colonisation was terra nullius (land belonging to no-one). It recognised for the first time that Indigenous Australians may continue to hold native title.

Native Title rights may include the possession, use and occupation of traditional country. In some areas, native title may be a right of access to the area. It can also be the right for native title holders to participate in decisions about how others use their traditional land and waters. Although the content of native title is to be determined according to the traditional laws and customs of the title holders, there are some common characteristics. It may be possessed by a community, group, or individual depending on the content of the traditional laws and customs. It is inalienable (that is, it cannot be sold or transferred) other than by surrender to the Crown or pursuant to traditional laws and customs. Native Title is a legal right that can be protected, where appropriate, by legal action.

Native Title may exist in areas where it has not been extinguished (removed) by an act of government. It will apply to Crown land but not to freehold land. It may exist in areas such as:

- Vacant (or unallocated) Crown land;
- Forests and beaches;
- National parks and public reserves;
- Some types of pastoral leases;
- Land held by government agencies;
- Land held for Aboriginal communities;
- Any other public or Crown lands; and/or
- Oceans, seas, reefs, lakes, rivers, creeks, swamps and other waters that are not privately owned.

Native Title cannot take away anyone else's valid rights, including owning a home, holding a pastoral lease or having a mining lease. Where native title rights and the rights of another person conflict the rights of the other person always prevail. When the public has the right to access places such as parks, recreation reserves and beaches, this right cannot be taken away by Native Title. Native Title does not give Indigenous Australians the right to veto any project. It does mean, however, that everyone's rights and interests in land and waters have to be taken into account.

Indigenous people can apply to have their native title rights recognised by Australian law by filing a native title application (native title claim) with the Federal Court. Applications are required to pass a test to gain

certain rights over the area covered in the application. The Native Title Tribunal (NNTT) was established to administer application processes. Once applications are registered, the NNTT will notify other people about the application and will invite them to become involved so all parties can try to reach an agreement that respects everyone's rights and interests. If the parties cannot agree, the NNTT refers the application to the Federal Court and the parties argue their cases before the Court.

As a common law right, native title may exist over areas of Crown land or waters, irrespective of whether there are any native title claims or determinations in the area. Native Title will therefore be a necessary consideration when Government is proposing or permitting any activity on or relating to Crown land that may affect native title[7].

4.3.2.1 Implications

There are currently no Native Title claims extending over the activity area. Parts of the activity area are designated as Crown land; therefore Native Title has not been extinguished.

4.3.3 *Coroners Act 2008* (Victorian)

The Victorian *Coroners Act 2008* requires the reporting of certain deaths and the investigation of certain deaths and fires in Victoria by coroners to contribute to the reduction of preventable deaths. Of most relevance to heritage is the requirement for any "reportable death" to be reported to the police (s. 12[1]). The *Coroners Act 2008* requires that the discovery of human remains in Victoria (s. 4[1]) of a person whose identity is unknown (s. 4[g]) must be reported to the police. It should be noted that occasionally archaeological and construction works uncover human remains.

4.3.3.1 Implications

There are no implications under this legislation known at this stage of the development.

4.3.4 *Heritage Act 1995* (Victorian)

The *Victorian Heritage Act 1995* (the Act) is administered by Heritage Victoria (HV) and is the Victorian Government's key piece of historical heritage legislation.

The Act identifies and protects heritage places and objects that are of significance to the State of Victoria including:

- Historic archaeological sites and artefacts;
- Historic buildings, structures and precincts;
- Gardens, trees and cemeteries;
- Cultural landscapes;
- Shipwrecks and relics; and
- Significant objects.

[7] The information in this section was taken from the Department of Sustainability and Environment, Fact Sheet on Native Title, 2008

This Act protects all non-Aboriginal heritage sites older than 50 years. If a site is of State Significance it is listed on the Victorian Heritage Register and a Permit from HV is required to disturb it. If an archaeological site is not of State significance and has archaeological value it is usually listed on the VHI and a Consent from HV would be required to disturb it.

Up until late 2009, Heritage Victoria had a 'D' classification for places that are considered to have low historical or scientific significance. These sites are listed on the Victorian Heritage Inventory but are not subject to statutory protection, therefore there is no requirement to obtain a Consent to Disturb or destroy these sites. Heritage Victoria has requested that a letter be sent to them informing them if 'D' listed sites or places are destroyed to maintain records of these destroyed sites.

4.3.4.1 *Implications*

There are no registered Heritage Places within the study area and no areas of historical archaeological likelihood were identified during the site visit. No areas of State-level heritage significance were identified. Therefore there are no implications for this project.

4.3.5 *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

Consistent with the above, the EPBC Act provides a national framework for the protection of heritage and the environment and the conservation of biodiversity. The EPBC Act is administered by DoE. The Australian Heritage Council assesses whether or not a nominated place is appropriate for listing on either the National or Commonwealth Heritage Lists and makes a recommendation to the Minister on that basis. The Minister for the Environment, Water, Heritage and the Arts makes the final decision on listing. DoE also administers the Register of the National Estate.

The objectives of the EPBC Act are:

- To provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance;
- To promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources;
- To promote the conservation of biodiversity;
- To provide for the protection and conservation of heritage;
- To promote a cooperative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples;
- To assist in the cooperative implementation of Australia's international environmental responsibilities;
- To recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and,
- To promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in cooperation with, the owners of the knowledge.

4.3.5.1 *Implications*

There are no known cultural heritage sites of National Significance within the study area. It is considered unlikely that any cultural heritage sites of National Significance will be located it the study area. Therefore a referral or further works would not be required under the EPBC Act.

4.3.6 *Planning and Environment Act 1987* (Victorian)

All municipalities in Victoria are covered by land use planning controls which are prepared and administered by State and local government authorities. The legislation governing such controls is the *Planning and Environment Act 1987*. Places of significance to a locality can be listed on a local planning scheme and protected by a Heritage Overlay (or other overlay where appropriate). Places of Aboriginal cultural heritage significance are not often included on local government planning schemes.

4.3.6.1 *Implications*

There are no heritage places listed on the Heritage Overlay to the Greater Geelong Planning Scheme. The site is likely to have some local heritage significance for its technical and social values as a means of alleviating ongoing water shortages in Geelong during and immediately following World War II. However, the site does not appear to have been identified as significant during assessments for the various Geelong heritage studies. Therefore there are no implications for this project.

5 CONCLUSION

Based on the preliminary project information, the following key areas of constraint have been identified within or immediately adjoining the site (Map 2):

Natural Heritage

- Remnant native vegetation patches of modified woodland (Grassy Woodland: EVC 175) .

Cultural Heritage

There are no cultural heritage constraints for this project.

5.1 Natural Heritage

The study area is representative of many areas within the region as it has been significantly modified, with vegetation generally limited to modified woodland habitats and planted trees. Remnant vegetation within the study area was limited to small fragmented patches of the Grassy Woodland EVC. While the study area comprised modified components of this EVC, this habitat has the ability to support some level of diversity for flora and common urban-adapted fauna species. However, the general scarcity of structural diversity and density within most vegetated areas represents limited niche availability to support high species diversity. Accordingly, significant flora and fauna species are considered unlikely to be present as there is no suitable habitat in the study area or they are presumed to be extinct in the locality.

A summary of legislative implications is provided in Table 5 below.

Table 5: Summary of Natural Heritage Legislation Implications

Legislation/ Policy	Implications
Environment Protection and Biodiversity Conservation Act 1999	The proposed action is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is not recommended regarding matters listed under the EPBC Act.
Flora and Fauna Guarantee Act 1988	No species listed as threatened or protected under the FFG Act were recorded within the study area, and none are considered likely to occur. As such an FFG Act permit will not be required for development of the study area.
Planning and Environment Act 1987	A Planning Permit from the City of Greater Geelong is required to remove, destroy or lop any native vegetation as part of any proposed development of the study area.
Biodiversity Assessment Guidelines	Areas of remnant native vegetation must be offset if they are proposed to be disturbed as part of the project. The offset requirement for native vegetation removal is 0.011 General Biodiversity Equivalence Units (BEU).
Wildlife Act 1975	Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*.
Catchment and Land Protection Act 1994	To meet CaLP Act requirements listed noxious weeds and animals should be appropriately controlled throughout the study area during any upgrade works to minimise their spread and overall impact on ecological values.

5.2 Cultural Heritage

The proposed development is a high impact activity under the *Aboriginal Heritage Regulations 2007*; however, the study area is not located in a legislated area of cultural heritage sensitivity. Therefore a mandatory CHMP under the *Aboriginal Heritage Act 2006* is not required. In relation to the likelihood of Aboriginal heritage occurring in the study area, although it is located on a ridge crest overlooking an incised waterway, a landform that would normally be considered to have Aboriginal archaeological likelihood, the extent of previous ground disturbance throughout the study area, associated with the construction of the basins and associated infrastructure, is likely to have destroyed any archaeological deposits that may have been present.

There are no registered historical heritage places in the study area and there are no historical heritage sites (built or archaeological) considered to meet the thresholds for registration on either State or local heritage instruments. Consequently, no heritage permits or consents are required.

A summary of cultural heritage legislative implications is provided in Table 6 below.

Table 6: Summary of Cultural Heritage Legislation Implications

Legislation/ Policy	Notes
Environment Protection and Biodiversity Conservation Act 1999	There are no known cultural heritage sites of National Significance within the study area. Therefore a referral or further works would not be required under the EPBC Act.
Aboriginal Heritage Act 2006	There are no legislated areas of cultural heritage sensitivity within the study area; therefore a mandatory CHMP for the proposed development is not required prior to a planning permit being approved. The study area is considered to have been subjected to total ground disturbance throughout and it is unlikely that any in situ Aboriginal cultural heritage will be present; therefore it is not considered that a voluntary CHMP is warranted.
Native Title Act 1993	The study area does not comprise Crown land and comprises private land: therefore Native Title has been extinguished.
Coroners Act 2008	There are no implications under this legislation at present. If human remains are identified either during the course of any other ground impact works, then Police must be notified immediately.
Planning and Environment Act 1987	There are no historical heritage places listed on the local Heritage Overlay within the study area. Although the site exhibits some local heritage significance for its technical and social values, a permit from City of Greater Geelong will not be required for any works that will impact the site.
Heritage Act 1995	There are no historical heritage places on the VHR or VHI within the study area and there are no areas of historical archaeological likelihood present. Therefore a Permit and/or Consent from Heritage Victoria will not be required prior to a planning permit being approved.

REFERENCES

Andrew Long and Associates, 2000. Buckley Falls Precinct: An Aboriginal and Cultural Heritage Survey. Unpublished report to Parks Victoria.

Barwick, D., 1984. Mapping the Past: An Atlas of Victorian Clans 1835-1904. *Aboriginal History* **8**: 100-131.

Barwon Bluff Marine Sanctuary, 2012. http://www.barwonbluff.com.au/koorie/Game.htm, accessed on 9 May 2012.

Barwon Water, 2015. *Our History*. https://www.barwonwater.vic.gov.au/about/corporate/history, accessed 10 April 2015.

Bonwick, J. (ed. Anderson, H.) 1883. *Port Phillip Settlement*. North Melbourne, Red Rooster Press.

Bowdler, S., 1981. Unconsidered trifles? Cultural Resource Management, Environmental Impact Statements and Archaeological Research in New South Wales. *Australian Archaeology* **12***: 123 – 133*.

Broome, R., 1984. *The Victorians: Arriving*. McMahons Point NSW, Fairfax, Syme and Weldon Associates.

Brownhill, W.R., 1955. The History of Geelong and Corio Bay. Wilks and Co., Melbourne.

