



**Biodiversity Assessment Report-
Contract Area 21**

Growth Areas Authority Biodiversity Mapping 2009-2011

Date 21/04/2010

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Growth Areas Authority Biodiversity Mapping Project: Biodiversity Assessment Report – Contract Area 21

For: The Growth Areas Authority

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EXECUTIVE SUMMARY

Overview of the Study Area

The Greenvale Activity Centre Contract Area 21 (CA 21) covers an area of approximately 73 ha, and is located within the catchment area of the Port Phillip and Western Port Catchment Management Authority, and within the Victorian Volcanic Plain Bioregion. The site is bounded by Mickleham Road to the west, and Somerton Road to the South. Greenvale Reservoir Park and Greenvale Reservoir are situated adjacent to the contract area to the east. An overview map of the study area is presented in Figure i (below).

Current land use is predominately low-density residential. Public open space exists to the east of the contract area (Greenvale Reservoir Park).



Figure i. Location and Overview Map of Contract Area 21. The Contract Area can be seen outlined in blue.

Methods

The following methods were used in the preparation of the report:

Literature and dataset review

- All relevant, available literature and environmental databases were reviewed, perhaps the most important of which are:
 - Atlas of Victorian Wildlife (AVW) records.
 - Flora Information System (FIS) records.
 - EPBC Act Protected Matters Search Tool.

Field Survey Techniques.

General Flora Survey

- The adaptive sampling method (Sutherland 2009) was adopted to survey for native flora.
- All terrestrial and aquatic habitat was surveyed.

Native Vegetation (Habitat Hectare Assessment)

- Remnant patches of vegetation were subjected to a quality Habitat Hectares assessment (Parkes *et al.* 2003, DSE 2004).
- The conservation significance of any native vegetation or flora species present on site was determined.

General Fauna Survey

The assessment for vertebrate fauna at the site involved:

- recording incidental records of all vertebrate fauna observed during the site inspection
- recording observations of habitat and potential habitat (or lack of)
- active search activities such as rock rolling, searching vegetation
- sampling using sign surveys to detect evidence of presence (e.g. scats, diggings, tracks and footprints) of vertebrate species.

Specifications of general fauna survey methodology are provided in Appendix A.

Targeted Surveys (Flora and Fauna)

- Targeted surveys for Matted Flax-lily were conducted. Specifications of targeted survey methodology are provided in Appendix B.

Likelihood of Threatened Species

- SMEC assessed the likelihood of the presence of national and state listed threatened species within the contract area. Categories of Likelihood include: Unlikely, Low, Moderate, High, and Present.

Results

SMEC did not identify any patches of remnant native vegetation as defined by the Department of Sustainability and Environment (DSE 2006b) within the contract area, and all vegetation was considered Degraded Treeless Vegetation or Non-native Vegetation as defined by DSE (DSE 2009). A total of three small scattered indigenous trees were

identified within the contract area, all of which were River Red Gum *Eucalyptus camaldulensis*. Vegetation assessment results are presented in Figure ii (below).

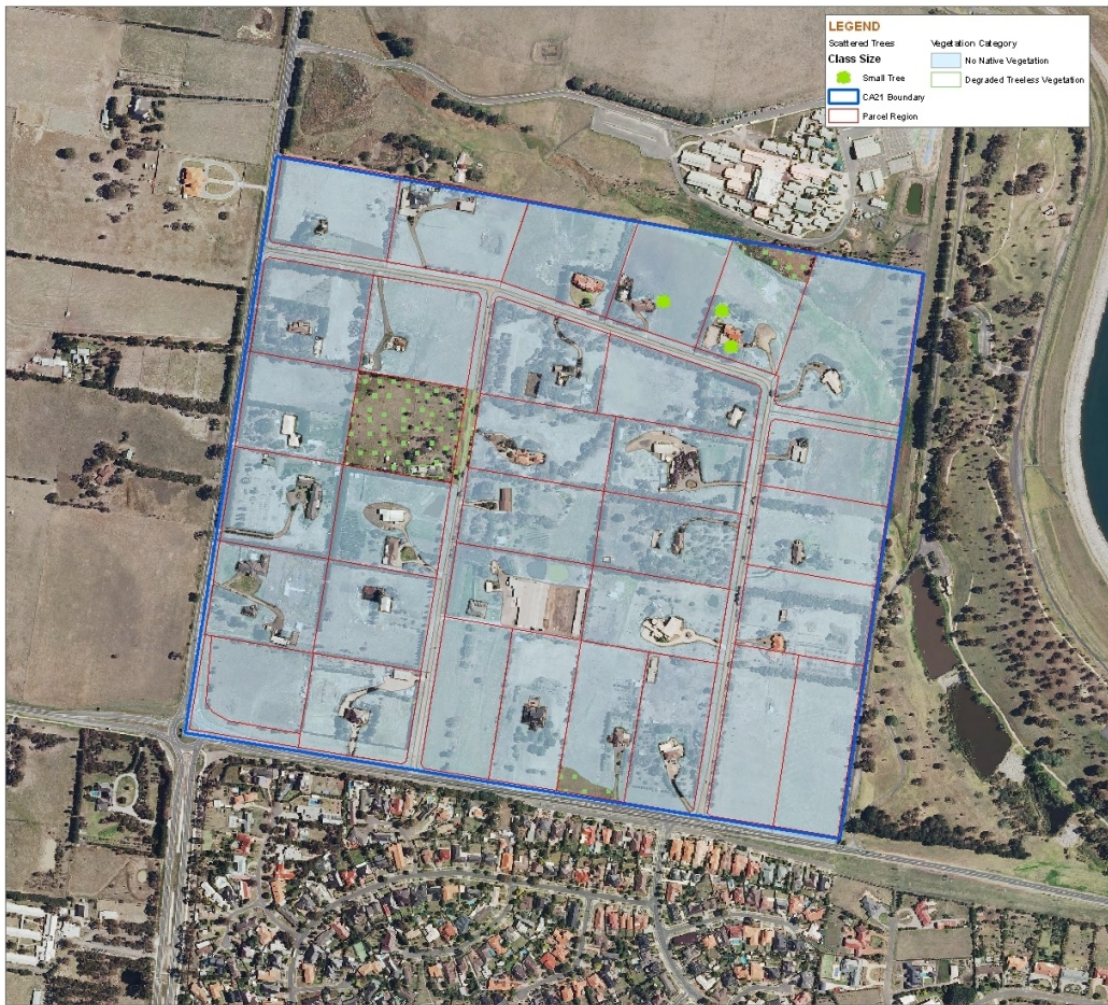


Figure ii. Vegetation Attributes assessed within Contract Area 21.

No nationally or state listed fauna or flora species were identified within the site, nor was any potential habitat for threatened flora and fauna species identified (see Figure iii, overleaf)

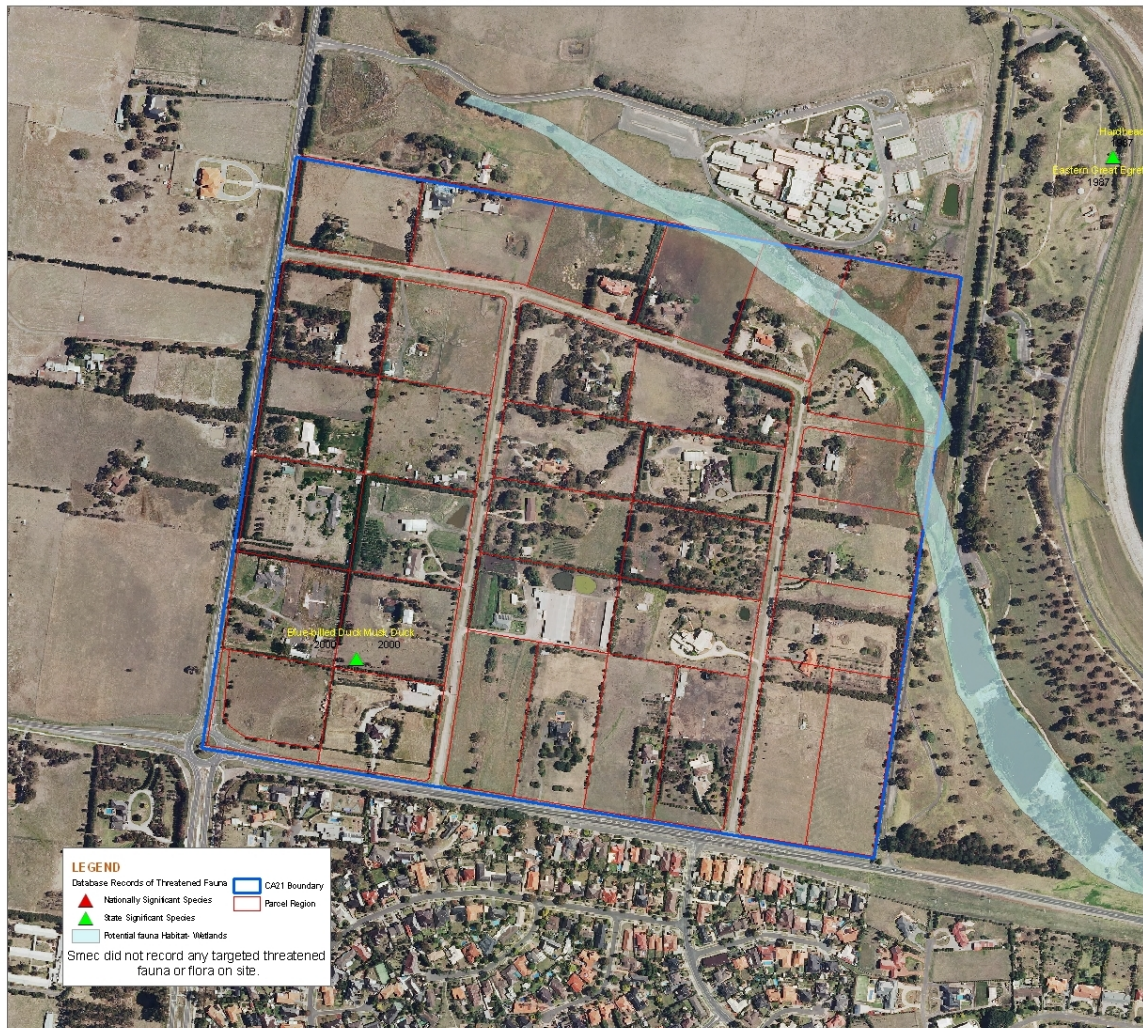


Figure iii. Habitat values identified within Contract Area 21.

Conclusion - Summary of key biodiversity issues and implications identified from the assessment

Contract Area 21 had very limited biodiversity value. This lack of biodiversity reduces the likely significance of the impact of future land use change on the contract area. The existing subdivision has significantly altered the biological value that the site would once have supported.

The likely impacts of any future development are likely to be restricted to the issues associated with increased housing densities on the site. These include:

- Modification to the natural drainage of the site.
- Introduction of urban activities which have the potential to result in stormwater runoff and contamination both on and off site.
- Increasing hard surfaces across the contract area which may increase the amount of surface runoff which may risk contaminating Yuroke Creek which passes through the North-eastern corner of CA 21.
- Indirect disturbance to Shankland Wetland south-east of CA 21 which is fed by Yuroke Creek, and has been identified as providing habitat for Growling Grass Frog *Litoria raniformis*, a national and state listed species. This is particularly

relevant to increased sediment loads, suspended solids and chemical run-off associated with urban development. These water quality parameters will be critical in determining the continued utilisation by Growling Grass Frogs and aquatic dependent birds such as Blue-billed Duck, Musk Ducks and Hardheads.

- Increased human activities in habitat areas causing disturbance to existing and re-constructed habitat zones.

Given the lack of biological value within the contract area, there is limited opportunity to mitigate potential development impacts through the protection of existing values. Instead, attention should be given to improving landscape function with a particular focus on improving the values associated with Yuroke Creek.

Water Sensitive Urban Design principles should be incorporated into the Precinct Structure Planning process, and this may result in a significant improvement to the value of Yuroke Creek, encouraging habitation of native aquatic faunal species, including, but not restricted to Growling Grass Frog *Litoria raniformis*.

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1 INTRODUCTION

1.1 Project Background

TO BE PROVIDED BY GAA

1.2 Assessment Objectives

The purpose of this assessment is to identify and quantify the biodiversity values found within Contract Area 21 (CA 21) in line with Victorian and Commonwealth policy and legislation, and to provide advice to the Growth Areas Authority to ensure consideration of such values during the Precinct Structure Planning process.