Bullers, R. and Harbour, M., 2013. Mt Brandon Landscape Plan Stage 1, Highton, Victoria: Historical Heritage Assessment. Unpublished report to the City of Greater Geelong.

Bureau of Meteorology (BOM), 2015. http://www.bom.gov.au. Accessed 7 April 2015.

Clark, I. D., 1990. *Aboriginal languages and Clans: An Historical Atlas of Western and Central Victoria, 1800-1900*, Number 37. Department of Geography and Environmental Science, Monash University, Melbourne, Victoria.

Collins, S., 2012. Deakin University Waurn Ponds Campus Student Housing: CHMP #12031. Unpublished report to Deakin University.

Dedman, V., McCarthy, G. and Pescott, T. (eds.), 1987. *From Buckleys to the Break: A History and Natural History of the Barwon River through Geelong*. Geelong Field Naturalists Club, Geelong, Vic.

DELWP 2015a. Ecological Vegetation Class (EVC) Benchmarks for each Bioregion [WWW Document]. URL http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/evc-benchmarks#bioregionname. Victorian Department of Environment, Land, Water and Planning.

DELWP 2015b. Biodiversity Interactive Map [WWW Document]. URL http://mapshare2.dse.vic.gov.au/MapShare2EXT/imf.jsp?site=bim/. Victorian Department of Environment, Land, Water and Planning.

DEWLP, 2015c. *Planning Schemes*. http://www.dse.vic.gov.au/planningschemes. Accessed 20 April 2015. Department of Transport, Planning and Local Infrastructure, East Melbourne, Victoria.

DELWP 2015d. Native Vegetation Information Management Tool [WWW Document] URL http://nvim.depi.vic.gov.au/. Victorian Department of Environment, Land, Water and Planning.

De Maria, N., 2014. Proposed Residences on Nicol Drive South, Deakin University, Waurn Ponds, Victoria: CHMP #12919. Unpublished report to Tim Hanley of Deakin University.

DEPI 2013. Permitted clearing of native vegetation - Biodiversity assessment guidelines (the Guidelines). Victorian Department of Environment and Primary Industries.

DEPI 2014. Victorian Biodiversity Atlas. Sourced from: "VBA_FLORA25" and "VBA_FLORA100", February 2014. Victorian Department of Environment and Primary Industries.

DoE 2013. Significant Impact Guidelines 1.1. Matters of National Environmental Significance. Federal Department of the Environment, Canberra.

DoE 2015. Protected Matters Search Tool: Interactive Map [WWW Document]. URL http://www.environment.gov.au/epbc/pmst/. Federal Department of Environment, Canberra.

DSE, 2005. *Advisory list of Threatened Flora in Victoria – 2005*. Department of Sustainability and Environment, Victoria.

DSE, 2009. *Advisory list of Threatened Invertebrate Fauna in Victoria – 2009*. Department of Sustainability and Environment, Victoria.

DSE, 2013. *Advisory list of Threatened Vertebrate Fauna in Victoria – 2013*. Department of Sustainability and Environment, Victoria.

du Cros, H. and Rhodes, D. 1998. Aboriginal Archaeological Sensitivities Study of the Waterways and Flood Plains of Greater Melbourne. Unpublished report for Melbourne Water Corporation by Biosos Research Pty Ltd, Port Melbourne, Victoria.

Edmonds, L., 2005. Living By Water: A History of Barwon Water and its Predecessors. Barwon Region Water Authority, Geelong.

Flood, J., 1995. *Archaeology of the Dreamtime*. Angus & Robertson, Sydney.

Gott, B. and Conran, J., 1991. Victorian Koorie Plants: some plants used by Victorian Koories for food, fibre, medicines and implements. Aboriginal Keeping Place, Hamilton.

Hewitt, G. and Allen, J., 2010. Site Disturbance and Archaeological Integrity: the Case of Bend Road, an Open Site in Melbourne Spanning Pre-LGM Pleistocene and Late Holocene Periods. *Australian Archaeology*, 70: 1-16.

Howell-Muers, J., Matthews, D., Milanes, J., Clark, V., Phillips, O., Kiddell, H., and Noble, A., 2010. Geelong Ring Road Project (Section 4B). Unpublished report to VicRoads by Dr Vincent Clark and Associates.

Howitt, A. W., 2001 [1904]. *The Native Tribes of South-East Australia*. Facsimile edition. Canberra, Aboriginal Studies Press.

Kaskadanis, C. 2008. Section 4A of the Geelong Ring Road, Waurn Ponds. Unpublished report to VicRoads.

Light, A. and Schell, P., 2002. Barrabool Hills, Ceres: A Cultural Heritage Assessment. Unpublished report to Fadgyas Planning Associates Pty Ltd.

Marshall, B., 1998. An Archaeological Survey at Mount Brandon. Unpublished report to Tidebird Pty Ltd.

Marshall, B., 2001. An Archjaeological Desktop Survey of Proposed Storm Water – Wetlands at Buckley Falls Park and Queens Park – Highton. Unpublished report to Hyder Consulting.

Marshall, B. 2002a. An Archaeological Sub-surface Survey, University Park Estate, Highton. Unpublished report to TGM by TerraCulture Pty Ltd.

Marshall, B., 2002b. An Archaeological Investigation at 'Claremont': Ghazeepore Road Waurn Ponds. Unpublished report to John Wellam.

Marshall, B. 2007. An Archaeological Assessment at the Geelong and East Belmont Saints Baseball Clubs on Pioneer Road, Grovedale. Unpublished report to Davis Langdon and the City of Greater Geelong by TerraCulture Pty Ltd.

Marshall, B., 2010. Waurn Ponds Shopping Centre, Waurn Ponds: Salvage Report. Unpublished report to Thinc Projects.

Marshall, B. and Schell, P. 1998. Coast Action Coast Care 1998/1999 Aboriginal Desktop Study. Unpublished report prepared for DNRE Coast Division by Austral Heritage Consultants, Coburg, Victoria.

Marshall, B., and Webb, C. 2005. Geelong Bypass Project Section 3, Cultural Heritage Assessment Stage 2. Unpublished report for VicRoads, Victoria by TerraCulture, Fairfield, Victoria.

Marshall, B. and Toscano, M. 2009. Waurn Ponds Retirement Village, Waurn Ponds. Unpublished report to Australian Unity Retirement Living Services Ltd by TerraCulture Pty Ltd.

Marshall, B., Toscano, M., and Kaskadanis, C. 2008. Construction of a Shopping Centre, Princes Highway, Waurn Ponds. Unpublished report to Peter Lambden on behalf of MU Nominees by TerraCulture Pty Ltd.

Nichols, H., 2014. Salvage Report for CHMP 12357, Rossack Drive, Grovedale. Unpublished report to Victoria Police.

OAAV, 2015. http://www.dpc.vic.gov.au/index.php/aboriginal-affairs/publications-and-research/aboriginal-cultural-heritage-mini-poster-series. Accessed 17 April 2015.

Pescott, J., 1985. *South Barwon 1857-1985*. City of South Barwon, Victoria.

Presland, G., 2010. *First People: The Eastern Kulin of Melbourne, Port Phillip and Central Victoria*. Museum Victoria, Melbourne.

Sullivan, S. and Bowdler, S. (eds.), 1984. *Site Surveys and Significance Assessments in Australian Archaeology, Proceedings of the 1981 Springwood conference on Australian Prehistory*. Research School of Pacific Studies, Australian National University, Canberra.

TerraCulture Pty Ltd, 2003. An Archaeological Investigation at Rossack Drive, Waurn Ponds. Unpublished report to Fadgyas Planning Associates.

TerraCulture Pty Ltd, 2004. An Archaeological Investigation at 60 Ghazeepore Road, Waurn Ponds. Unpublished report to Vautier-Phipps Pty Ltd.

Toscano, M., 2013a. Proposed Victoria Police and State Emergency Services Complex, Rossack Drive Grovedale: CHMP # 12357. Unpublished report to Victoria Police.

Toscano, M., 2013b. Proposed Sewer Easement off Rossack Drive Grovedale: CHMP # 12634. Unpublished report to Victoria Police.

Vines, G., 1996. Geelong Water Sports Complex Barwon River: Archaeological Assessment. Unpublished report to Sinclair Knight Merz

Vines, G., 1998. Barwon River Crossing: Archaeological Assessment. Unpublished report to Sinclair Knight Merz.

Viridans, 2013a. Flora Information System (FIS), Viridians Biological Databases Pty Ltd, Department of Sustainability and Environment, East Melbourne, Victoria.

Viridans, 2013b. Victorian Fauna Database (VFD), Viridians Biological Databases Pty Ltd, Department of Sustainability and Environment, East Melbourne, Victoria.

Walker, J., 2010. Waurn Ponds Shopping Centre, Waurn Ponds: Salvage Report. Unpublished report to Thinc Projects.

Weaver, F. 1994. The Mount Duneed/Armstrong Creek Urban Development Study: Aboriginal and Historical Archaeological Assessment. Unpublished report for Hensell Hansen Associates.

Weaver, F. 2001. Ghazeepore Road, Waurn Ponds, Victoria. Unpublished report to Grant St. Quentin Surveyors and Great Craft Pty Ltd.

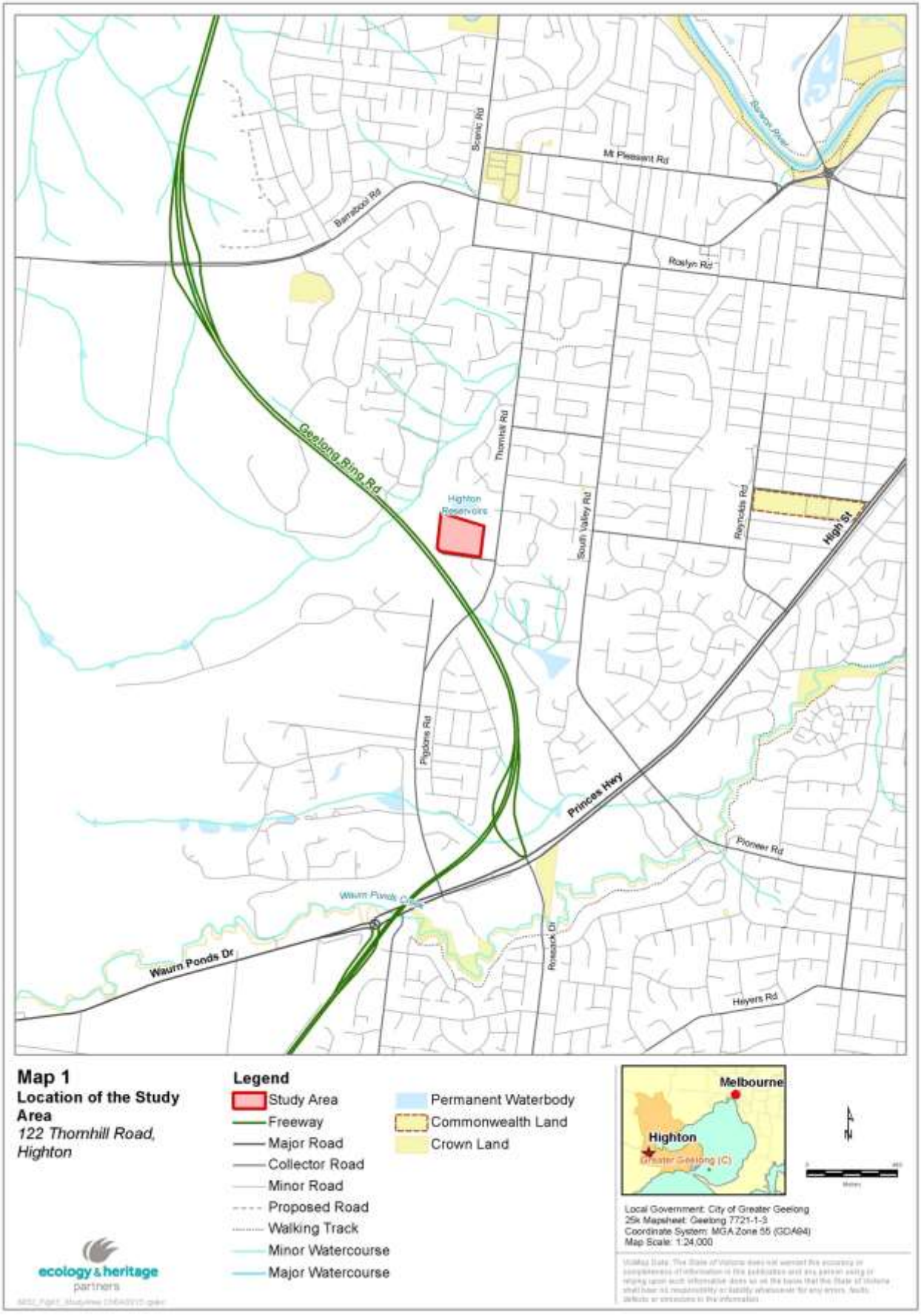
Weaver, F. 2002. The Valley Estate and the Heights Estate Waurn Ponds Victoria: Proposed Residential Development. A Survey for Aboriginal and Historic Archaeological Sites. Unpublished report to Grant St. Quentin Surveyors and MYH Wombah Park.

Webb, C., Butcher, L. and Cooper, S. 2007. Geelong Ring Road- Section 3: Cultural Heritage Management Plan. Unpublished report to VicRoads.

Whincop, M., 2011. 23-29 Ghazeepore Road, Waurn Ponds Residential Subdivision: CHMP #11470. Unpublished report to TGM Group Pty Ltd.

Wynd, I., 1992. *Barrabool – Land of the Magpie*. Barrabool Shire, Torquay.

MAPS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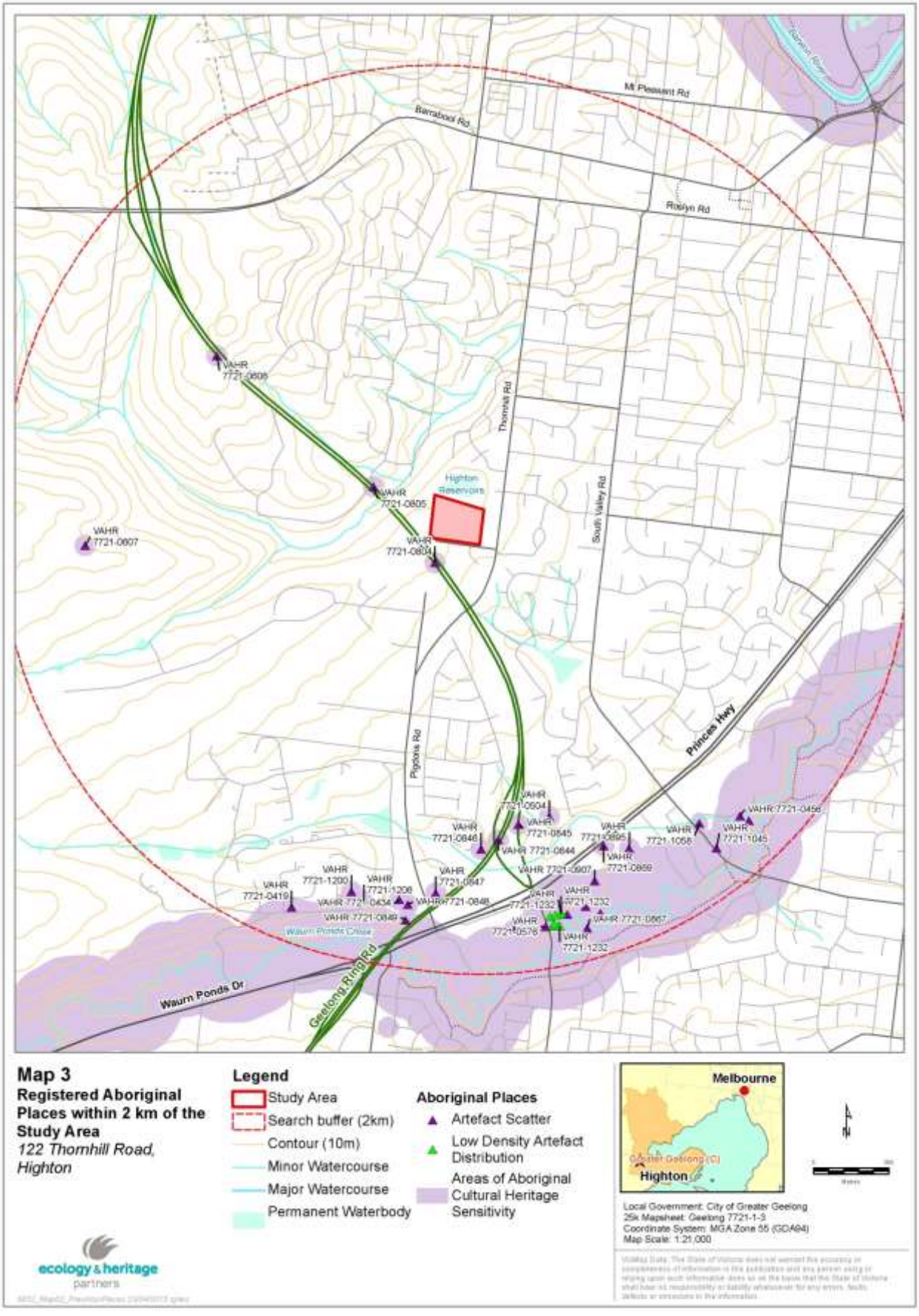
Roslyn Rd
Thornhill Rd
Geelong Ring Rd
Highton Reservoirs
South Valley Rd
Reynolds Rd
High St
Pigdons Rd
Princes Hwy
Pioneer Rd
Waurn Ponds Creek
Waurn Ponds Dr
Rossack Dr
Heyers Rd
Map 1
Location of the Study Area
122 Thornhill Road, Highton
Legend
Study Area
Freeway
Major Road
Collector Road
Minor Road
Proposed Road
Walking Track
Minor Watercourse
Major Watercourse
Permanent Waterbody
Commonwealth Land
Crown Land
Melbourne
Highton
Greater Geelong (C)
Local Government: City of Greater Geelong
25k Mapsheet: Geelong 7721-1-3
Coordinate System: MGA Zone 55 (GDA94)
Map Scale: 1:24,000
ecology & heritage partners


Thornhill Rd
Map 2
Ecological features within the study area
Thornhill Road, Highton
Legend
Study Area
Grassy Woodland
Planted Trees and Shubs
Development Area
Lots
Public Open Space
Retarding Basin
Site boundary
Vegetation to be removed
ecology & heritage partners
N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Pigdons Rd
Waurn Ponds Dr
Geelong Ring Rd
Waurn Ponds Creek
Highton Reservoirs
VAHR 7721-0606
VAHR 7721-0607
VAHR 7721-0805
VAHR 7721-0804
VAHR 7721-0904
VAHR 7721-0545
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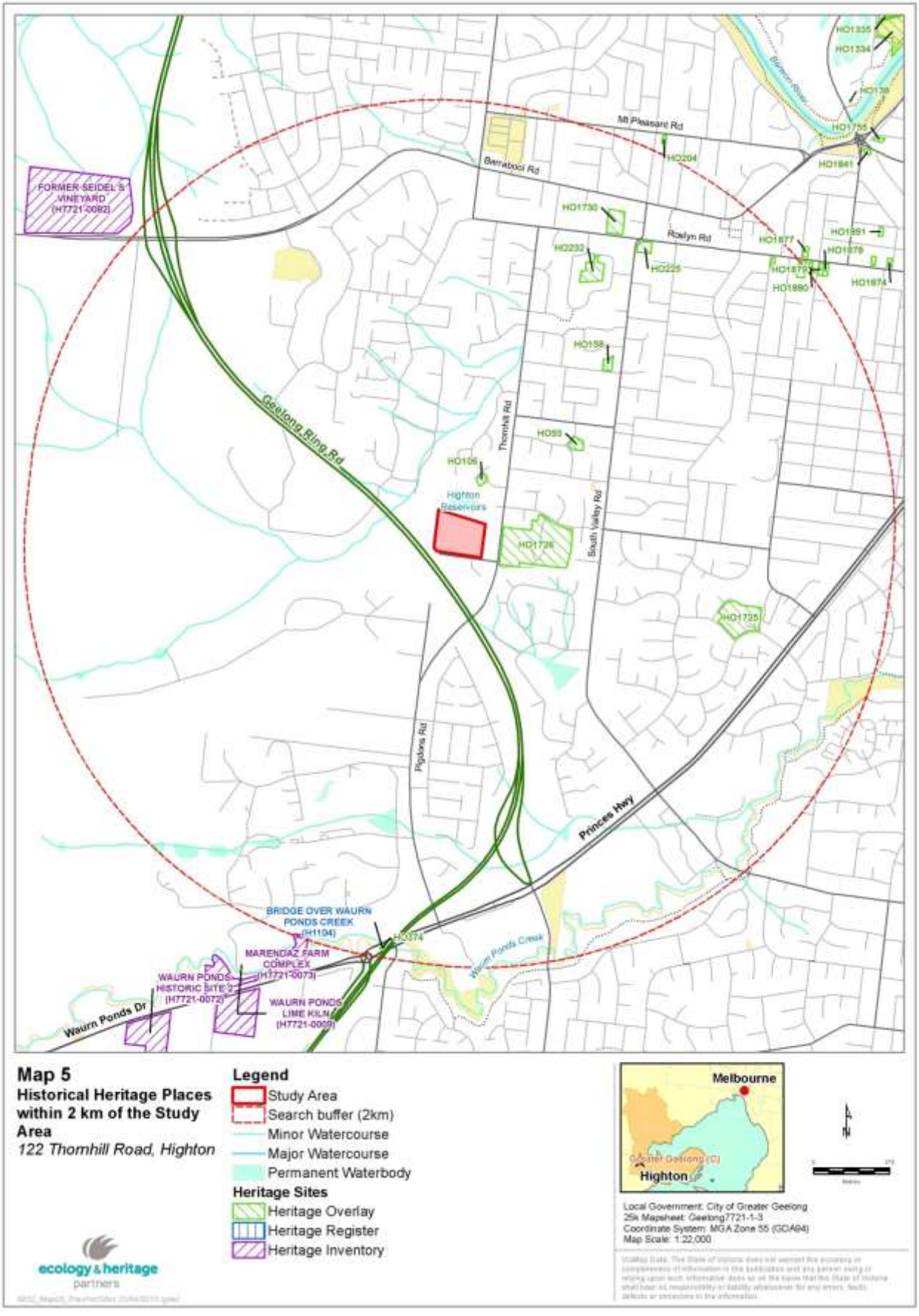
VAHR 7721-0419
VAHR 7721-0847
VAHR 7721-0848
VAHR 7721-0849
VAHR 7721-1232
VAHR 7721-0576
VAHR 7721-0667
Map 3
Registered Aboriginal Places within 2 km of the Study Area
122 Thornhill Road, Highton
Legend
Study Area
Search buffer (2km)
Contour (10m)
Minor Watercourse
Major Watercourse
Permanent Waterbody
Aboriginal Places
Artefact Scatter
Low Density Artefact Distribution
Areas of Aboriginal Cultural Heritage Sensitivity
Melbourne
Highton
Local Government: City of Greater Geelong
25k Mapsheet: Geelong 7721-1-3
Coordinate System: MGA Zone 55 (GDA94)
Map Scale: 1:21,000
ecology & heritage partners