As an overview, this report aims to:

1. Identify, assess, and map significant flora, fauna, and habitat in the contract area and their level of conservation significance.
2. Collect data at sufficient detail and standard that enables a Precinct Structure Plan and Biodiversity Plan to be developed.
3. Provide advice on any works or management measures that may reduce adverse impacts of the development on species known or likely to occur in the contract area.
4. Ensure that development of the contract area is able to comply with Government legislative and policy requirements on the protection of indigenous fauna and flora species and communities.

1.3 Study Site (Contract Area 21)

The Greenvale Activity Centre Contract Area 21 (CA 21) covers an area of approximately 73 ha, and is located within the catchment area of the Port Phillip and Western Port Catchment Management Authority (PPWPCMA), and within the Victorian Volcanic Plain Bioregion. The site is bounded by Mickleham Road to the west, and Somerton Road to the South. Greenvale Reservoir Park and Greenvale Reservoir are situated adjacent to the contract area to the east (refer to Figure 1). Yuroke Creek runs through the north eastern corner of the contract area towards Greenvale Reservoir Park. The contract area overlies Tertiary newer volcanics and olivine basalt with minor limburgite, trachy-andesite, scoria and thin interbedded sand, clay and tuff.

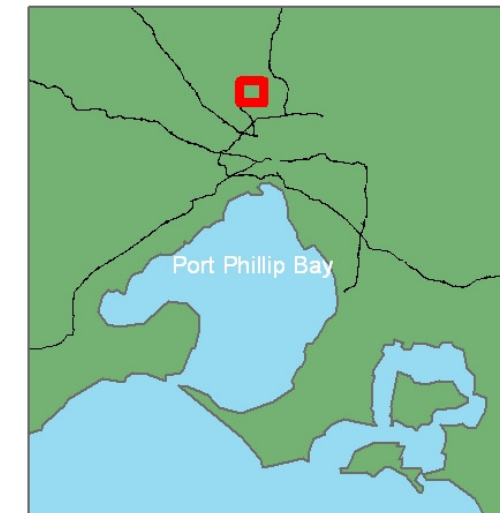
All land within this contract area has been extensively cleared and subdivided into 2 hectare lots. Vegetation is dominated by introduced ornamental garden trees, and pasture grass species, such as Wild Oat *Avena fatua*, Perennial Rye Grass *Lolium perenne*, and Toowoomba Canary Grass *Phalaris aquatica*. No remnant vegetation as defined by the Department of Sustainability and Environment (DSE, 2006b) exists within the contract area. Three small River Red Gum *Eucalyptus camaldulensis* were recorded within two properties in the north east of the contract area, however given their size, and the absence of any mature specimens, these trees are likely to have been planted.

Current land use within CA 21 can be classed as residential, however a number of properties are currently grazed with small numbers of sheep or goats. Public open space exists to the east of the contract area (Greenvale Reservoir Park) and to the north is an educational facility. Current land use to the west of the site is predominately agricultural, however a Precinct Structure Plan is currently being prepared for this land.

CA 21 is currently zoned as Rural Living Zone (RLZ), and contains no overlays.

The site doesn't support any species, vegetation communities, or other matters of national environmental significance listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

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LEGEND

- Major Roads
- Watercourse
- CA 21 Boundary
- Parcel Boundaries
- Parks and Reserves

<div style="display: inline-block; text-align: center;"> <p>PRELIMINARY</p> <p>1:20,000 @A3</p> </div>
<p>CONSULTANT:</p> <div style="text-align: center;"> <p>SMEC</p> <p>SMEC AUSTRALIA PTY LTD</p> <p>Level 5/71 Queens Road, Melbourne VIC 3004 T + 61 3 9514 1500 F + 61 3 9514 1502 Website: www.smec.com.au</p> </div>
<p>PROJECT:</p> <p style="text-align: center;">GAA Biodiversity Mapping 2009-2011</p>
<p>TITLE:</p> <p style="text-align: center;">Figure 1 - Location and Overview map of Contract Area 21</p>
<p>DRAWN BY: Christopher White DATE: 11.3.2010</p> <p>CHECKED BY: Rob Gratton DATE: 28.3.2010</p> <p>PROJECT MANAGER: Christopher White</p>
<p>DATA SOURCE:</p> <p><small>Data Source: VICMAP_IMAGERY © The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE) © The State of Victoria, Department of Sustainability and Environment. Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment</small></p>
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2 METHODS

2.1 Terminology

A full glossary of acronyms and terms used throughout the report can be found in Appendix F.

2.2 Literature and Database Review

Flora, fauna, habitat and related environmental values previously recorded within the assessment area were assessed via a literature and dataset review. The following databases, reports and search results were used to complete this assessment:

- Victoria:
 - Atlas of Victorian Wildlife (AVW)
 - Flora Information System (FIS)
 - Department of Sustainability and Environment (DSE) Advisory Lists
 - Ecological Vegetation Class (EVC) Spatial Dataset – Biodiversity Interactive Map (DSE website)
 - Actions for Biodiversity Conservation (threatened species)
 - Biosite database and databases available through DataMart
- Commonwealth:
 - EPBC Act Protected Matters Search Tool, EPBC Section of www.environment.com.au
 - EPBC Act Species Profiles and Threats Database (SPRAT)
 - EPBC Act National species Recovery Plans and Conservation Advices
- Aerial photos, topographic maps, and GIS information
- Relevant legislation, government policies and strategies
- Relevant published and unpublished work, including:
 - Sub Regional Fauna Surveys: Golden Sun Moth (Biosis Research, 2010)
 - Hume Fauna Study – The Vertebrate Fauna of Hume City (McLean and Wilson 2004)
 - Targeted surveys for Golden Sun Moth at 1770 Mickleham Road and 400 Somerton Road, Victoria (Ecology Partners, 2010).

2.2.1 Environment Protection And Biodiversity Conservation Act 1999 Protected Matters Search Tool

Matters of National Environmental Significance for the contract area were analysed on the 5 March 2010 using the Department of the Environment, Water, Heritage and the Arts (DEWHA) EPBC Act Protected Matters Search Tool. This tool lists those species or species habitat and vegetation communities that may occur, or are likely to occur within a 5km radius of the study area. Matters of National Environmental Significance identified include:

- 22 threatened flora and fauna species
- 11 listed marine species

- 13 migratory species
- 5 sites on the Register of the National Estate
- 3 threatened ecological communities – Grassy Eucalypt Woodland of the Victorian Volcanic Plain, Natural Temperate Grassland of the Victorian Volcanic Plain, and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

The complete Search Tool results are presented in Appendix C.

2.2.2 Threatened Flora And Fauna Data

2.2.2.1 Threatened Flora Records

The DSE's Flora Information System was used to obtain flora records within a 5km radius of the site (DSE 2007a). Refer to Appendix E for a complete list of these species.

2.2.2.2 Threatened Fauna Records

The DSE's Atlas of Victorian Wildlife was used to obtain fauna records within a 5km radius of the site (DSE 2007b). Refer to Appendix E for a complete list of these species.

2.3 Field Survey Techniques

The field survey aimed to validate the findings from the desktop assessment and identify any remnant patches, scattered indigenous trees and flora and fauna species. A targeted threatened species survey was also carried out. The conservation significance of any native vegetation or flora or fauna species present on site was also determined.

The field survey followed procedures developed by DSE (DSE 2009) and the *Biodiversity Guidelines* developed by Vic Roads (Vic Roads 2005). Field surveys were undertaken by qualified and experienced Botanists and Zoologists all of whom had undertaken extensive habitat-hectare training, provided by DSE. The contract area was surveyed between 1 November 2009 and 10 December 2009. This falls within the optimal period for ecological surveys given many plants are in flower and warmer weather promotes increased faunal activity.

2.3.1 General Flora Survey

The adaptive sampling method outlined by Sutherland (2009) was adopted to survey native flora. All terrestrial and aquatic areas were surveyed to identify the range of botanical values occurring within the contract area. Where flora identification was difficult in the field, a sample of the species was taken to aid in later identification. A number of authoritative texts and databases were utilized to identify flora samples. Each of these is documented in the reference section of this report.

The spatial location of all significant plant species were mapped and potential habitat areas recorded.

2.3.2 Native Vegetation (Habitat Hectare Assessment)

Where present, remnant patches of native vegetation (as defined by DSE) were identified and mapped and subjected to a quality assessment. In order for vegetation to be considered a 'remnant patch' under the Framework it must meet certain criteria, these being:

An area of vegetation, with or without trees, where less than 75% of the total understorey plant cover is weeds or non-native plants (bare ground not included). That is at least 25% of the understorey is native; or

A group (3 or more) of trees where the canopy cover is at least 20% (DSE 2006b).¹

All location and class size of all scattered indigenous trees were recorded, the definition of a scattered tree being:

Canopy trees within an area where at least 75% of the total understorey plant cover is weeds or non-native plants and the overall canopy cover for a group (3 or more) is less than 20% (DSE 2006b).

A vegetation quality assessment of remnant patches was undertaken using the Habitat Hectares methodology (Parkes *et al.* 2003, DSE 2004) and scattered trees assessed following *Victoria's Native Vegetation Management: A Framework for Action* guidelines. The conservation significance of any native vegetation or flora species present on site was determined in line with Victorian and Commonwealth policy and legislation, including the Framework. For any rare or threatened species likely to be present or for which the habitat could be important, the habitat was classified as constituting the best 50% of habitat for a particular species, or the remaining 50% of habitat for the species in accordance with Table 5, Page 53 of *Victoria's Native Vegetation Management: A Framework for Action*.

2.3.3 General Fauna Survey

The assessment for vertebrate fauna at the site involved recording incidental records of all vertebrate fauna observed during the site inspection, and recording observations of habitat and potential habitat (or lack of), such as vegetation type, structure and / or other habitat niches, tree hollows, water sources, leaf litter, rocks and rock walls, movement links and corridors. This specifically involved identifying and examining habitat resources available within the site and active search activities such as rock rolling, searching vegetation, and searching amongst debris and other potential refuge sites. Sampling also included using sign surveys to detect evidence of presence (e.g. scats, diggings, tracks and footprints) of vertebrate species. These non invasive techniques primarily targeted terrestrial vertebrates, in particular mammals and herpetofauna. Avian fauna were sampled using direct observation and call recognition. Specifications of general fauna survey methodology are provided in Appendix A.

2.3.4 Targeted Surveys (Flora and Fauna)

Matted Flax-lily *Dianella amoena* was targeted during the assessment. Appendix B outlines the agreed approach to surveys for significant flora species throughout Contract Area 21. No targeted fauna surveys were required as part of the assessment.

2.4 Limitations

This assessment has been undertaken to provide a broad overview of biodiversity assets within the study site. The survey effort, combined with information available from other sources, is considered suitable to assess the overall ecological values of the site. However, the following limitations apply:

- The identification of flora relies on readily available diagnostic material such as leaves, fruits and buds. In the case of woody plants and trees, bark form and colour and species provenance can also be used as diagnostic characteristics. On all

¹ *Indigenous canopy trees include all tree species that typically form part of the canopy as per the relevant EVC benchmark that are ≥ 1.3m in height at the time of the assessment and meet the DBH thresholds.*

sites, varying degrees of non-uniformity of flora and fauna habitats are encountered. Hence no sampling technique can totally eliminate the possibility that a species is present on a site (e.g. species of plant present in the seed bank). Furthermore, the survey was undertaken outside the optimal time for detecting some species (e.g. flowering periods of some terrestrial cryptic orchids and grasses).

- The conclusions in this report are based upon data acquired for the site and the environmental field surveys and are, therefore, merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of species. Also, it should be recognised that site conditions, including the presence of threatened species, can change with time.
- Mapping was conducted using hand-held (uncorrected) Trimble GPS units and aerial photo interpretation. The accuracy of uncorrected GPS is subject to the accuracy of the unit and access to satellite information (generally < 6 metres). As such, these points should not be relied on for design purposes.
- SMEC were not contracted to conduct targeted fauna surveys for this contract area. Incidental threatened fauna species records were noted at the time of field survey. It is noted however that the current land use, coupled with the lack of remnant vegetation suggests the likelihood of threatened fauna habitation of the site is low.
- SMEC were not required to record the Diameter at Breast Height (DBH) of scattered indigenous trees within the contract area. As per Figure 7 of the Port Phillip and Western Port Native Vegetation Plan (2006), the replacement ratio for small scattered trees depends on the DBH of the tree being removed. As no DBH was recorded, SMEC are unable to provide replacement ratios for the removal of small scattered trees within the contract area.

2.5 Likelihood of Threatened Species

As with most biological assessments, the presence or absence of particular species of flora or fauna over time cannot be definitively determined by a single site assessment. SMEC has developed a method to assess the likelihood of the presence of national and state listed threatened species within a site. This method identifies the habitat requirements of species of conservation significance with the potential to occur on site, as identified during the desktop assessment. Based on the outcomes of the field surveys SMEC then examines whether the site contains any suitable habitat for individual species and then assesses the likelihood of species occurrence based on those results.

Likelihood categories provided include:

- Unlikely: No preferred habitat on the site. Species unlikely to be present on the site at any time or season.
- Low: Some of the preferred habitat present on the site. Species may infrequently visit the site on-route for foraging but will not roost or otherwise depend on habitats on the site for their survival. Migratory and aerial foraging birds may overfly the site.
- Moderate: Site contains some of the preferred habitat to support a population of the species.
- High: Site contains the preferred habitat which is likely to support a population of the species, including roost sites.
- Present: Species directly observed on the site or recently recorded at the site. Preferred habitat is present on the site.

This process is to be used as a guide and is NOT to be used as indicating species presence or absence.

3 BIODIVERSITY ASSESSMENT RESULTS

This section presents the findings from the Biodiversity Assessment.

3.1 Literature Review

3.1.1 Sub Regional Fauna Surveys

The Growth Areas Authority commissioned sub-regional surveys for one nationally and state listed threatened fauna species, Golden Sun Moth *Synemon plana* in 2009-2010. The results of this survey are detailed below.

3.1.1.1 Golden Sun Moth *Synemon plana*

Biosis Research (2010) were contracted to undertake a sub-regional survey for Golden Sun Moth within CA 21 in December 2009. However, a drive-by assessment of the contract area in addition to assessments of CA 21 conducted by SMEC lead Biosis Research to conclude that the contract area had low potential to support Golden Sun Moth as it is a low-density residential area of small hobby farms with largely exotic vegetation and planted trees. Biosis Research concluded that while there was a small possibility of Golden Sun Moth occurring within the contract area, a survey was not undertaken due to the unsuitable nature of the habitat and the difficulty in gaining access to small properties within the limited timeframe of survey.

3.1.2 Targeted surveys for the Golden Sun Moth *Synemon plana* at 1770 Mickleham Road and 400 Somerton Road, Victoria (Ecology Partners, 2010)

Ecology Partners were commissioned to undertake targeted surveys for Golden Sun Moth at two properties in Mickleham and Greenvale. While neither of these properties falls within the boundary of Contract Area 21, one of the locations is situated less than 1km north of CA 21. Golden Sun Moth was recorded within both of the properties surveyed. In particular, in the far south-west corner of the Mickleham Road property (i.e. the closest property to CA 21), 88 male moths were recorded in the 2009-2010 survey. This area was found to be dominated by Chilean Needle-grass *Nassella neesiana* interspersed with native grass species.

3.1.3 Hume Fauna Study – The Vertebrate Fauna of Hume City (McLean and Wilson, 2004)

The Hume Fauna Study was commissioned to identify the diversity, distribution and abundance of vertebrate fauna within the Hume Local Government Area (LGA) prior to management plans being devised to protect and enhance the vertebrate fauna of Hume. Data collection for the study was limited to desktop analysis, and found that 266 vertebrate species have been recorded within the Hume LGA since European settlement, 22 of which have been identified as being vulnerable, rare or threatened in Victoria. These include species such as Growling Grass Frog *Litoria raniformis*, Red-chested Button-quail *Turnix pyrrhorthorax*, Fat-tailed Dunnart *Sminthopsis crassicaudata* and Cattle Egret *Ardea ibis*. In particular, Shankland Wetlands south-east of Contract Area 21 was highlighted as providing key habitat for Growling Grass Frog.

The Hume Fauna Study identified three main threats to the biodiversity of vertebrate fauna within the Hume LGA, including habitat degradation, feral species and increasing urbanisation and existing agricultural land uses in Hume. In response to these threats, the study provides key recommendations for the Hume LGA, including:

- ongoing research and database maintenance
- education and community engagement
- conservation strategies
- strategic land-use planning.

3.2 Flora

3.2.1 General Flora survey

Very little native vegetation persists within the contract area. The vegetation observed was dominated by exotic species particularly pasture grass species such as Perennial Rye Grass *Lolium perenne*, Toowoomba Canary Grass *Phalaris aquatica* and Wild oat *Avena fatua* (refer to Plate 3.1 and Plate 3.2). Indigenous native species were scattered throughout the contract area, including native grass and herb species, such as Sheep's Burr *Acaena echinata*, Windmill Grass *Chloris truncata* and Common Wallaby grass *Austrodanthonia caespitosa*. Few native trees are remaining, with a small number of River Red Gum *Eucalyptus camaldulensis*, Black Wattle *Acacia mearnsii* and Blackwood *Acacia melanoxylon* scattered around the contract area. What overstorey is present is dominated by planted non-indigenous natives and exotics, such as Sugar Gum *Eucalyptus cladocalyx*, and exotic Peppercorn tree *Schinus molle*, Monterey Cypress *Cupressus macrocarpa*, and Desert Ash *Fraxinus angustifolia*.



Plate 3.1. Vegetation lining Yuroke Creek, which runs through the north eastern corner of the contract area. Much of the creek is degraded, and dominated by exotic vegetation.



Plate 3.2. Vegetation typical of the contract area, with few native flora species present.

3.2.1.1 Flora species recorded

In total 85 flora species were recorded on-site, including 14 indigenous natives, 7 non-indigenous natives and 64 exotic species, refer to Appendix D for the complete list of species recorded on site.

3.2.1.2 Threatened flora species or communities

Two threatened flora species were identified within the contract area, Giant Honey-myrtle *Melaleuca armillaris* subsp. *armillaris* and Buxton Gum *Eucalyptus crenulata*. However, both of these species are not considered indigenous to the contract area and are likely to be planted. No other threatened flora species were considered likely to occur within CA 21 (refer to Figure 4.1, Appendix G).

The likelihood of occurrence of threatened flora species at the site can be found in Appendix E.

An EPBC Act protected matters report was generated for CA 21, highlighting a number of matters of environmental significance known to occur within a 5km buffer surrounding the contract area. Three threatened ecological communities were identified within or near the contract area. These include:

- Natural Temperate Grassland of the Victorian Volcanic Plain (Critically Endangered);
- White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered); and
- Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered).

Given that no patches of remnant vegetation were found within the contract area, SMEC consider it unlikely that the contract area supports any of these threatened communities.

3.2.1.3 Best or remaining 50% habitat for rare and threatened flora species OR Likelihood of threatened flora species

Given the paucity of native vegetation within the study area, and low likelihood of the existence of threatened species, none of the habitat within CA 21 comprises best OR remaining 50% habitat for threatened flora species.

3.2.2 Vegetation

3.2.2.1 Ecological Vegetation Classes

DSE mapping of Ecological Vegetation Classes within Contract Area 21 show that little native vegetation is predicted to occur within the contract area. Small patches of EVC 55: Plains Grassy Woodland are modelled on the eastern and western boundaries of CA 21, however field validation revealed none of the vegetation within the contract area met the definition of a remnant patch as per DSE criteria.

3.3 Habitat Hectare Assessment

The following section provides an inventory of the extent, quality and conservation significance of the native vegetation present within Contract Area 21.

3.3.1 Scattered Trees

A total of three (3) 'Scattered Trees' (as defined by DSE 2006b) were recorded from the entire contract area. All scattered trees are presented in Figure 2.1, Appendix G. All three trees were River Red Gum.

The size class of scattered indigenous trees was determined by the EVC Benchmark 55 – Plains Grassy Woodland as per methods prescribed by DSE. Size categories are provided below:

- Small tree (ST) – those trees with a DBH between 20 - 60 cm
- Medium old tree (MOT) – those trees with a DBH between 60 – 80cm
- Large old tree (LOT) – those trees with a DBH between 80 - 120cm
- Very Large old tree (VLOT) – those trees with a DBH >120cm.

All of the scattered trees identified across the contract area were Small (refer to Table 3.1). Under the Port Phillip and Western Port Native Vegetation Plan (PPWP CMA 2006) the conservation significance of Small scattered trees is 'Low'.

Table 3.1: Scattered Trees within Contract Area 21.

Scattered Tree Number	Species	Common Name	Size of Tree*	Conservation Status	Conservation Significance	Datum: VicGrid_94		Map No.
						Latitude	Longitude	
1	<i>Eucalyptus camaldulensis</i>	River Red Gum	Small	Endangered	Low	-37.6300	144.8900	Fig. 1.1 (C2)
2	<i>Eucalyptus camaldulensis</i>	River Red Gum	Small	Endangered	Low	-37.6295	144.8900	Fig. 1.1 (D2)
3	<i>Eucalyptus camaldulensis</i>	River Red Gum	Small	Endangered	Low	-37.6294	144.8890	Fig. 1.1 (D2)

*Size categories defined by the relevant EVC benchmark.

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3.3.2 Habitat Zones

No zones of vegetation (i.e. Habitat Zones) were identified across the contract area (refer to Figure 1.1, Appendix G). Therefore, a quantitative assessment of vegetation quality was not undertaken. All vegetation on site was considered to be Degraded Treeless Vegetation, or Non-native Vegetation as defined by DSE (DSE 2007c, DSE 2009). Vegetation within the contract area was mapped and is presented in Appendix G.

3.4 Targeted Flora

One flora species of conservation significance was targeted as part of the assessment, Matted Flax-lily *Dianella amoena*. Targeted surveys failed to detect any occurrences of the species within the contract area.

Details of the surveys undertaken are provided in Table 3.2 below.

Table 3.2: Details of targeted flora surveys within Contract Area 21.

Assessor	Survey Dates/Times	Site Conditions	Species Surveyed	Type of Survey	Duration of Survey	Properties Not Assessed
Christopher White & Mark Cairns	7.12.2009	Warm and Sunny conditions, ground surface temperature of 23°C	Matted Flax Lily	Targeted	8 hrs	N/A

3.5 Fauna

3.5.1 Fauna habitats

The extent of fauna habitat within CA 21 is largely restricted to non-indigenous and exotic vegetation dominated within an urban context. This is exemplified by the lack of any remnant patches found within the study area. Similarly, the diversity of fauna found within the site showed a distinct lack of native species in comparison to exotic and feral species. The contract area may provide habitat to those native species capable of taking advantage of non-indigenous and exotic plantings and adapting to the urban environment, such as the Red Wattle Bird *Anthochaera carunculata*, Noisy Miner *Manorina melanocephala* and Common Ringtail Possum *Pseudocheirus peregrinus*, all of which were recorded within CA 21. All native species found in CA 21 occur continuously through neighbouring areas within a dominantly urban and semi-urban landscape.

3.5.2 Fauna species

3.5.2.1 Fauna species recorded

During the field survey, fauna observed, encountered or detected using other indirect means were noted and are subsequently presented in Appendix D. A total of 27 species were encountered, of which 19 (70%) were native. The proportion and diversity of native species is considered low and typical of urban environments.

3.5.2.2 Threatened Fauna Species

No threatened fauna species were detected within the contract area during the survey period (refer to Figure 5.1, Appendix G). While some migratory species, such as Latham's Snipe *Gallinago hardwickii* may utilise wet grassy areas of the contract area on a transient basis, SMEC consider it unlikely that CA 21 supports any threatened fauna species and additional survey effort is unlikely to detect target species given the lack of

native vegetation and habitat values present within the contract area (refer to Figure 6.1, Appendix G).

The likelihood of occurrence of threatened fauna species within a 5km radius of the study area can be found in Appendix E. Threatened species likely to occur in habitat areas adjacent CA 21 is discussed in section 4.2 below.

3.5.2.3 Best or remaining 50% habitat for rare and threatened fauna species OR Likelihood of threatened fauna species

Given the paucity of native vegetation within the study area, and low likelihood of the existence of threatened species, none of the habitat within CA 21 comprises best OR remaining 50% habitat for threatened fauna species.