Map 4
Previous disturbance within the Study Area
122 Thornhill Road, Highton
Legend
Building and Infrastructure Footprint
Concrete Basin including bund wall, concrete apron and drain
Underground Utilities and Trenching
Landscape modification and earth moving
Utilities
Study Area
Melbourne
Highton
Local Government: City of Greater Geelong
25k Mapsheet: Geelong7721-1-3
Coordinate System: MGA Zone 55 (GDA94)
Map Scale: 1:1,361
ecology & heritage partners


FORMER SEIDEL'S VINEYARD (H7721-0082)
Mt Pleasant Rd
Berrabool Rd
Roslyn Rd
Geelong Ring Rd
Thornhill Rd
South Valley Rd
Pigdons Rd
Princes Hwy
Waurn Ponds Dr
Waurn Ponds Creek
Highton Reservoirs
HO1730
HO204
HO232
HO225
HO158
HO93
HO109
HO1726
HO1725
HO1335
HO1334
HO1755
HO1841
HO1877
HO1879
HO1880
HO1874
HO1891
HO74
BRIDGE OVER WAURN PONDS CREEK (H104)
MARENDAZ FARM COMPLEX (H7721-0073)
WAURN PONDS HISTORIC SITE 2 (H7721-0072)
WAURN PONDS LIME KILN (H7721-0009)
Map 5
Historical Heritage Places within 2 km of the Study Area
122 Thornhill Road, Highton
Legend
Study Area
Search buffer (2km)
Minor Watercourse
Major Watercourse
Permanent Waterbody
Heritage Sites
Heritage Overlay
Heritage Register
Heritage Inventory
Melbourne
Highton
Local Government: City of Greater Geelong
25k Mapsheet: Geelong7721-1-3
Coordinate System: MGA Zone 55 (GDA94)
Map Scale: 1:22,000

APPENDICES

Appendix 1: Threatened Flora and Fauna Recorded within the Project Locality

Table 1.1: Threatened Flora Recorded in the Project Locality

Scientific Name	Common Name	No. of Records	Last documented record	EPBC	FFG	VICADV
NATIONAL						
Glycine latrobeana	Clover Glycine	1	1881	VU	L	v
Senecio macrocarpus	Large-headed Fireweed	1	1853	VU	L	e
# Caladenia pumila	Dwarf Spider-orchid	-	-	CR	L	E
# Carex tasmanica	Curly Sedge	-	-	VU	L	v
# Diuris basaltica	Small Golden Moths	-	-	EN	L	v
# Glycine latrobeana	Clover Glycine	-	-	VU	L	v
# Pimelea spinescens subsp. spinescens	Spiny Rice-flower	-	-	CR	L	e
# Prasophyllum frenchii	Maroon Leek-orchid	-	-	EN	L	e
# Thelymitra epipactoides	Metallic Sun-orchid	-	-	EN	L	e
# Thelymitra matthewsii	Spiral Sun-orchid	-	-	VU	L	v
# Xerochrysum palustre	Swamp Everlasting	-	-	VU	L	v
STATE						
Acacia uncifolia	Coast Wirilda	4	1884	-	-	r
Callitriche palustris var. palustris	Swamp Water-starwort	1	1986	-	-	k
Callitriche umbonata	Winged Water-starwort	1	1770	-	X	r
Eucalyptus leucoxylon subsp. bellarinensis	Bellarine Yellow-gum	3	2010	-	L	e
Euphrasia scabra	Rough Eyebright	1	1770	-	L	e

Galium compactum	Compact Bedstraw	1	1885	-	-	r
Nicotiana maritima	Coast Tobacco	1	1986	-	-	e
Pleurosorus subglandulosus	Glandular Blanket-fern	1	1770	-	-	k
Poa billardierei	Coast Fescue	1	1885	-	-	r
Prasophyllum lindleyanum	Green Leek-orchid	1	1893	-	X	v
Rhagodia parabolica	Fragrant Saltbush	11	2006	-	-	r
Senecio cunninghamii var. cunninghamii	Branching Groundsel	1	1770	-	-	r
Tripogon loliiformis	Rye Beetle-grass	1	1986	-	-	r
Cardamine tenuifolia *	Slender Bitter-cress	1	1986	-	-	k

Notes: 1) Listed as Critically Endangered (CE), Endangered (E) or Vulnerable (V) under the EPBC Act

2) Listed (L) under the FFG Act

3) Listed as Endangered (e), Vulnerable (v) or Rare (r) on the Victoria Advisory List (DSE 2005)

4) Likelihood of occurrence (based on preliminary assessments): 1 - Known occurrence, 2 -Habitat present, 3 - Habitat present, but low likelihood, 4 - Unlikely/no suitable habitat

Species listed as Poorly Known in Victoria (DSE 2005) have not been included as they have no legislative implications.

Table 1.2: Threatened fauna recorded in the project locality

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG Act	DSE (2013)	National Action Plan	Likelihood
NATIONAL SIGNIFICANCE								
# Southern Brown Bandicoot	*Isoodon obesulus obesulus*	1964	1	EN	L	NT	NT	4
# Grey-headed Flying-fox	*Pteropus poliocephalus*	2002	3	VU	L	VU	VU	3
Wandering Albatross	*Diomedea exulans*	1959	1	VU	L	EN	VU	4
# Australasian Bittern	*Botaurus poiciloptilus*	1974	1	EN	L	EN	VU	4
# Australian Painted Snipe	*Rostratula australis*	1956	1	VU	L	CR	VU	4
Fairy Tern	*Sternula nereis nereis*	1974	1	VU	L	EN	-	4
# Swift Parrot	*Lathamus discolor*	2006	3	EN	L	EN	EN	4
# Growling Grass Frog	*Litoria raniformis*	1995	4	VU	L	EN	VU	4
# Australian Grayling	*Prototroctes maraena*	1997	32	VU	L	VU	VU	4
Murray Cod	*Maccullochella peelii*	1873	1	VU	L	VU	-	4
Macquarie Perch	*Macquaria australasica*	1938	4	EN	L	EN	DD	4
# Yarra Pygmy Perch	*Nannoperca obscura*	2009	6	VU	L	VU	VU	4
# Regent Honeyeater	*Anthochaera phrygia*	-	-	EN	L	CR	EN	4
# Orange-bellied Parrot	*Neophema chrysogaster*	-	-	CR	L	CR	-	4
# Plains-wanderer	*Pedionomus torquatus*	-	-	VU	L	CR	EN	4
# Dwarf Galaxias	*Galaxiella pusilla*	-	-	VU	L	EN	VU	4
# Golden Sun Moth	*Synemon plana*	-	-	CR	CR	L	-	4
# Long-nosed Potoroo	*Potorous tridactylus tridactylus*	-	-	VU	L	NT	VU	4
# New Holland Mouse	*Pseudomys novaehollandiae*	-	-	-	L	VU	-	4
STATE SIGNIFICANCE								
Magpie Goose	*Anseranas semipalmata*	1995	5	-	L	NT	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG Act	DSE (2013)	National Action Plan	Likelihood
Musk Duck	*Biziura lobata*	1999	3	-	-	VU	-	3
Australasian Shoveler	*Anas rhynchotis*	1979	2	-	-	VU	-	3
Hardhead	*Aythya australis*	2001	25	-	-	VU	-	3
Blue-billed Duck	*Oxyura australis*	1974	1	-	L	EN	-	3
White-throated Needletail	*Hirundapus caudacutus*	2000	1	-	-	VU	-	4
Eastern Great Egret	*Ardea modesta*	2001	35	-	L	VU	-	3
Intermediate Egret	*Ardea intermedia*	2001	7	-	L	EN	-	3
Little Egret	*Egretta garzetta nigripes*	2001	7	-	L	EN	-	4
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	2007	15	-	L	VU	-	4
Lewin's Rail	*Lewinia pectoralis pectoralis*	1994	1	-	L	VU	NT	4
Baillon's Crake	*Porzana pusilla palustris*	2010	10	-	L	VU	-	4
Major Mitchell's Cockatoo	*Lophocroa leadbeateri*	1999	1	-	L	VU	-	4
Caspian Tern	*Hydroprogne caspia*	1999	5	-	L	NT	-	4
Barking Owl	*Ninox connivens connivens*	1993	1	-	L	EN	NT	4
Brown Treecreeper	*Climacteris picumnus victoriae*	2004	3	-	-	NT	NT	4
Speckled Warbler	*Chthonicola sagittatus*	1960	1	-	L	VU	NT	4
Diamond Firetail	*Stagonopleura guttata*	1967	1	-	L	NT	NT	4
Southern Pygmy Perch	*Nannoperca australis*	2011	6	-	-	-	-	4
REGIONAL SIGNIFICANCE								
Pied Cormorant	*Phalacrocorax varius*	2008	5	-	-	NT	-	3
Black-faced Cormorant	*Phalacrocorax fuscescens*	1999	1	-	-	NT	-	4
Nankeen Night Heron	*Nycticorax caledonicus hillii*	2010	18	-	-	NT	-	4
Royal Spoonbill	*Platalea regia*	2010	14	-	-	NT	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG Act	DSE (2013)	National Action Plan	Likelihood
Latham's Snipe	*Gallinago hardwickii*	2001	51	-	-	NT	-	4
Whiskered Tern	*Chlidonias hybridus javanicus*	1987	2	-	-	NT	-	3
Pacific Gull	*Larus pacificus pacificus*	2000	4	-	-	NT	-	4
Azure Kingfisher	*Alcedo azurea*	1999	1	-	-	NT	-	4
River Blackfish	*Gadopsis marmoratus*	1981	1	-	-	-	-	4

Note: While the PMST has listed additional fauna species (i.e. Whales, Albatross and Terns), these species have not been included above as there is no suitable habitat and/or they are highly unlikely to be impacted by the proposed works (DoE 2015).

Definitions: 1) Listed as Critically Endangered (CE), Endangered (E), Vulnerable (V) or Migratory (M) under the EPBC Act 2) Listed (L) under the FFG Act

3) Listed as Critically Endangered (ce), Endangered (e), Vulnerable (v), Near Threatened (nt) or Regionally Extinct (re) on the Victoria Advisory List (DSE 2009, DSE 2013)

4) Likelihood of occurrence (based on preliminary assessments):

1	High Likelihood	• Known resident in the Study area based on site observations, database records, or expert advice; and/or, • Recent records (i.e. within five years) of the species in the local area (VBA 2011); and/or, • The Study area contains the species' preferred habitat.	2	Moderate Likelihood	• The species is likely to visit the Study area regularly (i.e. at least seasonally); and/or, • Previous records of the species in the local area (DSE 2011b); and/or, • The Study area contains some characteristics of the species' preferred habitat.
3	Low Likelihood	• The species is likely to visit the Study area occasionally or opportunistically whilst en route to more suitable sites; and/or, • There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or, • The Study area contains few or no characteristics of the species' preferred habitat.	4	Unlikely	• No previous records of the species in the local area; and/or, • The species may fly over the Study area when moving between areas of more suitable habitat; and/or, • Out of the species' range; and/or, • No suitable habitat present.

Appendix 2: Aboriginal Heritage Places within 2 km of the Study Area

Table 2.1: List of Previously Identified Sites within 2 km of the Study Area

VAHR Site Number	Site Name	Site Type	No. Site Components	Within Activity Area?
7721-0419	Deakin Campus 1	Artefact Scatter	1	No
7721-0434	St Augustines No. 1	Artefact Scatter	1	No
7721-0455	Waurn Ponds B	Artefact Scatter	1	No
7721-0456	Waurn Ponds C	Artefact Scatter	1	No
7721-0504	University Park Estate 1	Artefact Scatter	1	No
7721-0576	Rossack Drive- FAGG 1	Artefact Scatter	1	No
7721-0604	FAGG-2	Artefact Scatter	1	No
7721-0606	Western Bypass 21	Artefact Scatter	1	No
7721-0607	Western Bypass 22	Artefact Scatter	1	No
7721-0804	Geelong Bypass 33	Artefact Scatter	1	No
7721-0805	Geelong Bypass 34	Artefact Scatter	1	No
7721-0844	Geelong Ring Road S4 Isolated Artefact	Artefact Scatter	1	No
7721-0845	Geelong Ring Road S4 Artefect Scatter 1	Artefact Scatter	1	No
7721-0846	Geelong Ring Road S4 Artefact Scatter 2	Artefact Scatter	1	No
7721-0847	Geelong Ring Road S4 Artefact Scatter 3	Artefact Scatter	1	No
7721-0848	Geelong Ring Road S4 Artefact Scatter 4	Artefact Scatter	1	No
7721-0849	Geelong Ring Road S4 Artefact Scatter 5	Artefact Scatter	1	No
7721-0867	Waurn Ponds Ck AS2	Artefact Scatter	1	No
7721-0868	Waurn Ponds Ck AS3	Artefact Scatter	1	No
7721-0869	Princes Hwy, Waurn Ponds A	Artefact Scatter	1	No
7721-0895	Waurn Ponds Princes Hwy B	Artefact Scatter	1	No
7721-0907	Waurn Ponds RV 3	Artefact Scatter	1	No
7721-0908	Waurn Ponds RV 1	Artefact Scatter	1	No
7721-0909	Waurn Ponds RV 2	Artefact Scatter	1	No
7721-0910	Waurn Ponds RV 4	Artefact Scatter	1	No
7721-1058	Pioneer Road Grovedale 1	Artefact Scatter	1	No
7721-1045	Pioneer Road Grovedale 2	Artefact Scatter	1	No
7721-1206	Nicol Drive South 1	Artefact Scatter	1	No
7721-1200	Nicol Drive South 2 IA	Artefact Scatter	1	No
7721-1232	Rossack Drive	LDAD	33	No

Table 2.3: Aboriginal Archaeological Reports Relevant to the Study Area

Author Date Report #	Description and Location	Results
De Maria, N. 2014 #12919	CHMP for a proposed residential subdivision on Nicol Drive South, Deakin University, Waurn Ponds.	No Aboriginal archaeological sites were identified. The upper strata of the soil profile were found to be contaminated with modern rubbish and disturbed by modern construction.
Toscano, M. 2013a #12634	CHMP for a proposed sewer easement off Rossack Drive, Grovedale.	No Aboriginal archaeological sites were identified.
Toscano, M. 2013b #12357	CHMP for a proposed Victoria Police And State Emergency Services Complex, Rossack Drive, Grovedale.	No surface artefacts were identified due to poor GSV, but a total of 33 artefacts were found in a disturbed subsurface context and were registered as an LDAD as VAHR 7721-1232 (Rossack Drive). A follow up salvage was conducted (see #4589 below).
Collins, S. 2012 #12031	CHMP for proposed student housing complex at Deakin University, Waurn Ponds, 670 m north west of the current activity area.	No surface artefacts were identified during the standard assessment, but two Aboriginal Places were identified during the complex assessment. VAHR 7721-1206 comprises two stone artefacts made from quartz and silcrete, and VAHR 7721-1200 comprises an isolated quartzite flake. None of the artefacts were considered to be in situ.
Whincop, M. 2011 #11470	CHMP for a proposed residential subdivision at 23-29 Ghazeepore Road, Waurn Ponds.	The activity area for this assessment is located 300 m south of Waurn Ponds creek and 500 m south west of the current activity area. No Aboriginal archaeological sites were identified.
Mialanes, J., Clark, V. & Kiddell, H. 2010 #10692	CHMP for the proposed Geelong Ring Road Section 4C, on land between Anglesea Road and the Surf Coast Highway, Waurn Ponds. The road will link from the Geelong Ring Road to the Surf Coast Highway.	One artefact scatter had been previously recorded within the activity area (VAHR 7721-0608). The standard assessment identified the correct location of the previously recorded historic place 7.1-6 'Duneed Aboriginal Reserve', and recorded as VAHR 7721-0903. One new Aboriginal cultural heritage place was recorded during the survey (VAHR 7721-0896. This site consisted of two flakes. Subsurface testing identified three flakes. An area of potential sensitivity was noted within 100 m of an Armstrong Creek tributary. A second Aboriginal site was recorded on the surface, containing two flakes (VAHR 7721-0939).
Clark, V. 2010 #10553	Desktop and standard assessment of Freeway standard connection between Geelong Ring Road and Princess Highway West at Waurn Ponds.	Desktop found several artefact scatters within close proximity but not in the development area. The standard assessment identified three sites; the alignment was changed to minimize harm to these sites. The review determined no complex assessment was necessary. Included in the alignment was an area recorded in CHMP 10669 which contained one artefact scatter (VAHR 7721-0967), this was salvaged prior to commencement of works.

Author Date Report #	Description and Location	Results
Marshall, B. & Toscano, M. 2009 #10528	CHMP for a parcel of land off the Princes Highway, bordered by the Waurn Ponds Shopping Centre and Waurn Ponds Creek, for a proposed retirement village.	The salient landform of the study area made the area archaeologically sensitive for Aboriginal cultural heritage. The complex assessment identified four artefact scatters: VAHR 7721-0908 to -0910. The four sites consisted of low density stone artefact scatters. All of these sites were found on high ground (low rises) associated with a minor tributary of the Waurn Ponds Creek with the exception of one, which was approximately 300 m from the creek and revealed a different stratigraphy than the other pits in which artefacts were found.
Marshall, B. et al. 2008 #10174	CHMP for the proposed development of a shopping centre at Waurn Ponds.	Five new artefact scatters were registered during the course of the assessment, but only two of them were within the bounds of the activity area, VAHR 7721-0869 and 7721-0895. Site VAHR 7721-0869 consisted of both surface and subsurface material, with a total of 23 artefacts. Site VAHR 7721-0895 consisted of 10 artefacts. The assemblage was dominated by flakes and the majority of the artefacts were silcrete. Both places were found on slight rises overlooking a tributary of Waurn Ponds Creek.
Kaskadanis, C. 2008 #10011	CHMP for section 4A of the Geelong Ring Road. Section 4A is located north of sections 4B and 4C, at Anglesea Road and up to the Princes Highway.	The desktop research for section 4A determined that one Aboriginal archaeological site (VAHR 7721-0434, an isolated silcrete stone flake) was located within the activity area. During the complex assessment, a further six sites were recorded (VAHR 7721-0844, 7721-0845, 7721-0846, 7721-0847, 7721-0848 and 7721-0849; artefact scatters). A total of 45 stone flake artefacts were recovered from sites VAHR 7721-0847, 7721-0848 and 7721-0849. All sites were recorded on higher ground (above 40 m contour), north of the Princes Highway. No sites were recorded south of the Princes Highway, and this was attributed to a high level of ground disturbance.
Webb, C., Butcher, L. & Cooper, S. 2007 #10097	Aboriginal archaeological assessments for Section 3 of the Geelong Ring Road were conducted prior to the introduction of the Aboriginal Heritage Act 2006. However Webb et al (2007) prepared this CHMP combining previously separate reports.	During the desktop assessment, one Aboriginal archaeological site (VAHR 7721-0504) was found to be located on the alignment, and two additional archaeological sites likely to be affected by construction of the road (VAHR 7721-0605 and 7721-0606) during the standard assessment. Twelve additional archaeological sites were located on the alignment during subsurface testing: VAHR 7721-0801, 7721- 0804, 7721-0805, 7721- 0844, 7721-0845, 7721-0846, 7721-0858, 7721-0859, 7721-0860, 7721-0861, 7721-0862 and 7721- 0863. Most of these sites were located on or near the tops of hills and ridges.
Nichols, H. 2014 #4589	An archaeological salvage at Rossack Drive, Warn Ponds, in accordance with the recommendations in CHMP 12357.	An archaeological salvage of VAHR 7721-1232 adjacent to Rossack Drive and Waurn Ponds Creek, just to the east of the current activity area. The salvage involved two 2 x 1 m test pits and two large mechanical trenches. A total of 451 additional artefacts were identified, most in a disturbed context.
Walker, J. 2010 #4330	An archaeological salvage for the Waurn Ponds Shopping Centre, Waurn Ponds.	An archaeological salvage of VAHR 7721-0869 and -0895 located on a minor tributary of Waurn Ponds Creek, 600 m north east of the current activity area. The salvage involved two 2 x 1 m test pits and two large mechanical trenches. A total of 451 additional artefacts were identified, most in a disturbed context.

Author Date Report #	Description and Location	Results
Marshall, B. 2007 #3928	An archaeological survey of part of the Pioneer Road reserve on the opposite (eastern) bank of Waurn Ponds Creek at the Geelong and East Belmont Saints Baseball Clubs on Pioneer Road.	Two new Aboriginal archaeological sites were recorded during the survey, VAHR 7721-0829 and 7721-0828. Both sites were low-density artefact scatters in a disturbed context and both were damaged or removed during construction of the new baseball field under Consents to Disturb issued by the Wathaurong Aboriginal Co-operative Ltd.
Clark, V. 2006 #3572	Desktop survey for two routes for a gas pipeline between Waurn Ponds and Barwon Heads; mostly along existing road reserves.	One known site was located in the alignment. No other sites were located. Sensitive areas were noted and monitoring was recommended during installation.
Marshall, B. & Webb, C. 2005 #3265	Standard survey for the Geelong Bypass between the Princess Freeway Corio Interchange and the Princess Freeway at Waurn Ponds, approximately 11 km and five separate alignment options.	Previous archaeological investigations are noted as limited in this report. Thirty four known sites and two new sites were within or in close proximity to the alignments. Subsurface testing of any known sites or sensitive areas was recommended prior to development.
TerraCulture 2004 #2691	An archaeological survey for a proposed residential subdivision at 60 Ghazeepore Road, Waurn Ponds, 850 m south west of the current activity area.	No Aboriginal archaeological sites were identified.
TerraCulture 2003 #2572	An archaeological subsurface testing program at Rossack Drive, Waurn Ponds	One surface site was identified during the survey, VAHR 7721-0576, which is located just east of the current activity area adjacent to Rossack Drive. Subsurface testing using a rotary hoe identified an additional 12 artefacts at VAHR 7721-0576. Two outlying artefacts were registered as VAHR 7721-0604, which may or may not be within the current activity area (see description above).
Marshall, B. 2002a #2390	An archaeological investigation at 'Claemont', Ghazeepore Road, Waurn Ponds, approximately 670 m south west of the current activity area.	No Aboriginal archaeological sites were identified.
Marshall, B. 2002b #2298	The results of a survey at Highton, near the Princes Highway. The study area includes two parcels of land, totalling 55 ha. The proposed activity is residential subdivision.	The subject land was a grassed paddock with a minor drainage line (the western end of the above mentioned tributary of Waurn Ponds Creek) at the southern end, with two low but prominent hills at the south-western and south-eastern ends. No Aboriginal archaeological sites were found in the small 5 ha parcel. A single Aboriginal artefact (VAHR 7721-0434) was found on the former hill near the ruins of an old dairy.
Weaver, F. 2002 #2197	An archaeological survey was undertaken across a large parcel of land between Ghazeepore Rd. and Rossack Dr., including the entirety of the current activity area.	Four new Aboriginal archaeological sites were identified during the survey; Rossack Drive 1 (VAHR 7721-0528), Rossack Drive 2 (VAHR 7721-0531), Ghazeepore Road 2 (VAHR 7721-0529) and Ghazeepore Road 3 (VAHR 7721-0530). One of these sites, isolated artefact site Ghazeepore Road 2 (VAHR 7721-0529) is located within the current activity area, though Weaver noted that intensive survey around its noted location did not reveal any further Aboriginal cultural heritage.