3.6 Targeted Fauna

SMEC were not required to undertake any targeted fauna surveys within Contract Area 21.

4 RELEVANT POLICY AND LEGISLATION

4.1 Commonwealth

4.1.1 Environmental Protection and Biodiversity Conservation Act 1999

One of the main aims of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is to provide for the conservation of biodiversity and the protection of the environment, particularly those aspects that are considered to be matters of national environmental significance. The Act defines seven matters of national environmental significance, these are:

- World Heritage properties
- National Heritage places
- Wetlands of International Importance
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth marine areas
- Nuclear actions (including uranium mines).

Under the Act, actions that are likely to have a significant impact upon matters of national environmental significance require approval from the Environment Minister to undertake those actions. An action includes any project, development, undertaking, activity or series of activities.

Those matters considered relevant to development within the Contract Area 21 are:

- listed threatened species and communities
- listed migratory species.

While no records exist within the boundary of the contract area, SMEC consider Growling Grass Frog to have some likelihood of occurrence within CA 21, particularly in habitat associated with Yuroke Creek in the north-east corner. Sections of the creek immediately downstream to the east of CA 21 where deeper artificial impoundments (Brodies Lakes) have been created may continue to support threatened species as they have in the past. Historic records for Growling Grass Frogs have been recorded in Brodies Lakes, and further downstream in and around the confluence of Yuroke Creek and the Shankland Wetlands drainage line that runs through Roxburgh Park and Meadow Heights. There are also records for Growling Grass Frog on Yuroke Creek in West Meadows, and further south along Moonee Ponds Creek.

One migratory species, Latham's Snipe, is considered to have a moderate likelihood of occurrence within the contract area. This species may occupy grassy wet patches of the contract area on a transient basis, such as areas along Yuroke Creek.

4.2 State

4.2.1 Planning And Environment Act 1987

The *Planning and Environment Act 1987* (PE Act) establishes the framework for the use, development and protection of land in Victoria. The Act provides for the preparation of standard provisions for planning schemes which are administered by local government. The purpose of the Planning Scheme is to:

- Provide a clear and consistent framework within which decisions about the use and development of land can be made.
- Express state, regional and local community expectations for areas and land uses.
- Provide for the implementation of state, regional and local policies affecting land use and development.

A number of clauses under the Shire of Hume Planning Scheme are relevant to the proposed Contract Area 21 development and these are summarised below.

4.2.1.1 Conservation Of Native Flora And Fauna (Clause 15.09-2)

Decision-making by planning and responsible authorities should:

- *Assist the protection of conservation values of national parks and conservation reserves.*
- *Assist the conservation of the habitats of threatened and endangered species and communities as identified under the Flora and Fauna Guarantee Act 1988, including communities under-represented in conservation reserves such as native grasslands, grassy woodlands and wetlands.*
- *Address potentially threatening processes identified under the Flora and Fauna Guarantee Act 1988.*
- *Assist re-establishment of links between isolated habitat remnants.*

Contract Area 21 is currently zoned Rural Living Zone (RLZ) and thus has no specific environmental requirements.

4.2.2 Flora And Fauna Guarantee Act 1988

The *Victorian Flora and Fauna Guarantee Act 1988* (FFG Act) was established to provide a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes. One of the main features of the Act is the listing process, whereby native species and communities of flora and fauna, and the processes that threaten native flora and fauna are listed in the schedules of the Act. This assists in identifying those species and communities that require management to survive, and identifies the processes that require management to minimise the threat to native flora and fauna species and communities within Victoria.

A permit from DSE is required to 'take' listed flora species that are members of listed communities or protected flora from public land. A permit is not required under the *FFG Act* for private land, unless listed species are present and the land is declared 'critical habitat' for the species. No FFG Listed species were recorded across the contract area, however one record of an FFG listed fauna species exists within the contract area boundary, Blue-billed Duck *Oxyura australis*. This is likely to be attributed to an occurrence in a house dam in 2000 during favourable rainfall period. Almost all house dams were found to be dry as a result of the extended drought period during the survey period. The Blue-billed Duck, and similarly the Musk Duck, are both diving species and are dependent upon deep permanent pools with substantial area of emergent vegetation to support foraging and breeding activities. SMEC consider this species unlikely to occur within the contract area given that this section of Yuroke creek does support any deep permanent pools. The occurrence of these species is likely to occur only in the adjacent Greenvale Reservoir Reserve intermittently in favourable years both in the reservoir itself in the northern sections of suitable water depth gradient, and in the artificial lakes created on Yuroke Creek.

While no records exist within the boundary of the contract area, SMEC consider Growling Grass Frog to have some likelihood of occurrence within CA 21, particularly in habitat

associated with the small section of Yuroke Creek. Higher rainfall seasons may create substantial water bodies that may persist for longer periods (>6 months) that may support suitable foraging habitat. In exceptionally good years Yuroke Creek may provide breeding habitat for this species where water bodies may persist for 12 months or more.

Given the paucity of suitable habitat within CA21 the occurrence of species such as the Growling Grass Frog, Blue-billed Duck, Musk Duck and Eastern Great Egret are considered an artefact of association with the neighbouring habitat zones associated with Greenvale Reservoir Reserve, and further south east in the Shankland Wetland areas.

4.2.3 Environmental Effects Act 1978

Under Victoria's *Environmental Effects Act 1978* (EEA), projects that could have a 'significant effect' on Victoria's environment can potentially require an Environmental Effect Statement (EES). This Act applies to any public works 'reasonably considered to have or be capable of having a significant effect on the environment. The Minister for Planning and Environment is the responsible person for assessing whether this Act applies. Before commencing any public works to which this Act applies, the proponent must cause an EES to be prepared and submit it to the Minister for the Minister's assessment of the environmental effects of the works.

4.2.4 Environmental Protection Act 1970

The *Environment Protection Act 1970* deals with the whole of the environment in a systematic and integrated way. The Act is outcome oriented, with a basic philosophy of preventing pollution and environmental damage by setting environmental quality objectives and establishing programs to meet them. Key aims of the Act include sustainable use and holistic management of the environment, ensuring consultative processes are adopted so that community input is a key driver of environment protection goals and programs and encouraging a co-operative approach to environment protection.

4.2.4.1 State Environmental Protection Policy (Waters Of Victoria) 2003

The SEPP (Waters of Victoria) sets a statutory framework for the protection of the uses and values of Victoria's fresh and marine water environments (EPA 2003.). Requirements of the *Environment Protection Act 1970* SEPP include:

- The uses and values of the water environment that the community and the government want to protect (known as beneficial uses).
- The objectives and indicators which describe the environmental quality required to protect beneficial uses.
- Guidance to CMA's coastal boards, water authorities, communities, businesses and local government and state government agencies to protect and rehabilitate water environments to a level where environmental objectives are met and beneficial uses are protected.

The SEPP recognises that human's use of Victoria's land and water resources has affected the health of the aquatic environment to such an extent that threatens the very features that make them valuable. The most imminent threats include excess nutrients, suspended solids, salinity, reduced environmental flows and altered flow regimes, heavy metals and oils, aquatic pests and other threats.

There are no significant rivers, creeks or water bodies relevant to this act within Contract Area 21, however development within this contract area needs to be cognisant of the SEPP (Waters of Victoria).

4.2.5 Catchment And Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (CaLP Act) is the principle legislation relating to the management of pest plants and animals in Victoria. Under this Act, landowners have a responsibility to avoid causing or contributing to land degradation, including taking all reasonable steps to conserve soil, protect water resources, eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds and where possible, eradicate established pest animals, as declared under the Act. Requirements under this Act are of particular relevance during construction.

Thirteen (13) CaLP listed noxious weeds were recorded within CA 21. The CaLP listing category of these weeds is presented in Table 4.3 below.

Table 4.3: Noxious weeds recorded within Contract Area 21.

Scientific name	Common name	CaLP listing
<i>Cirsium vulgare</i>	Spear Thistle	Regionally Prohibited, Regionally Controlled, and Restricted
<i>Crataegus monogyna</i>	Hawthorn	Regionally Controlled, and Restricted
<i>Cynara cardunculus</i>	Artichoke Thistle	Regionally Prohibited, Regionally Controlled, and Restricted
<i>Echium plantagineum</i>	Paterson's Curse	Regionally Controlled, and Restricted
<i>Foeniculum vulgare</i>	Fennel	Regionally Controlled, and Restricted
<i>Juncus acutus</i>	Spike Rush	Regionally Controlled, and Restricted
<i>Lycium ferocissimum</i>	African Boxthorn	Regionally Controlled
<i>Nassella neesiana</i>	Chilean Needle-grass	Regionally Controlled
<i>Nassella trichotoma</i>	Serrated Tussock	Regionally Prohibited, and Regionally Controlled
<i>Onopordum acanthium</i> subsp. <i>acanthium</i>	Scotch Thistle	Regionally Prohibited, Regionally Controlled, and Restricted
<i>Opuntia stricta</i>	Common Prickly Pear	Regionally Prohibited, Regionally Controlled, and Restricted
<i>Oxalis pes-caprae</i>	Soursob	Restricted
<i>Rosa rubiginosa</i>	Sweet Briar	Regionally Controlled, and Restricted

These species have specific requirements under the Act with regards to management and control and should be considered during planning and development of the contract area.

4.2.6 Wildlife Act 1975

The *Wildlife Act 1975* forms the procedural, administrative and operational basis for the protection and conservation of native wildlife within Victoria. This Act often sits as the default reference for other associated legislation, and is the basis for the majority of Wildlife permit / licensing requirements within the state. In accordance with this Act, if any wildlife are located within vegetation proposed for clearing, salvage and translocation of such wildlife may be needed.

4.2.7 Victoria's Native Vegetation Management Framework: A Framework for Action

During the planning stage of any development, the proponent is required to take into account the principles of Net Gain as outlined in the Framework to achieve a sustainable increase in the quality and quantity of indigenous vegetation across the Victorian landscape (DNRE 2002). The key principles of Net Gain are discussed in further detail below.

Step 1: avoid adverse impacts, particularly through vegetation clearance.

The objectives of the first step in the 'Three-step Approach' to achieving Net Gain, is to avoid native vegetation clearance where possible. For example, where possible the design should be modified to limit impacts on native vegetation and in particular higher value areas.

Step 2: where impacts cannot be avoided, explore appropriate options to minimise those impacts.

Where clearing of vegetation cannot be avoided, appropriate modification to the development design may provide opportunities for minimising the impact of any necessary vegetation clearance, or clearing of scattered trees.

Step 3: identify appropriate offset options in response to clearing.

Where it is determined that clearing of native vegetation cannot be avoided, an offset must be supplied in response to such clearing.

In addition to vegetation offsets, under the Framework an offset is required for the removal of large old trees within habitat zones (DNRE 2002). The offset is dependent upon the size of the tree proposed for removal and its conservation significance. Under the Framework, the following offsets are required for the removal of large old trees (LOT):

- In areas of 'Very High' conservation significance: Protect 8 LOT and recruit 40 new trees.
- In areas of 'High' conservation significance: Protect 4 LOT and recruit 20 new trees.
- In areas of 'Medium' conservation significance: Protect 2 LOT and recruit 10 new trees.
- In areas of 'Low' conservation significance: No specific other LOT protection offsets are required.

Where scattered trees are removed the Framework defaults to the relevant Native Vegetation Plan, in this case the Port Phillip and Western Port Native Vegetation Plan (PPWP CMA 2006). Under the PPWP NVP the offset required for the removal of large old trees within habitat zones reflects that of the Framework.

In addition to planning overlays, under Clause 52.17 of the City of Hume Planning Scheme DSE is a mandatory referral authority for vegetation clearance which involves:

- Removal of more than 15 trees with a diameter less than 40 cm at 1.3 metres above ground.
- Removal of more than five trees with a diameter more than 40 cm at 1.3 metres above ground.
- Removal of more than 0.5 hectares of vegetation in an Ecological Vegetation Class with Bioregional Conservation Status of Endangered, Vulnerable or Rare.

- Removal of more than one hectare of vegetation in an Ecological Vegetation Class with Bioregional Conservation Status of Depleted or Least Concern.
- Any vegetation clearance on Crown Land or where a property vegetation plan applies to the site.
- Any vegetation clearance where a Vegetation Protection Overlay applies to the site.