Author Date Report #	Description and Location	Results
Weaver, F. 2001 #2003	An archaeological survey of a proposed residential subdivision (10 ha) on the eastern side of Ghazeepore Road, between Monterey Drive and Waurn Ponds Creek.	A single Aboriginal archaeological site was found during the survey; an artefact scatter. Site VAHR 7721-0461 consisted of four flakes located on a dam wall about 250 m from the creek. Weaver concluded from the desktop assessment that 'Aboriginal archaeological sites could be located anywhere on the floodplain of the Waurn Ponds Creek' (Weaver 2001: 8). However, much of the subject land was covered with fill and no artefacts were found along the banks of the creek where there was good ground exposure.
du Cros, H & Rhodes, D. 1998 #1320	This report aimed to provide an overview and assessment of waterways and floodplains for The Waterways and Drainage Group within Melbourne Water to understand the impact on cultural heritage.	The predictive models provided in this report illustrate that waterways and floodplains in and around Melbourne should still be considered highly likely to yield evidence of Aboriginal occupation. Site types considered common are surface artefact scatters, isolated artefacts and scarred trees. Rarer site types are fresh water middens, burials and quarries.
Amorosi, L. 1998 #1260	A personal collection of Aboriginal artefacts of W.L. Koenig.	This collection contains Aboriginal stone artefacts, two ground axes from New Guinea, skeletal remains, a Tjurunga stone, a basket, boomerangs, a spear thrower and cord made from vegetable matter. 139 of the 651 artefacts have a provenance or name provided, usually by the name of a town or landmark. Koenig's collection contains a high frequency of complete artefacts and interesting examples of artefact types however, this report is only a broad indicator of areas where the artefacts were traded or collected due to the lack of provenance.
Richards, T & Jordan, J. 1999 #856	An investigation of the Barwon River Basin's written archaeological record; further surveys demonstrated low/insufficient records from previous investigations.	All parts of the Barwon Basin must be considered archaeological sensitive. The areas of highest sensitivity are the coast, the vicinity of freshwater sources and the foothills of the Otway Range. Site damage is high due to human disturbance, intact or nearly intact sites noted as high priority for protection.
Black, C.F. 1984 #728	A report on the history of the occupying tribes of Melbourne and Geelong (Wathaurung, Kurung, Wurundjeri, Taungurong and Bunurung), and other Aboriginal people in the study area.	This report examines previous archaeological surveys and historical documents to include information on tribal areas, ethnographic and demographic information, current land use of the area by Aborigines, and Aboriginal archaeological sites.
Weaver, F. 1994 #718	Drive by survey of the corridor between Geelong, Duneed and Lake Connewarre.	An overview of the area describes an undulating plain, almost entirely cleared for farming. No Aboriginal sites were located. Six historical sites were seen. Sensitive areas were recorded requiring examination prior to any development of the Bellarine Peninsular
Mulvaney, D.J. 1964 #187	Reviews the population, relics and trade of the basalt plains in Victoria.	When the first census was taken in 1877 there was 774 Victorian full-blooded Aborigines recorded, 170 lived in the W. District. This paper suggests a higher population by discussing the Aborigines of the Basalt Plain using environmental adaptation, archaeological and anthropological references.

Appendix 3: Historical Heritage Places and Literature Review

Table 3.1: Summary of Previously Identified Historical Heritage Sites within and adjacent to the study area

Register & Site Number	Site Name	Site Type	Within study area?
H7721-0070	Waurn Ponds Historical Site 1 50 Princes Highway, Waurn Ponds	Archaeological: House ruins	No, 1.9 km SW
HO93	'Aringa' Residence 5 Aringa Avenue, Highton	Built: Residence	No, 600 m NE
HO106 NTR B1333	'Barrabool' Residence 13 Pepperdine Way, Highton	Built: Residence	No, 225 m north
HO158	'Greystanes' House 2 Brassey Avenue, Highton	Built: Residence	No, 1 km NE
HO225	St Johns Anglican Church 269 Roslyn Road, Highton	Built: Religious	No, 1.5 km NE
HO232	'Shoubra' Residence 6A Keram Cresent, Highton	Built: Residence	No, 1.3 km NE
HO1725	Geelong Christian College, Junior Campus 39-47 Broughton Avenue, Belmont	Built: Educational	No, 1.2 km SE
HO1726	Geelong Christian College, Middle Campus 18A &18-32 Burdekn Drive, Highton	Built: Educational	No, 90 m east
HO1730	Highton Primary School 212 Roslyn Road, Highton	Built: Educational	No, 1.5 km NE
HO1882	Residence 209 Roslyn Road, Belmont	Built: Residence	No, 1.9 km NE

Table 3.2: Historical Archaeological Reports Relevant to the study area

Author Date Report #	Description and Location	Results
Vines, G. 1996 #424	An archaeological survey for the construction of a water sports complex beside the Barwon River.	No historical sites were identified.

Author Date Report #	Description and Location	Results
Marshall, B. 1998 #562	An archaeological survey of Mount Brandon, a rural property near Buckley Falls on the Barwon River.	The general area and river frontage has a history of European occupation. The desktop assessment showed that the farm had undergone intensive agricultural uses, including ploughed fields, and a series of farm buildings had once been present. During the survey, areas where the homestead and other built structures were located were visible due to the position of existing tracks and the distribution of planted trees. Two historical sites were recorded. Mount Brandon 1 7721-0057: The top of the bluestone wall and the concrete water holding tanks which are thought to be as old as the former homestead (1840s). The exposed top of the walls are capped with bluestone blocks. Mount Brandon 2 7721-0058: A second site was found north of Mount Brandon 1. The second site was found towards the river and comprised the remains of the bluestone homestead (Roberts' Bluestone Cottage Site). The site consists of two crescent-shaped piles of bluestone rubble and associated artefacts including glass, pottery and metal fragments.
Vines, G. 1998 #591	An archaeological assessment of route options for the road crossing of the Barwon River between Belmont and Breakwater, Geelong.	The desktop assessment identified several sites in the vicinity of the study area, but none within. Areas of high historical potential were identified in some specific areas: along remnants of natural flood levees, beside billabongs, and the banks of the Barwon River and Waurn Ponds Creek. The higher eastern banks of the Barwon River were identified as being particularly sensitive as higher ground close to rich swamp and river resources were often preferred occupation sites. Historic sites in the area include industrial remains, railway bridges, aqueduct, and cottages.
Andrew Long & Associates 2000 #1141	An assessment of the Buckley Falls precinct to identify potential linkages between open space in Geelong within the existing trail system.	The desktop assessment identified 30 sites within a 10 km radius, one of them (Buckley Falls Pumping Station H7721-0001) is situated within the secondary impact zone. There has been sustained occupation of the area since the earliest days of settlement at Port Phillip. The Buckley Falls precinct brings together historical themes relating to early exploration, pastoralism, government bureaucracy, historical identities, engineering feats and industry. It was expected that other historical features such as fords, fences, arch deposits associated with historic use of the area may be found during the survey. No historical sites were recorded.
Marshall, B. 2001 #1265	An archaeological assessment for two proposed stormwater wetlands in the Buckley Falls area in Highton.	Buckley Falls was a focus of early European settlement. Barwon River was an important source of water for domestic, rural and industrial uses. No historic sites were identified during the assessment.
Light, A. and Schell, P. 2002. #1571	An archaeological survey of agricultural land on the south-eastern slopes of the Barrabool Hills.	The land has been predominantly used for pastoral and agricultural uses. Intensive cultivation practices occurred during the late 19th and 20th centuries. No historical sites were found.

Author Date Report #	Description and Location	Results
TerraCulture 2004a 2217a	An archaeological investigation between the Barwon River and Barrabool Road, Ceres, in the Barrabool Hills.	There has been a history of intense farming, livestock grazing and agricultural crops on the property. Much of the land was covered in vineyards and orchards following the establishment of the viticulture industry in the late 1840s. Highview and Siedel's Vineyard/Ceres Nursery (H7721-0082) lies adjacent to the study area. One site was found during the survey- Ceres Vineyard H7721-0241. The site was found at the junction of the two gullies in the north-western corner and extends 200 m south east. A windbreak of pine trees and a series of cobbled areas adjacent to boxthorn were also identified, and at the southern end there is a brick well adjacent to boxthorn, and patches of in situ cobbles and brick. A scatter of domestic and structural artefacts was found throughout the site. The remains are of a vineyard operated by Louis Niffnecker in the 1860s, and could relate to Glencairn Estate, in the south, which operated at same time. The potential location of two other historic sites were also discovered during the desktop assessment: Worland's Cottage and Wright's Structures.
TerraCulture 2004b 2217B	An archaeological investigation of a proposed soil fill site and sediment drop-out dam between the Barwon River and Barrabool Road in the Barrabool Hills.	There has been a history of intense farming, livestock grazing and agricultural crops on the property. A previous survey of the site identified a historic site known as Ceres Vineyard H7721-0024. The potential location of two other historic sites were also discovered during the desktop assessment: Worland's Cottage and Wright's Structures. No additional sites were identified.
Bullers, R. and Harbour, M. 2013 #4237	An archaeological survey for a proposed walking trail along the Barwon River at Highton	No new historical sites were located in the study area. Several features associated with previous pastoral occupation of the land were identified (trees, fence lines, fence posts), but none were considered to be of sufficient heritage significance for listing on State or local heritage registers. Two features outside the curtilage of H7721-0001 (Buckley Falls Pumping Station) were identified: a short length of water delivery pipe lying on the ground surface and the remains of what appears to be an earthen water race.

Appendix 4: Biodiversity Impact and Offset Report (BIOR), DELWP

Biodiversity assessment report

Biodiversity information for applications for permits to remove native vegetation under clause 52.16 or 52.17 of the Victoria Planning Provisions

Date of issue: **10 November 2015**

Time of issue: **10:58:19**

Property address	THORNHILL ROAD HIGHTON 3216
	176-194 THORNHILL ROAD HIGHTON 3216
	122A THORNHILL ROAD HIGHTON 3216
	176-194 THORNHILL ROAD WANDANA HEIGHTS 3216
	122A THORNHILL ROAD WANDANA HEIGHTS 3216

Summary of marked native vegetation

Risk-based pathway	**Low**
Total extent	0.224 ha
Remnant patches	
1	0.176 ha
2	0.024 ha
3	0.024 ha
Location risk	A

See Appendix 1 for risk-based pathway details

Offset requirements

If a permit is granted to remove the marked native vegetation, a requirement to obtain a native vegetation offset will be included in the permit conditions. The offset must meet the following requirements:

Offset type	General offset
Offset amount (general biodiversity equivalence units)	0.011
Offset attributes	
Vicinity	Corangamite Catchment Management Authority (CMA)
Minimum strategic biodiversity score	0.102
Strategic biodiversity score of marked native vegetation	0.128

See Appendix 2 for offset requirements details

Next steps

This proposal to remove native vegetation must meet the application requirements of the low risk-based pathway and it will be assessed in the low risk-based pathway.

If you wish to remove the marked native vegetation you are required to apply for a permit from your local council.

The Biodiversity assessment report should be submitted with your application for a permit to remove native vegetation you plan to remove, lop or destroy.

The Biodiversity assessment report provides the following information that is required to be provided with your application for a permit to remove native vegetation:

- The location of the site where native vegetation is to be removed.
- The area of the patch of native vegetation and/or the number of any scattered trees to be removed.
- Maps or plans containing information set out in the *Permitted clearing of native vegetation - Biodiversity assessment guidelines*.
- The risk-based pathway of the application for a permit to remove native vegetation.
- The strategic biodiversity score of the native vegetation to be removed.
- The offset requirements should a permit be granted to remove native vegetation.

If you have undertaken any permitted clearing on your property within the last five years contact DEPI to confirm offset requirements.

Additional information is required when submitting an application for a permit to remove native vegetation. Refer to the *Permitted clearing of native vegetation - Biodiversity assessment guidelines* for a full list of application requirements.

Maps of marked native vegetation

Marked native vegetation to be removed, lopped or destroyed

Legend

Marked native vegetation

Property boundary

N

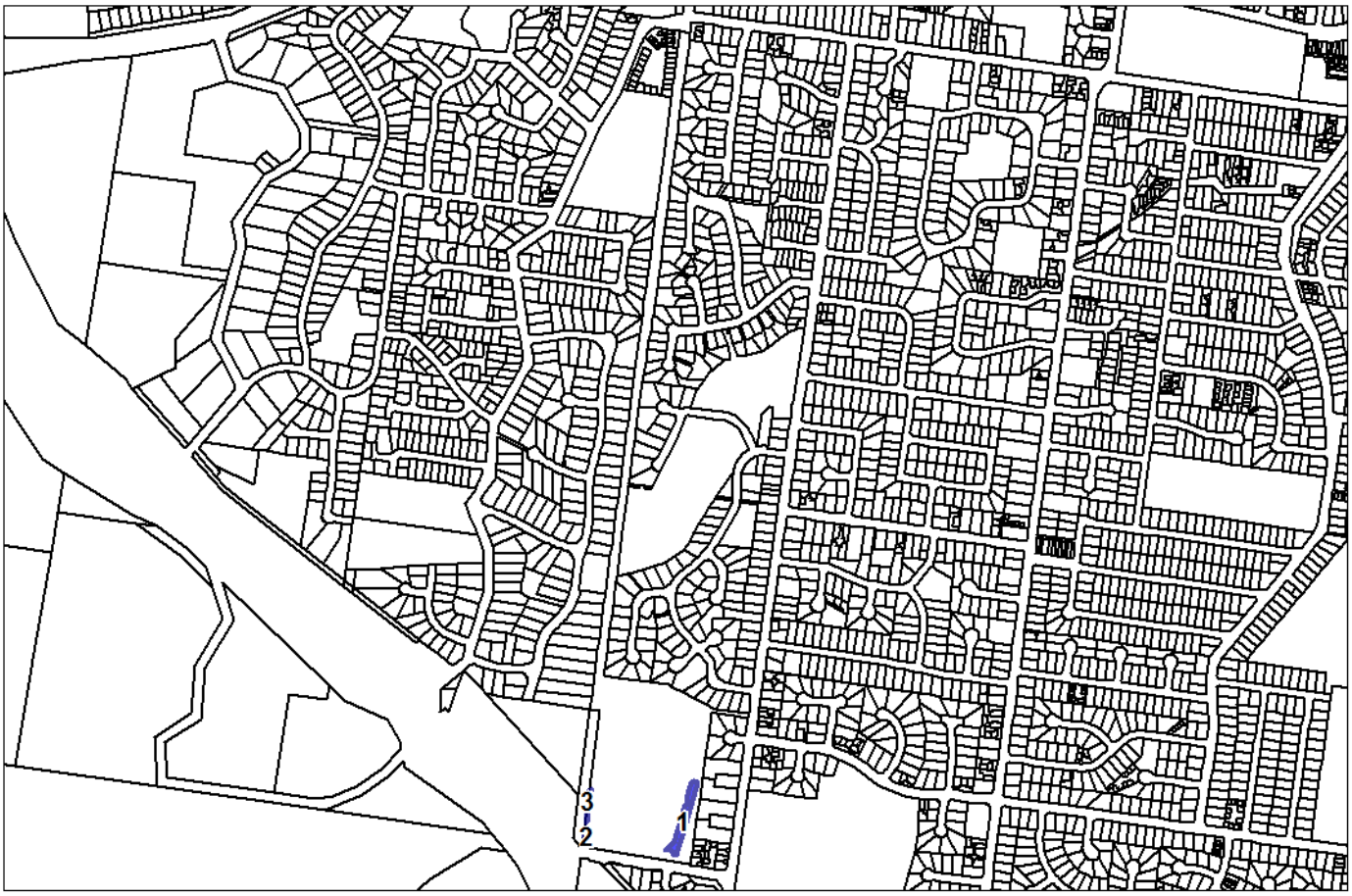
0 10 20 30

Metres

Department of Environment and Primary Industries

State Government Victoria

Property view of marked native vegetation



See Appendix 3 for biodiversity information maps

Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

For more information contact the DEPI Customer Service Centre 136 186

Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Obtaining this publication does not guarantee that an application will meet the requirements of clauses 52.16 or 52.17 of the Victoria Planning Provisions or that a permit to remove native vegetation will be granted.

Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of clauses 52.16 or 52.17 of the Victoria Planning Provisions.

www.depi.vic.gov.au

Department of Environment and Primary Industries
State Government Victoria

Appendix 1 - Risk-based pathway details

Risk-based pathway	**Low**
Total extent	0.224 ha
Remnant patches	
1	0.176 ha
2	0.024 ha
3	0.024 ha
Location risk	A

Why is the risk-based pathway low?

The following table explains how the risk-based pathway is determined:

Extent	Location A	Location B	Location C
< 0.5 hectares	Low	Low	High
≥ 0.5 hectares and < 1 hectares	Low	Moderate	High
≥ 1 hectares	Moderate	High	High

The marked native vegetation is located entirely within Location A and has a total extent of less than 0.5 hectares.

At this location, native vegetation removal of this size is not expected to have a significant impact on the habitat of any rare or threatened species. As a result, an application for the removal of this native vegetation must meet the requirements of, and will be assessed in, the low risk-based pathway.

For further information on location risk please see *Native vegetation location risk map factsheet*. For information on the determination of the risk-based pathway see *Permitted clearing of native vegetation – Biodiversity assessment guidelines*.

Have you received a planning permit to remove native vegetation in the last five years?

If you have undertaken any permitted clearing on your property within the last five years, the extent of this past clearing must be included in the total extent of your current permit application. The risk-based pathway for your application requirements and assessment pathway is determined using the combined extent of permitted clearing within the last five years and proposed clearing.

If the risk-based pathway determined from this combined extent is low, contact DEPI to confirm offset requirements.

Appendix 2 - Offset requirements details

If a permit is granted to remove the marked native vegetation the permit condition will include the requirement to obtain a native vegetation offset. This offset must meet the following requirements:

Offset type	General offset
Offset amount (general biodiversity equivalence units)	0.011
Offset attributes	
Vicinity	Corangamite Catchment Management Authority (CMA)
Minimum strategic biodiversity score	0.102
Strategic biodiversity score of marked native vegetation	0.128

Native vegetation to be removed		
Total extent (hectares) for calculating habitat hectares	0.224	This is the total area of the marked native vegetation in hectares. The total extent of native vegetation is an input to calculating the habitat hectares of a site and in calculating the general biodiversity equivalence score. Where the marked native vegetation includes scattered trees, each tree is converted to hectares using a standard area calculation of 0.071 hectares per tree.
Condition score*	0.244	This is the weighted average condition score of the marked native vegetation. This condition score has been calculated using the *Native vegetation condition map*. The condition score of native vegetation is a site-based measure of how close the native vegetation is to its mature natural state, as represented by a benchmark reflecting pre-settlement circumstances. The *Native vegetation condition map* is a modelled layer based on survey data combined with a benchmark model and a range of other environmental data.
Habitat hectares	0.055	Habitat hectares is a site-based measure that combines extent and condition of native vegetation. The habitat hectares of native vegetation is equal to the current condition of the vegetation (condition score) multiplied by the extent of native vegetation. Habitat hectares = total extent x condition
Strategic biodiversity score	0.128	This is the weighted average strategic biodiversity score of the marked native vegetation. This strategic biodiversity score has been calculated using the *Strategic biodiversity map*. The strategic biodiversity score of native vegetation is a measure of the native vegetation's importance for Victoria's biodiversity, relative to other locations across the landscape. The *Strategic biodiversity map* is a modelled layer that prioritises locations on the basis of rarity and level of depletion of the types of vegetation, species habitats, and condition and connectivity of native vegetation.

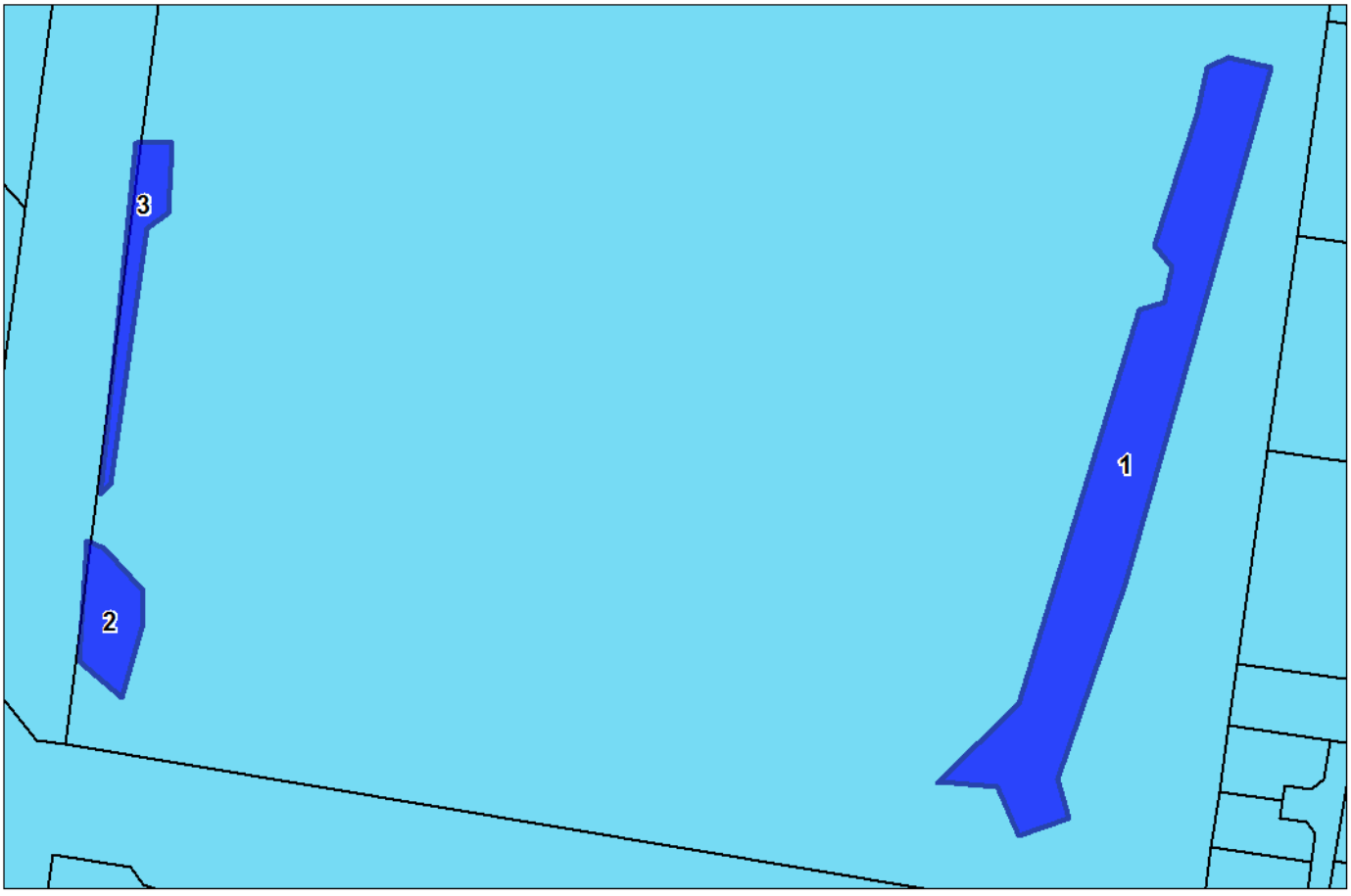
General biodiversity equivalence score	0.007	The general biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed (the marked native vegetation) makes to Victoria's biodiversity. It is calculated as follows: General biodiversity equivalence score = habitat hectares × strategic biodiversity score

* Offset requirements for partial clearing: If your proposal is to remove parts of the native vegetation in a remnant patch (for example only understorey plants) the condition score must be adjusted. This will require manual editing of the *condition score*, and an update to the following calculations that the biodiversity assessment tool has provided: *habitat hectares*, *general biodiversity equivalence score* and *offset amount*.