However Clause 52.17-1, stipulates that if the land in question incorporates a Native Vegetation Precinct Plan (NVPP), then it may be excluded from any further requirements of Clause 52.17. A NVPP sets out requirements for the protection and removal of native vegetation for a defined area or precinct in accordance with the principles of Net Gain, discussed above. The plan can form a component of a PSP with other development requirements. Under clause 52.16 a NVPP must:

- Specify the purpose of the plan.
- Specify the area to which the plan applies.
- Specify the native vegetation which can be removed, destroyed or lopped.
- Specify the native vegetation to be protected.
- Set out the conservation significance and status of the native vegetation to be protected, and the vegetation protection objective to be achieved.
- Set out the works, payments or other actions necessary to offset the removal, destruction or lopping of native vegetation.
- Relate the need for the works, payments or other actions to the proposed removal, destruction or lopping of native vegetation in the area.
- Provide for the procedures for the collection of any payments.

It is SMEC's understanding that an NVPP will be developed for Contract Area 21 in accordance with Clause 52.16 and in consultation with DSE. The NVPP will be incorporated into the City of Hume planning scheme and will replace the requirement to obtain a permit to remove native vegetation under Clause 52.17 of the planning scheme.

4.2.8 Port Phillip and Western Port Native Vegetation Plan

The Port Phillip and Western Port Native Vegetation Plan (PPWPVNP) implements a co-ordinated and strategic approach to managing native vegetation within the PPWCMA region. This approach is consistent with the Framework (DNRE 2002). The *Native Vegetation Plan* sets out 4 key strategic directions and associated aspirational targets and management actions for the region.

Broadly, these are:

- To minimise clearance of native vegetation.
- Permanently protect at least 15 % of the current area of each EVC.
- Maintain and improve the quality of native vegetation by the total 'Habitat Hectares' within the region being increased by 10 % by 2030.
- Increase the total extent of native vegetation to at least 35 % of the region's area; and at least 95 % of the region's EVC's represented to at least 10 % if their pre-1750 extent by 2030.

Under the Framework regional vegetation plans are required to be used as a reference document in providing guidelines for responsible authorities (usually local councils) in determining permit applications to remove, destroy or lop native vegetation. The Framework further allows for the regional vegetation plans to increase the minimum requirements for any vegetation offsets in response to vegetation removal.

In particular, the proponent must demonstrate that:

- The removal of native vegetation has been avoided where practical.
- Where avoidance of native vegetation cannot be achieved, techniques to minimise impacts have been implemented.
- Native vegetation offsets have been provided where necessary to compensate for the removal of native vegetation.

4.2.9 Victoria's Biodiversity Strategy

The Biodiversity Strategy complements the National Strategy and the *Flora and Fauna Guarantee Act 1988*. This Strategy demonstrates how conserving biodiversity is a part of everyday life and how many of our actions can affect biodiversity. It provides the overarching direction for biodiversity conservation and management in Victoria. The Biodiversity Strategy is coordinated with other natural resources management mechanisms such as Regional Catchment Strategies, Regional Forest Agreements, and National Parks and Reserve planning. The goals for biodiversity management are to ensure that within Victoria:

- There is a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a net gain with the first target being no net loss by the year 2001.
- The ecological processes and the biodiversity dependent upon terrestrial, freshwater and marine environments are maintained and, where necessary, restored.
- The present diversity of species and ecological communities and their viability is maintained or improved across each bioregion.
- There is no further preventable decline in the viability of any rare species or of any rare ecological community.
- There is an increase in the viability of threatened species and in the extent and quality of threatened ecological communities.

Development within the contract area should be cognisant with the goals of Victoria's Biodiversity Strategy.

4.3 Local Government

4.3.1 Local Planning Scheme

The site is located within the Hume City Council LGA . Under the Local Government Planning Scheme (Hume City Council), the study area is defined as a Rural Living Zone (RLZ), and is not covered by any Planning Overlays.

4.3.2 Local Planning Policies/Strategies

4.3.2.1 Sustainable Land Management And Integrated Weed Control Strategy 2003-2006

Hume City Council previously developed and implemented two Integrated Weed Strategies, one from 1996-1999, the other from 1999-2002. The strategies were focused on ongoing implementation of weed management on Council Land and improving weed control across Hume City by working with and educating landholders. The strategy integrates farm planning as a whole and sustainable land management practices to promote more effective land management, including weed control and broader issues such as pest animal control.

The strategy incorporates seven key elements, including local education programs, advocacy and enforcement of weed control, incentives for landowners, research and dissemination of results, strategic initiatives and responses, council's on-ground works program, and integrated pest animal management. The overall goal of the strategy is to minimise the current and future impacts of land degradation including weed and pest animal infestation on production and environmental values of land within Hume City. Furthermore, the plan incorporates a Pest Animal Action Plan 2005-2007, which sets out to minimise the current and future impacts of foxes and rabbits on the production, environmental and social values of land within Hume City.

Development within the contract area should be cognisant with the goals of Strategy, and it's associated Action Plans.

4.3.2.2 Hume City Council - Pathways to Sustainability and Environmental Framework 2008

In 2008, Hume City Council reviewed its Environmental Sustainability Framework. The vision of the Framework is to create a prosperous, sustainable and vibrant city, renowned for social justice, lifelong learning and community inclusion. The revised Framework incorporates 5 pathways:

1. Create sustainable places.
2. Support communities to live and work sustainably.
3. Support sustainability learning and action.
4. Build Council sustainability leadership.
5. Provide strong environmental stewardship.

The Framework is a key Council document, guiding Council's decision-making and delivery of services and programs. The Framework supports the Hume City Plan 2030 and the Council Plan, and is delivered through four-yearly Action Plans. Development within the contract area should be cognisant with the Pathways to Sustainability and Environmental Framework, and it's associated Action Plans.

5 KEY BIODIVERSITY ISSUES AND IMPLICATIONS IDENTIFIED FROM THE ASSESSMENT

The very limited biodiversity value within CA 21 reduces the likely significance of the impact of future land use change on the contract area. As stated previously, the subdivision that has already occurred across the contract area has significantly altered the biological value that the site would once have supported.

The likely impacts of any future development are likely to be restricted to the issues associated with increased housing densities on the site. These include:

- Modification to the natural drainage of the site.
- Introduction of urban activities which have the potential to result in stormwater runoff and contamination both on and off site.
- Increasing hard surfaces across the contract area which may increase the amount of surface runoff which may risk contaminating Yuroke Creek which passes through the North-eastern corner of CA 21.
- Indirect disturbance to Shankland Wetland south-east of CA 21 which is fed by Yuroke Creek, and has been identified as providing habitat for Growling Grass Frog *Litoria raniformis*, a nationally and state listed species. This is particularly relevant to increased sediment loads, suspended solids and chemical run-off associated with urban development. These water quality parameters will be critical in determining the continued utilisation by Growling Grass Frogs and aquatic dependent birds such as Blue-billed Duck, Musk Ducks and Hardheads.
- Increased human activities in habitat areas causing disturbance to existing and re-constructed habitat zones.

5.1 Opportunities to reduce potential impacts

Opportunities to reduce the potential impact of the future development on the contract area should focus on improving the ecological functionality of the site, post construction. There is very limited opportunity to mitigate impacts through the protection of existing values.

5.2 Opportunities to protect and enhance local and regional biodiversity values

Given the lack of biodiversity assets within the site worth conserving, attention should instead be paid to actively improving landscape function, with a particular focus on Yuroke creek.

SMEC have made a number of recommendations aimed at improving the ecological value of CA 21. These include:

- Incorporating the riparian zone of Yuroke Creek into the Precinct Structure Plan as Public Open Space, providing a continuous link with Greenvale Reservoir Park.
- Undertake targeted revegetation works with indigenous species along Yuroke Creek to create an ecological link with Greenvale Reservoir Park.

- Protect Yuroke Creek from likely increased runoff and sedimentation as a result of development to maximise the potential of aquatic fauna to utilise the habitat created through revegetation works, and where possible improve water quality in existing habitats downstream on Yuroke Creek.
- Utilize WSUD and revegetation works associated with development in and around Yuroke Creek to create structurally suitable habitat for species such as the Growling Grass Frog, Blue-billed Duck, and Musk Duck to expand the potential areas for foraging and breeding that are already associated with adjacent areas.

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6 CONCLUSION

Any biodiversity values that may once have been present within CA 21 have been severely degraded by the relatively recent residential land use at the site, and longer term history of agriculture.

No remnant vegetation as defined by the Native Vegetation Framework remains within CA 21, with vegetation dominated by introduced, ornamental tree species, with an understorey dominated by pasture grass species. Targeted survey for Matted Flax-lily did not reveal the presence of the species, nor any potential habitat.

Given the lack of biological value within the contract area, there is limited opportunity to mitigate potential development impacts through the protection of existing values. Instead, attention should be paid to improving landscape function with a particular focus on improving the values associated with Yuroke Creek.

Water Sensitive Urban Design principles should be incorporated into the Precinct Structure Planning process, and this may result in a significant improvement to the value of Yuroke Creek, encouraging habitation of native aquatic faunal species, including, but not restricted to Growling Grass Frog.

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APPENDIX A: GENERAL FAUNA SURVEY METHODOLOGY SPECIFICATIONS

Terrestrial mammals

Survey effort varied depending on the particular characteristics of the property, such as size, topography, vegetation type or types and structure. All habitat types were surveyed within each assessed properties. Non-invasive methods were used, such as visual identification, searches, and the identification of potential habitat. No mammal trapping was conducted.

Arboreal mammals

Arboreal mammals were surveyed by spotlighting over a maximum of 3 consecutive nights, for approximately 30 minutes at a time for each habitat type, unless the habitat type was less than 1 hectare in size, where surveys were shorter in duration. Any other signs of habitation were recorded, such as scratch marks on tree trunks and around hollows, audible calls, or scats on the ground.

Reptiles and amphibians

Prior to survey potential habitat was identified, including rocky outcrops, spider and cricket burrows, trees, dams, low lying or wetter areas and fallen timber. Survey effort included rock-rolling, with care taken to minimise disturbance to habitat by carefully replacing any material that was moved.

Survey for amphibian species were conducted along Yuroke Creek and house dams at night using call recognition and spotlight to detect presence. Surveys were also conducted during the day in conjunction with vegetation assessments, with areas of potential habitat surveyed for audible and visual signs of amphibian species. Surveys were primarily conducted when temperatures exceeded 20 – 25°C, as many native amphibian species are more active under these conditions.

Invertebrates

Survey for invertebrate species involved traversing potential habitat such as native grasslands to watch for actively flying individuals (e.g. Golden Sun Moth) and to locate/identify indicator species (e.g. Ants). Surveys were primarily conducted mid-morning and / or when temperatures ranged between 18 - 25°C.

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APPENDIX B: TARGETED SURVEY METHODOLOGY SPECIFICATIONS (FLORA & FAUNA)

Targeted flora surveys

As per the contract, the following significant flora were targeted within Contract Area 21:

- Matted Flax-lily *Dianella amoena*.

The targeted field survey followed DSE guidelines as per the contract (DSE 2009), and involved surveying grassy areas including paddocks, remnant grasslands, and stony areas in early Summer when flowering material meant plants were easily identifiable if present.