Offset requirements		
Offset type	General offset	A general offset is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have a significant impact on habitat for any rare or threatened species. All proposals in the low risk-based pathway will require a general offset.
Risk factor for general offsets	1.5	There is a risk that the gain from undertaking the offset will not adequately compensate for the loss from the removal of native vegetation. If this were to occur, despite obtaining an offset, the overall impact from removing native vegetation would result in a loss in the contribution that native vegetation makes to Victoria's biodiversity. To address the risk of offsets failing, an offset risk factor is applied to the calculated loss to biodiversity value from removing native vegetation.
Offset amount (general biodiversity equivalence units)	0.011	This is calculated by multiplying the general biodiversity equivalence score of the native vegetation to be removed by the risk factor for general offsets. This number is expressed in general biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation. Risk adjusted general biodiversity equivalence score = general biodiversity equivalence score $_{\text{clearing}}$ × 1.5
Minimum strategic biodiversity score	0.102	The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed. This is to ensure offsets are located in areas with a strategic value that is comparable to, or better than, the native vegetation to be removed.
Vicinity	Corangamite CMA	The offset site must be located within the same Catchment Management Authority boundary as the native vegetation to be removed.

Appendix 3 - Biodiversity information maps

Marked native vegetation and the *Native vegetation location risk map*



Legend

Marked native vegetation

Property boundary

Native vegetation location risk

Location C

Location B

Location A

N

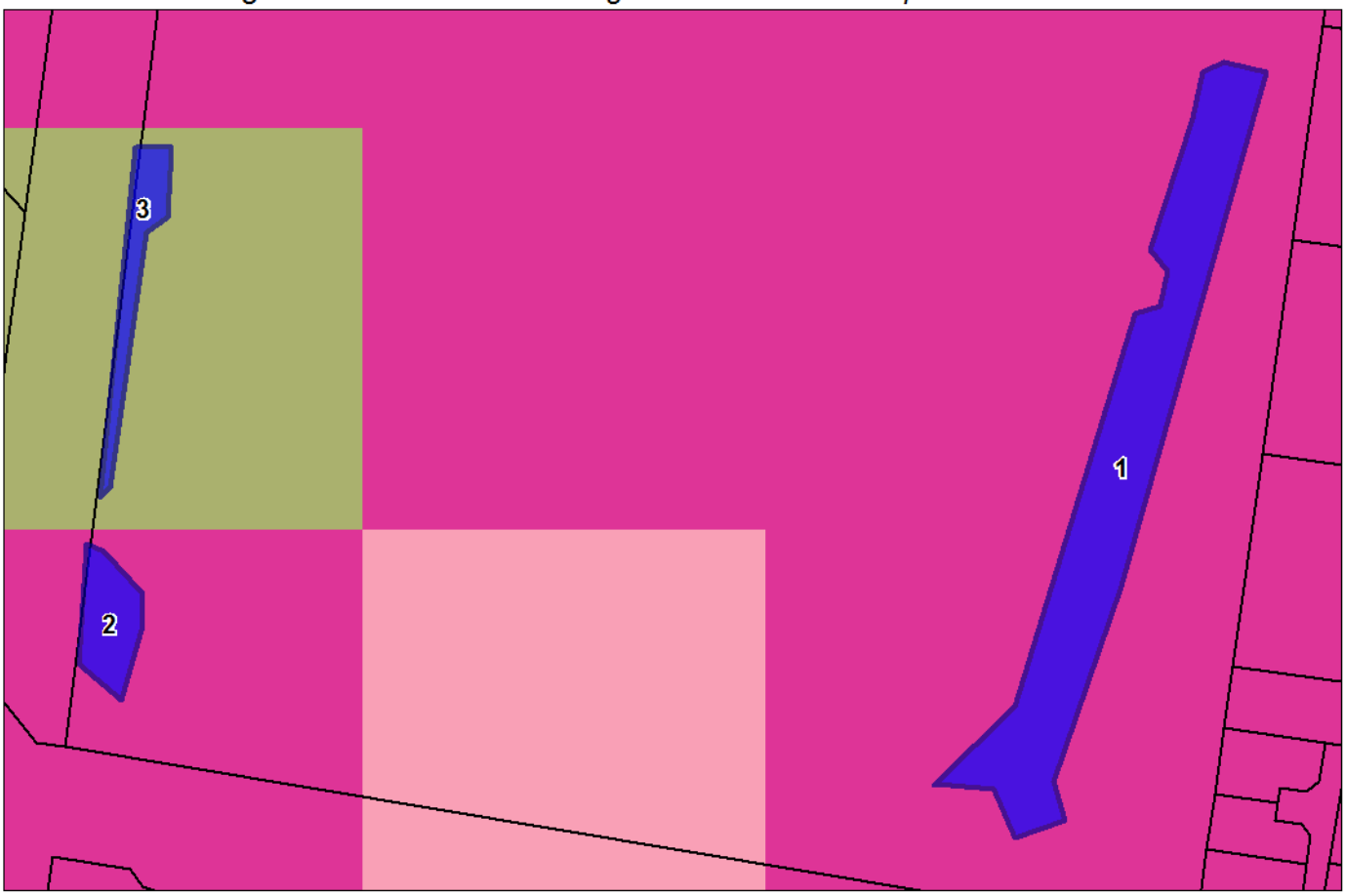
0 10 20 30

Metres

Department of Environment and Primary Industries

State Government Victoria

Marked native vegetation and the *Native vegetation condition map*



Legend

Marked native vegetation

Property boundary

Native vegetation condition*

0.81 - 1.00

0.61 - 0.80

0.41 - 0.60

0.21 - 0.40

0.00 - 0.20

* These classes are for display purposes only

N

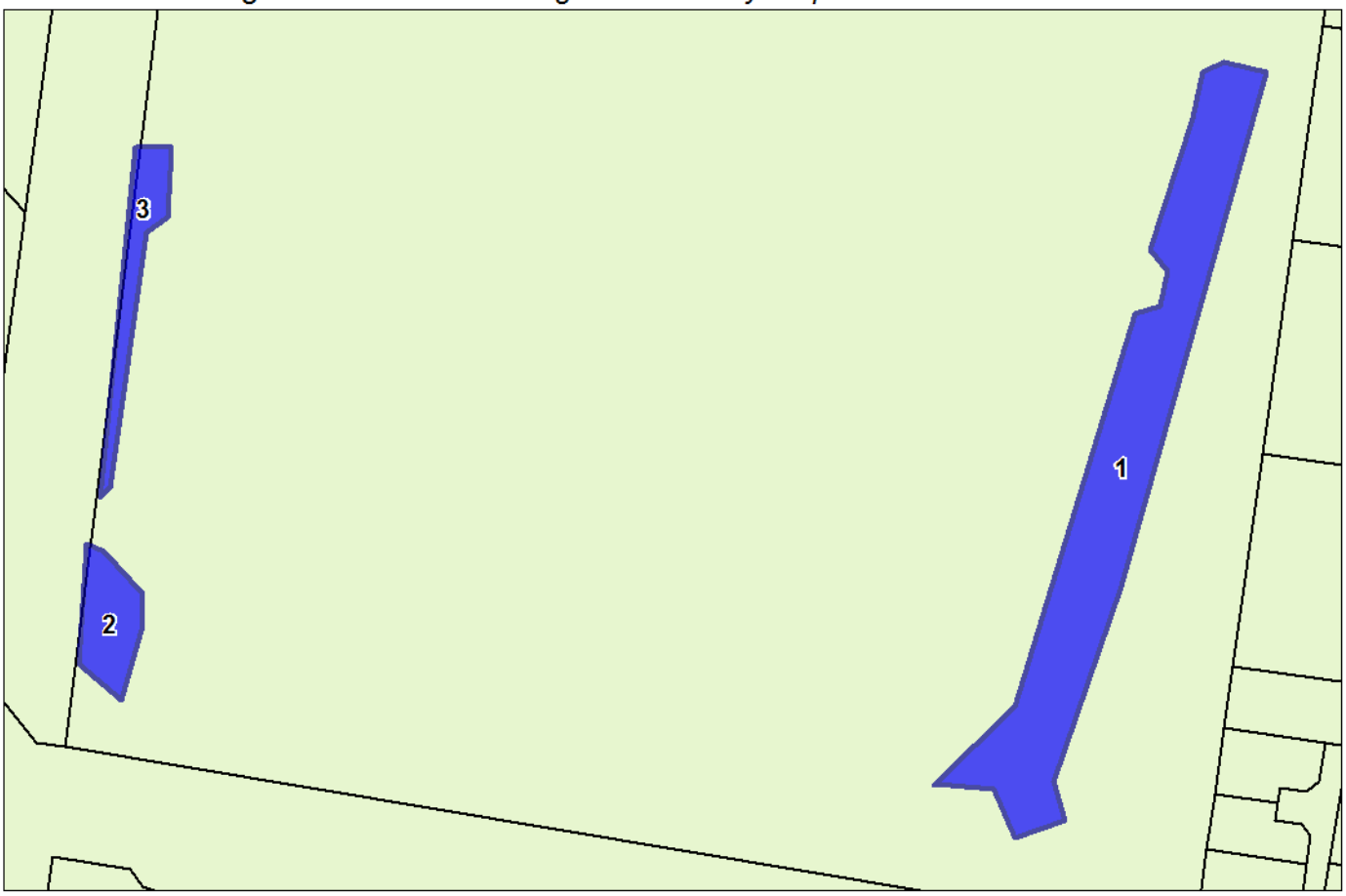
0 10 20 30

Metres

Department of Environment and Primary Industries

State Government Victoria

Marked native vegetation and the *Strategic biodiversity map*



Legend

Marked native vegetation

Property boundary

Strategic biodiversity score*

0.81 - 1.00

0.61 - 0.80

0.41 - 0.60

0.21 - 0.40

0.00 - 0.20

* These classes are for display purposes only

N

0 10 20 30

Metres

Department of Environment and Primary Industries

State Government Victoria