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APPENDIX C: EPBC ACT PROTECTED MATTERS SEARCH TOOL RESULTS



Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: [Environment Home](#) > [EPBC Act](#) > [Search](#)

5 March 2010 08:26

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the [caveat](#) at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at <http://www.environment.gov.au/atlas> may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

Search Type: Area
Buffer: 5 km
Coordinates: -37.627359,144.883081, -37.629138,144.892682, -37.638071,144.891577, -37.634629,144.881578



This map may contain data which are
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(Geoscience Australia)
© PSMA Australia Limited

Report Contents: [Summary](#)
[Details](#)
[Matters of NES](#)
[Other matters protected by the EPBC Act](#)
[Extra Information](#)
[Caveat](#)
[Acknowledgments](#)

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	3

http://www.environment.gov.au/cgi-bin/erin/ert/epbc/epbc_report.pl?searchtype=area:1... 5/03/2010

Threatened Species:	22
Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

Commonwealth Lands:	2
Commonwealth Heritage Places:	None
Places on the RNE:	5
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

Threatened Ecological Communities [Dataset Information]	Status	Type of Presence
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	Community known to occur within area
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area
Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Anthochaera phrygia	Endangered	Species or species habitat may occur within

http://www.environment.gov.au/cgi-bin/erin/ert/epbc/epbc_report.pl?searchtype=area;1... 5/03/2010

Regent Honeyeater	area	
Lathamus discolor	Endangered	Species or species habitat likely to occur within area
Swift Parrot		
Rostratula australis	Vulnerable	Species or species habitat may occur within area
Australian Painted Snipe		
Frogs		
Litoria raniformis	Vulnerable	Species or species habitat known to occur within area
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog		
Insects		
Synemon plana	Critically Endangered	Species or species habitat known to occur within area
Golden Sun Moth		
Mammals		
Dasypus maculatus maculatus (SE mainland population)	Endangered	Species or species habitat may occur within area
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)		
Perameles gunnii unnamed subsp.	Endangered	Translocated population known to occur within area
Eastern Barred Bandicoot (Mainland)		
Pteropus poliocephalus	Vulnerable	Species or species habitat likely to occur within area
Grey-headed Flying-fox		
Ray-finned fishes		
Galaxiella pusilla	Vulnerable	Species or species habitat likely to occur within area
Eastern Dwarf Galaxias, Dwarf Galaxias		
Prototroctes maraena	Vulnerable	Species or species habitat may occur within area
Australian Grayling		
Reptiles		
Delma impar	Vulnerable	Species or species habitat likely to occur within area
Striped Legless Lizard		
Typanocryptis pinguicolla	Endangered	Species or species habitat may occur within area
Grassland Earless Dragon		
Plants		
Amphibromus fluitans	Vulnerable	Species or species habitat may occur within area
River Swamp Wallaby-grass		
Carex tasmanica	Vulnerable	Species or species habitat likely to occur within area
Curly Sedge		
Dianella amoena	Endangered	Species or species habitat likely to occur within area
Matted Flax-lily		
Glycine latrobeana	Vulnerable	Species or species habitat likely to occur within area
Clover Glycine, Purple Clover		
Lachnagrostis adamsonii	Endangered	Species or species habitat likely to occur within area
Adamson's Blown-grass		
Lepidium hyssopifolium	Endangered	Species or species habitat likely to occur within area
Basalt Pepper-cress		
Pimelea spinescens subsp. spinescens	Critically Endangered	Species or species habitat may occur within area
Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea		
Prasophyllum frenchii	Endangered	Species or species habitat likely to occur within area
Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid		
Rutidosia leptorrhynchoides	Endangered	Species or species habitat likely to occur within area
Button Wrinklewort		
Senecio macrocarpus	Vulnerable	Species or species habitat likely to occur within area
Large-fruit Fireweed, Large-fruit Groundsel		
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		

http://www.environment.gov.au/cgi-bin/erin/ert/epbc/epbc_report.pl?searchtype=area;1... 5/03/2010

Birds

Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Breeding may occur within area
Xanthomyza phrygia Regent Honeyeater	Migratory	Species or species habitat may occur within area

Migratory Wetland Species**Birds**

Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area

Migratory Marine Birds

Apus pacificus Fork-tailed Swift	Migratory	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC ActListed Marine Species [[Dataset Information](#)]

	Status	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
Lathamus discolor Swift Parrot	Listed - overfly	Species or species habitat likely to occur within area

http://www.environment.gov.au/cgi-bin/erin/ert/epbc/epbc_report.pl?searchtype=area;1... 5/03/2010

Merops ornatus Rainbow Bee-eater	marine area Listed - overfly marine area	Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area

Commonwealth Lands [[Dataset Information](#)]

Defence

Unknown

Places on the RNE [[Dataset Information](#)]

Note that not all Indigenous sites may be listed.

Historic

[Bluestone Lockup VIC](#)

[Dunhelen Barn VIC](#)

[First Shire Hall VIC](#)

[Woodlands Homestead, Stables and Outbuildings VIC](#)

Natural

[Gellibrand Hill Park VIC](#)

Extra Information

Regional Forest Agreements [[Dataset Information](#)]

Note that all RFA areas including those still under consideration have been included.

West Victoria RFA, Victoria

Caveat

The information presented in this report has been provided by a range of data sources as [acknowledged](#) at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and

http://www.environment.gov.au/cgi-bin/erin/ert/epbc/epbc_report.pl?searchtype=area;1... 5/03/2010

detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the [migratory](#) and [marine](#) provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as [extinct or considered as vagrants](#)
- some species and ecological communities that have only recently been listed
- [some terrestrial species](#) that overfly the Commonwealth marine area
- migratory species that are very [widespread, vagrant, or only occur in small numbers](#).

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- [New South Wales National Parks and Wildlife Service](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Water and Environment, Tasmania](#)
- [Department of Environment and Heritage, South Australia Planning SA](#)
- [Parks and Wildlife Commission of the Northern Territory](#)
- [Environmental Protection Agency, Queensland](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- Other groups and individuals

[ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University](#) was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated: Thursday, 20-Nov-2008 14:17:56 EST

[Department of the Environment, Water, Heritage and the Arts](#)
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APPENDIX D: FLORA & FAUNA SPECIES RECORDED AS PART OF THE GENERAL AND TARGETED SURVEYS IN CONTRACT AREA 21

FLORA

Table D.4. Indigenous Flora species recorded as part of the general and targeted surveys in Contract Area 21.

Life form	Scientific name	Common name	Status		
			EPBC	DSE	FFG
Tree	Mimosaceae				
	<i>Acacia mearnsii</i>	Black Wattle			
	<i>Acacia melanoxylon</i>	Blackwood			
	Myrtaceae				
	<i>Eucalyptus camaldulensis</i>	River Red Gum			
Herb / Forb	Convolvulaceae				
	<i>Convolvulus erubescens</i>	Blushing Bindweed			
	Rosaceae				
	<i>Acaena echinata</i>	Sheep's Burr			
	<i>Acaena novae-zelandiae</i>	Bidgee Widgee			
Graminoid (grass-like plant)	Poaceae				
	<i>Austrodanthonia caespitosa</i>	Common Wallaby-grass			
	<i>Austrodanthonia racemosa</i>	Clustered Wallaby grass			
	<i>Austrostipa scabra</i>	Rough Spear-grass			
	<i>Austrostipa semibarbata</i>	Fibrous Spear-grass			
	<i>Chloris truncata</i>	Windmill Grass			
	<i>Lachnagrostis filiformis</i>	Common Blown-grass			
	<i>Phragmites australis</i>	Common Reed			
	Typhaceae				
	<i>Typha domingensis</i>	Narrow-leaf Cumbungi			

Table D.5. Non-indigenous and Exotic Flora species recorded as part of the general and targeted surveys in Contract Area 21.

Life form	Scientific name	Common name	Listed Status		
			EPBC	DSE	FFG
Non-indigenous native species			EPBC	DSE	FFG
Tree	Myrtaceae				
	<i>Callistemon citrinus</i>	Red bottle Brush			
	<i>Eucalyptus citriodora</i>	Lemon-scented Gum			
	<i>Eucalyptus cladocalyx</i>	Sugar Gum			
	<i>Eucalyptus crenulata</i>	Buxton Gum	Endangered	Endangered	Listed
	<i>Eucalyptus leucoxyton</i>	SA Blue Gum			
	<i>Eucalyptus polyanthemos</i>	Red Box			
	<i>Melaleuca armillaris</i>	Giant Honey-myrtle		Rare	

Life form	Scientific name	Common name	Listed Status
Exotic species		CaLP Listed species	
Tree	Anacardiaceae		
	<i>Schinus molle</i>	Peppercorn Tree	
	Cupressaceae		
	<i>Cupressus macrocarpa</i>	Monterey Cypress	
	Oleaceae		
	<i>Olea europaea</i>	Olive	
	<i>Fraxinus angustifolia</i>	Desert Ash	
	Pinaceae		
	<i>Pinus radiata</i>	Monterey Pine	
	<i>Pinus patula</i>	Patula Pine	
	Salicaceae		
	<i>Salix alba</i>	White Willow	
	<i>Salix babylonica</i>	Weeping Willow	
	Urticaceae		
	<i>Ulmus x hollandica</i>	Dutch Elm	
Shrub	Cactaceae		
	<i>Opuntia stricta</i>	Common Prickly Pear	✓
	Pittosporaceae		
	<i>Billardiera heterophylla</i>	Bluebell Creeper (WA)	
	<i>Pittosporum undulatum</i>	Sweet Pittosporum	
	Rosaceae		
	<i>Cotoneaster pannosus</i>	Silver-leaf Cotoneaster	
	<i>Crataegus monogyna</i>	Hawthorn	✓
	<i>Photinia serratifolia</i>	Hedge Photinia	
	<i>Prunus x domestica</i>	Plum	
	<i>Prunus persica</i>	Peach	
	<i>Prunus dulcis</i>	Almond	
	<i>Pyracantha crenulata</i>	Nepal Firethorn	
	<i>Rosa rubiginosa</i>	Sweet Briar	✓
	<i>Trifolium fragiferum</i>	Strawberry Clover	
Solanaceae			
<i>Lycium ferocissimum</i>	African Boxthorn	✓	
<i>Solanum mauritianum</i>	Tobacco Bush	✓	
Herb / Forb	Apiaceae		
	<i>Foeniculum vulgare</i>	Fennel	✓
	Asteraceae		
	<i>Cirsium vulgare</i>	Spear Thistle	✓
	<i>Cynara cardunculus</i>	Artichoke Thistle	✓
	<i>Hypochaeris radicata</i>	Cat's Ear	
	<i>Onopordum acanthium</i> subsp. <i>Acanthium</i>	Scotch Thistle	✓
	<i>Taraxacum officinale</i>	Garden Dandelion	
	Boraginaceae		
	<i>Echium plantagineum</i>	Paterson's Curse	✓
Brassicaceae			

Life form	Scientific name	Common name	Listed Status	
	<i>Brassica x juncea</i>	Indian Mustard		
	<i>Lepidium africanum</i>	Common Peppergrass		
	Chenopodiaceae			
	<i>Chenopodium album</i>	Fat Hen		
	<i>Trifolium angustifolium</i>	Narrow-leaved Clover		
	<i>Trifolium arvense</i>	Rabbit Foot Clover		
	Fumariaceae			
	<i>Fumaria muralis</i>	Wall Fumitory		
	Liliaceae			
	<i>Agapanthus praecox</i>	Agapanthus		
	Malvaceae			
	<i>Malva sylvestris</i>	Tall Mallow		
	Oxalidaceae			
	<i>Oxalis pes-caprae</i>	Sour Sob	✓	
	<i>Oxalis purpurea</i>	Large-flowered Wood sorrel		
	Plantaginaceae			
	<i>Plantago lanceolata</i>	Ribwort		
	Polygonaceae			
	<i>Acetosella vulgaris</i>	Sheep Sorrel		
	<i>Rumex brownii</i>	Slender Dock		
<i>Rumex crispus</i>	Curled Dock			
Graminoid (grass-like plant)	Iridaceae			
	<i>Romulea rosea</i> var. <i>australis</i>	Onion Grass		
	Poaceae			
	<i>Aira elegantissima</i>	Delicate Hairgrass		
	<i>Avena fatua</i>	Wild Oat		
	<i>Brachypodium distachyon</i>	False Brome		
	<i>Bromus catharticus</i>	Prairie Grass		
	<i>Bromus diandrus</i>	Great Brome		
	<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>	Soft Brome		
	<i>Cynodon dactylon</i>	Couch		
	<i>Dactylis glomerata</i>	Cocksfoot		
	<i>Ehrharta longiflora</i>	Annual Veldgrass		
	<i>Paspalum distichum</i>	Water Couch		
	<i>Holcus lanatus</i>	Yorkshire Fog		
	<i>Hordeum leporinum</i>	Barley Grass		
	<i>Juncus acutus</i>	Spike Rush	✓	
	<i>Lolium perenne</i>	Perennial Rye Grass		
	<i>Nassella neesiana</i>	Chilean Needle-grass	✓	
	<i>Nassella trichotoma</i>	Serrated Tussock	✓	
	<i>Phalaris aquatica</i>	Toowoomba Canary Grass		
<i>Vulpia myuros</i>	Foxtail Fescue			

Life form	Scientific name	Common name	Listed Status
Scrambler / Climber	Fabaceae		
	<i>Vicia sativa</i>	Common Vetch	

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FAUNA

Table D.6. Indigenous Fauna species recorded as part of the general and targeted surveys in Contract Area 21.

Scientific name	Common name	Conservation Status			Regional Significance	Type of Record	Comments
		EPBC	DSE	FFG			
BIRDS							
<i>Anthochaera carunculata</i>	Red Wattlebird					Observed	
<i>Cacatua roseicapilla</i>	Galah					Observed	
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo					Observed/Call Recognition	
<i>Corvus coronoides</i>	Australian Raven					Observed	
<i>Egretta novahollandiae</i>	White-faced Heron					Observed	
<i>Grallina cyanoleuca</i>	Magpie-lark					Observed	
<i>Gymnorhina tibicen</i>	Australian Magpie					Observed	
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater					Observed	
<i>Manorina melanocephala</i>	Noisy Miner					Observed	
<i>Ocyphaps lophotes</i>	Crested Pigeon					Observed	
<i>Psephotus haematonodus</i>	Red-rumped Parrot					Observed	
<i>Rhipidura leucophrys</i>	Willie Wagtail					Observed	
<i>Threskiornis spinicollis</i>	Straw-necked Ibis					Observed	
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet					Observed	
<i>Vanellus miles</i>	Masked Lapwing					Observed	
MAMMALS							
<i>Macropus giganteus</i>	Eastern Grey Kangaroo					Observed	
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum					Observed	
<i>Trichosurus vulpecula</i>	Common Brushtail Possum					Observed	
<i>Tadarida australis</i>	White-striped Freetail Bat					Observed/Call Recognition	

Table D.7. Exotic Fauna species recorded as part of the general and targeted surveys in Contract Area 21.

Scientific name	Common name	Type of record	Comments
BIRDS			
<i>Acridotheres tristis</i>	Indian Mynah	Observed	
<i>Passer domesticus</i>	House Sparrow	Observed	
<i>Streptopelia chinensis</i>	Spotted Turtle-dove	Observed	
<i>Sturnus vulgaris</i>	Common Starling	Observed	
<i>Turdus merula</i>	Common Blackbird	Observed	
MAMMALS			
<i>Vulpes vulpes</i>	Red Fox	Observed, dens & scats	
<i>Felis catus</i>	Cat (feral)	Observed	
<i>Oryctolagus cuniculus</i>	European Rabbit	Observed	

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APPENDIX E: THREATENED SPECIES LIKELIHOOD OF OCCURRENCE

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Table E.8. Threatened Flora species recorded and/or predicted to occur within a radius of 5km of Contract Area 21.

Life form	Family name	Scientific name	Common name	Conservation Status			Regional Significance*	Number of documented records			Total no. documented records	Likely occurrence in Contract Area 21	Likelihood reasoning	Habitat description (Sources: Gray and Knight 2001; Walsh and Entwisle 1999; 1996; 1994)	
				EPBC	DSE	FFG		DSE FIS Database	Other Sources	Current Survey					
Tree	Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum	-	Vulnerable	-		2			2 (November 2001)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Suited to temperate to tropical areas but will grow satisfactorily in drier climates if water is available. It adapts to a wide range of soils provided they are not waterlogged. Isolated population believed to exist in East Gippsland.	
	Myrtaceae	<i>Melaleuca armillaris</i> subsp. <i>armillaris</i>	Giant Honey-myrtle	-	Rare, not otherwise threatened	-		1		1	2 (December 2009)	Present	Recorded in contract area, however considered to be a non-indigenous planting.	Mainly confined to near coastal sandy heaths, scrubs, rocky coastlines and foothill outcrops eastwards of Marlo. Specimens found west of this are either planted or naturalized escapees.	
Herb / Forb	Ophioglossaceae	<i>Botrychium australe</i>	Austral Moonwort	-	Vulnerable	Listed	✓	1			1 (October 1983)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Rare in lowland forest to subalpine grassland in eastern Victoria. Formerly known from near Melbourne.	
	Cyperaceae	<i>Carex tasmanica</i>	Curly Sedge	Vulnerable	Vulnerable	Listed	✓					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Native herb that occurs in inundated and seasonally wet terrestrial sites in heavy clayey soils north of Melbourne and further to the west.	
	Fabaceae	<i>Desmodium varians</i>	Slender Tick-trefoil	-	Poorly known, suspected threatened	-		4			4 (March 2002)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	A prostrate herb, found scattered in cooler, mostly southern parts of the State from near sea-level (Orbost) to the alps (e.g. Buckety Plain), usually in open sites on permanently moist to wet, rather fertile soils, but rather uncommon.	
	Geraniaceae	<i>Geranium solanderi</i> var. <i>solanderi</i> s.s.	Austral Crane's-bill	-	Vulnerable	-		2			2 (April 2006)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Grasslands and grassy woodlands, often along drainage lines.	
	Geraniaceae	<i>Geranium</i> sp. 1	Large-flower Crane's-bill	-	Endangered	-		3			3 (December 2004)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Unknown	
	Geraniaceae	<i>Geranium</i> sp. 3	Pale-flower Crane's-bill	-	Rare, not otherwise threatened	-		2			2 (September 2003)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Open grassy areas of dry woodland to forest.	
	Fabaceae	<i>Glycine latrobeana</i>	Purple Clover, Clover Glycine	Vulnerable	Vulnerable	Listed	✓						Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Endemic in Victoria and sporadically dispersed. Grows mainly in grasslands and grassy woodlands.
	Brassicaceae	<i>Lepidium hyssopifolium</i>	Basalt Peppercross	Endangered	Endangered	Listed	✓	2			2 (September 1977)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Unknown, but known in very few localities on the basalt plain to the North and North-east of Melbourne.	
	Brassicaceae	<i>Lepidium pseudo-hyssopifolium</i>	Native Peppercross	-	Poorly known, suspected threatened	-		1			1 (January 1984)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Grows in dry woodland and open forest. Very rare plant reported recently far North of Bendigo.	

Life form	Family name	Scientific name	Common name	Conservation Status			Regional Significance*	Number of documented records			Total no. documented records	Likely occurrence in Contract Area 21	Likelihood reasoning	Habitat description (Sources: Gray and Knight 2001; Walsh and Entwisle 1999; 1996; 1994)
				EPBC	DSE	FFG		DSE FIS Database	Other Sources	Current Survey				
	Thymelaeaceae	<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	Critically Endangered	Vulnerable	Listed	✓					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Found primarily on the grasslands or open shrublands of the basalt plains.
	Orchidaceae	<i>Prasophyllum frenchii</i>	Maroon Leek-orchid	Endangered	Endangered	Listed	✓					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Tea-tree heath; wattle tea-tree scrub; valley sclerophyll forest. Predominantly in or near coastal swamps. Rarely occupies sites more than 10 km inland.
	Orchidaceae	<i>Pterostylis cucullata</i>	Leafy Greenhood	Vulnerable	-	Listed	✓	1			1 (Date unknown)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Widely distributed but disjunct, mostly occurring in coastal areas, rarely inland. Recent records from volcanic soils. Coastal populations occur on stabilised sand dunes under open to closed scrub of Coast Tea-tree <i>Leptospermum laevigatum</i> or Moonah Melale
	Asteraceae	<i>Rutidosia leptorrhynchoides</i>	Button Wrinklewort	Endangered	Endangered	Listed	✓					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Confined to basaltic grasslands. In Victoria known distribution is between Rokewood and Melbourne.
	Asteraceae	<i>Senecio macrocarpus</i>	Large-fruit Fireweed	Vulnerable	Endangered	Listed	✓					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Largely confined to remnant Kangaroo-grass grasslands on loamy grey soils derived from Basalt.
Graminoids (grass-like plants)	Poaceae	<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	Vulnerable	-	-	✓					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Permanent swamps.
	Poaceae	<i>Austrodanthonia setacea</i> var. <i>brevisetata</i>	Short-bristle Wallaby-grass	-	Rare, not otherwise threatened	-		1			1 (November 1994)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Occurs mostly in northern Victoria, with a few, isolated occurrences in the south.
	Phormiaceae	<i>Dianella amoena</i>	Matted Flax-lily	Endangered	Endangered	-	✓	3			3 (October 2000)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Plains grassland, grassy wetland, red gum woodland.
	Poaceae	<i>Eragrostis trachycarpa</i>	Rough-grain Love-grass	-	Rare, not otherwise threatened	-		1			1 (February 1994)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Confined to somewhat moist sites in the lower catchment of the Gippsland Lakes (between Heyfield and Lakes Entrance)
	Poaceae	<i>Lachnagrostis adamsonii</i>	Adamson's Blown-grass	Endangered	Vulnerable	Listed	✓					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Slightly saline, seasonally wet areas.
	Poaceae	<i>Lachnagrostis punicea</i> subsp. <i>punicea</i>	Purple Blown-grass	-	Rare, not otherwise threatened	-		3			3 (November 2001)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Seasonally wet or poorly drained soils.

Life form	Family name	Scientific name	Common name	Conservation Status			Regional Significance*	Number of documented records			Total no. documented records	Likely occurrence in Contract Area 21	Likelihood reasoning	Habitat description (Sources: Gray and Knight 2001; Walsh and Entwisle 1999; 1996; 1994)
				EPBC	DSE	FFG		DSE FIS Database	Other Sources	Current Survey				
	Poaceae	<i>Tripogon loliformis</i>	Rye Beetle-grass	-	Rare, not otherwise threatened	-		1			1 (September 1992)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Dry and mostly rocky grasslands and plains.

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Table E.9. Threatened Fauna species recorded and/or predicted to occur within a radius of 5km of Contract Area 21.

Scientific name	Common name	Conservation Status			Number of documented records			Total no. documented records & date of most recent record	Likely occurrence in Contract Area 21	Likelihood reasoning	Habitat description (Sources: Australian Museum - Birds in Backyards database 2010, DEWHA SPRAT database 2010, DPI NSW 2008, Gray and Knight 2001; Walsh and Entwisle 1999; 1996; 1994, Emison et al 1987; Strahan 1995; Hero et al 1991; Birds Australia 2003; Menkhorst and Knight 2001; Inland Fisheries Service 2000; NSW DEC 2005)
		EPBC	DSE	FFG	DSE AVW Database	Other Sources	Current Survey				
Amphibians											
<i>Litoria raniformis</i>	Growling Grass Frog	Vulnerable	Endangered	Listed	18			18 (November 2003)	Low	No habitat was identified within the precinct, but may occur in habitat associated with the adjacent Greenvale Reservoir and Yuroke Creek.	Permanent lakes, swamps, dams and lagoons; very wet areas in Woodland and shrubland.
<i>Pseudophryne bibronii</i>	Brown Toadlet	-	Endangered	Listed	15			15 (May 1990)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Forests, woodlands, shrublands, grassland and heaths, sheltering under moist leaf litter and other debris in boggy soaks and depressions.
<i>Pseudophryne semimarmorata</i>	Southern Toadlet	-	Vulnerable	-	3			3 (April 1961)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Inhabits a wide range of eucalypt dominated open forest communities that have a grassy understorey. Often found on rocky ridges or in gullies.
Birds											
<i>Apus pacificus</i>	Forktailed Swift	Vulnerable	-	-					Low	Not detected in current survey and no suitable habitat identified, however may fly over the study area.	Aerial over a wide range of habitats, particularly in the lowlands and foothills of northern Victoria.
<i>Anas rhynchotis</i>	Australasian Shoveler	-	Vulnerable	-	1			1 (January 2000)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Inhabits all kinds of wetlands, preferring large undisturbed heavily vegetated freshwater swamps. It is also found on open waters and occasionally along the coast.
<i>Ardea ibis</i>	Cattle Egret	Migratory	-	-					Low	No habitat was identified within the precinct, but may occur in habitat associated with the adjacent Greenvale Reservoir.	Grasslands, woodlands and wetlands and uses pastures and croplands, especially where drainage is poor.
<i>Ardea modesta (Ardea alba)</i>	Eastern Great Egret (Great Egret)	Migratory	Vulnerable	Listed	3			3 (August 2002)	Low	No habitat was identified within the precinct, but may occur in habitat associated with the adjacent Greenvale Reservoir.	Intertidal mudflats, inland lakes, swamps and rivers; also farm dams and artificial wetlands.
<i>Aythya australis</i>	Hardhead	-	Vulnerable	-	6			6 (May 1991)	Low	No habitat was identified within the precinct, but may occur in habitat associated with the adjacent Greenvale Reservoir.	Deep, permanent open freshwater wetlands with dense fringing vegetation. Sometimes artificial wetlands used during dry periods.

Scientific name	Common name	Conservation Status			Number of documented records			Total no. documented records & date of most recent record	Likely occurrence in Contract Area 21	Likelihood reasoning	Habitat description (Sources: Australian Museum - Birds in Backyards database 2010, DEWHA SPRAT database 2010, DPI NSW 2008, Gray and Knight 2001; Walsh and Entwisle 1999; 1996; 1994, Emison et al 1987; Strahan 1995; Hero et al 1991; Birds Australia 2003; Menkhorst and Knight 2001; Inland Fisheries Service 2000; NSW DEC 2005)
		EPBC	DSE	FFG	DSE AVW Database	Other Sources	Current Survey				
<i>Biziura lobata</i>	Musk Duck	-	Vulnerable	Listed	4			4 (January 2000)	Low	No habitat was identified within the precinct, but may occur in habitat associated with the adjacent Greenvale Reservoir.	Permanent swamps with dense vegetation, more open waters in non breeding season.
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	-	Near Threatened	-	2			2 (November 2000)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Found in drier country associated with species such as mulga and mallee form open woodlands and shrublands. Often found in vegetation lining creek beds.
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern ssp.)	-	Near Threatened	-	1			1 (January 1990)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Prefers open woodland lacking a dense understorey. Forages tree trunks and on ground for insects.
<i>Egretta garzetta</i>	Little Egret	-	Vulnerable	-	1			1 (January 1986)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Frequents tidal mudflats and freshwater and saltwater wetlands, and mangroves of northern eastern and southern Australia
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Migratory	Vulnerable	Listed					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Coastal islands, coastal lakes and along some inland rivers and lakes.
<i>Hirundapus caudacutus</i>	White-throated Needle-tail	Migratory	-	-					Low	Not detected in current survey, and no suitable habitat identified, however may fly over the study area.	Aerial, mainly eastern Australia often associated with coastal and mountain regions.
<i>Gallinago hardwickii</i>	Latham's Snipe	Migratory	Near Threatened	-					Moderate	Not detected in current survey, however may occur transiently in grassy wet patches over summer.	Wet grasslands, open and wooded swamps.
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Endangered	Listed	3			3 (October 2000)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Winter migrator from Tasmania. Generally prefers Box Ironbark forests and woodlands inland of the Great Dividing Range during winter.
<i>Melithreptus gularis</i>	Black-chinned Honeyeater	-	Near Threatened	-	1			1 (March 1989)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark, White Box, Grey Box, Yellow Box and Forest Red Gum. Also inhabits open forests of smooth-barked gums, Stringybarks, ironbarks and tea-trees
<i>Merops ornatus</i>	Rainbow Bee-eater	Migratory	-	-					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Summer migrants to Victoria where they occur in many wooded habitats with an annual rainfall of less than 800mm, especially north of the Great Divide.

Scientific name	Common name	Conservation Status			Number of documented records			Total no. documented records & date of most recent record	Likely occurrence in Contract Area 21	Likelihood reasoning	Habitat description (Sources: Australian Museum - Birds in Backyards database 2010, DEWHA SPRAT database 2010, DPI NSW 2008, Gray and Knight 2001; Walsh and Entwisle 1999; 1996; 1994, Emison et al 1987; Strahan 1995; Hero et al 1991; Birds Australia 2003; Menkhurst and Knight 2001; Inland Fisheries Service 2000; NSW DEC 2005)
		EPBC	DSE	FFG	DSE AVW Database	Other Sources	Current Survey				
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Migratory	-	-					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Summer migrants to wet forests and woodlands, particularly those containing a tall canopy of eucalypts with an understorey of Teatree's and wattles along streams.
<i>Nycticorax caledonicus</i>	Nankeen Night Heron	-	Near Threatened	-	6			6 (October 2000)	Low	No habitat was identified within the precinct, but may occur in habitat associated with the adjacent Greenvale Reservoir.	A wide range of wetlands.
<i>Oxyura australis</i>	Blue-billed Duck	-	Endangered	-	1			1 (February 2000)	Low	No habitat was identified within the precinct, but may occur in habitat associated with the adjacent Greenvale Reservoir.	Well vegetated freshwater swamps, large dams, lakes. More open waters in Winter.
<i>Phalacrocorax varius</i>	Pied Cormorant	-	Near Threatened	-	1			1 (January 1990)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Large freshwater and saline wetlands and tidal bays along the coast.
<i>Platalea regia</i>	Royal Spoonbill	-	Vulnerable	-	2			2 (January 1987)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Larger shallow waters (inland and coastal), well vegetated shallow freshwater wetlands, floodplains, billabongs, sewage ponds, irrigation storages, tidal mudflats, estuaries, salt marshes, salt fields, mangroves, islands.
<i>Porzana pusilla</i>	Baillon's Crake	-	Vulnerable	Listed	1			1 (January 2002)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Well vegetated freshwater to brackish swamps.
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	-	Vulnerable	Listed	2			2 (March 1990)	Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Inhabits a wide range of eucalypt dominated open forest communities that have a grassy understorey. Often found on rocky ridges or in gullies
<i>Rhipidura rufifrons</i>	Rufous Fantail	Migratory	-	-					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	A summer migrant to Victoria's wet forests, particularly gullies.
<i>Rostratula australis</i> (syn. <i>Rostratula benghalensis</i>)	Australian Painted Snipe (syn. Painted Snipe)	Vulnerable / Migratory	Critically Endangered	Listed					Low	No habitat was identified within the precinct, but may occur in habitat associated with the adjacent Greenvale Reservoir.	Well vegetated shallows and margins of wetlands, dams, sewage ponds; wet pastures, marshy areas, irrigation systems, flooded saltmarshes, lignum, teatree scrub, open timber.
<i>Stagonopleura guttata</i>	Diamond Firetail	-	Vulnerable	Listed	1			1 (January 1990)	Low	Not detected in current survey and no suitable habitat identified.	Open grassy woodland, heath and farmland or grassland with scattered trees. Endemic to south-eastern Australia

Scientific name	Common name	Conservation Status			Number of documented records			Total no. documented records & date of most recent record	Likely occurrence in Contract Area 21	Likelihood reasoning	Habitat description (Sources: Australian Museum - Birds in Backyards database 2010, DEWHA SPRAT database 2010, DPI NSW 2008, Gray and Knight 2001; Walsh and Entwisle 1999; 1996; 1994, Emison et al 1987; Strahan 1995; Hero et al 1991; Birds Australia 2003; Menkhurst and Knight 2001; Inland Fisheries Service 2000; NSW DEC 2005)
		EPBC	DSE	FFG	DSE AVW Database	Other Sources	Current Survey				
<i>Xanthomyza phrygia</i>	Regent Honeyeater	Endangered	Critically Endangered	Listed					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Depends on nectar and insects from Box Ironbark Eucalypt forests. Only breeding habitat lies in northeast Victoria and central coast of NSW.
Fish											
<i>Galaxiella pusilla</i>	Dwarf Galaxias	Vulnerable	Vulnerable	Listed					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Swamps, pools, back waters and lake margins among rocks and vegetation.
<i>Protectorates maraena</i>	Australian Grayling	Vulnerable	Vulnerable	Listed					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Spends part of its life cycle in freshwater in rivers, typically in gravel bottom pools. Often forming aggregations below barriers to upstream movement such as waterfalls.
Invertebrates											
<i>Synemon plana</i>	Golden Sun Moth	Critically endangered	Endangered	Listed	2	Several records north of CA 21 (Ecology Partners, 2010), 2 in CA 59, north of CA 21 (Biosis Research, 2010)	> 25 (January 2010)		Low	Not detected in current survey and no suitable habitat identified. Has recently been located in areas adjacent Greenvale Reservoir Reserve to the north.	Occurs in woodlands with a grassy understorey and native Grasslands, particularly those dominated by <i>Austrodanthonia spp.</i>
Mammals											
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spotted-tail Quoll	Endangered	Endangered	Listed					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Coastal heath and scrub, dry and wet sclerophyll forest, rainforest. Generally a forest dependent species requiring large intact areas of vegetation.
<i>Perameles gunnii</i>	Eastern Barred Bandicoot	Endangered	Critically Endangered	Listed	12		12 (June 2003)		Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Prefers open grassland and flourishes in areas of pastoral development where there are patches of dense ground cover. Only four small colonies known in Victoria.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Vulnerable	Listed					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Roost sites commonly occur in gullies, in vegetation with dense canopy cover and close to water.
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart	-	Near Threatened	-	1		1 (January 1990)		Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Occurs widely in southern and central Australia, in open woodland, shrublands of saltbush and blue bush and tussock and spinifex grassland. Can also occur in farmlands.
Reptiles											
<i>Delmar impar</i>	Striped Legless Lizard	Vulnerable	Endangered	Listed					Low	Not detected in current survey and no suitable habitat identified.	Native grasslands and grassy woodland, within grass tussocks, cracks in the ground or under rocks. Has been recorded in exotic pasture.

Scientific name	Common name	Conservation Status			Number of documented records			Total no. documented records & date of most recent record	Likely occurrence in Contract Area 21	Likelihood reasoning	Habitat description (Sources: Australian Museum - Birds in Backyards database 2010, DEWHA SPRAT database 2010, DPI NSW 2008, Gray and Knight 2001; Walsh and Entwisle 1999; 1996; 1994, Emison et al 1987; Strahan 1995; Hero et al 1991; Birds Australia 2003; Menkhorst and Knight 2001; Inland Fisheries Service 2000; NSW DEC 2005)
		EPBC	DSE	FFG	DSE AVW Database	Other Sources	Current Survey				
<i>Tympanocryptis pinguicolla</i>	Grassland Earless Dragon	Endangered	Critically Endangered	Listed					Unlikely	Not detected in current survey and no suitable habitat identified within study area.	Rocky native grasslands with sparse cover

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APPENDIX F: GLOSSARY OF TERMS AND ACRONYMS

Acronyms List

Acronym	Synonym
AVW	Atlas of Victorian Wildlife
BCS	Bioregional Conservation Status
BVT	Broad Vegetation Types
CaLP Act	<i>Catchment and Land Protection Act 1994</i>
CAMBA	Chinese Australia Migratory Bird Agreement
CMA	Catchment Management Authority
DBH	Diameter at Breast Height
DEWHA	Department of Environment, Water, Heritage and the Arts
DNRE	Department of Natural Resources and Environment
DSE	Department of Sustainability and Environment
EEA	<i>Environmental Effects Act 1978</i>
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESO	Environmental Significance Overlay
EVC -	Ecological Vegetation Class
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i>
FIS	Flora Information System
GWZ	Green Wedge Zone
Ha	Hectares
Hha	Habitat Hectares
HZ	Habitat Zone
JAMBA	Japanese Australia Migratory Bird Agreement
LOT	Large Old Tree
LSIO	Land Subject to Inundation Overlay
NVPP	Native Vegetation Precinct Plan
PRCZ	Public Resource Conservation Zone
RNE	Register of the National Estate
ROKAMBA	Republic Of Korea Migratory Bird Agreement
SLO	Significant Landscape Overlay
SMEC	Snowy Mountains Engineering Corporation
Vic	Victoria
VLOT	Very Large Old Tree
VROTS	Victorian Rare or Threatened Species
VOMP	Vegetation Offset Management Plan
VPO	Vegetation Protection Overlay

Acronym	Synonym
WMO	Wildfire Management Overlay
WONS	Weeds of National Significance

Terminology

Term	Definition
Biodiversity	The variety of all life-forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part.
Bioregion	A landscape based approach to classifying the land surface using a range of environmental attributes such as climate, geomorphology, lithology and vegetation.
Bioregional Conservation Status	An assessment of the conservation status of the native vegetation type (EVC) in the context of a particular bioregion, taking account of how commonly it originally occurred, the current level of depletion and the level of degradation of condition typical of remaining stands.
Ecological Vegetation Class	A type of native vegetation classification that is described through a combination of its floristics, life form and ecological characteristics, and through an inferred fidelity to particular environment attributes. Each EVC includes a collection of floristic communities that occurs across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.
Exotic Vegetation	Any vegetation that is not native to Australia or its States and Territories. This can sometimes include non-indigenous vegetation.
Habitat Hectare	A site based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type.
Habitat Zone	A discrete area of native vegetation consisting of a single vegetation type (EVC) with an assumed similar averaged quality. This is the base spatial unit for conducting a habitat hectare assessment.
High Threat Weed	Introduced species (including non-indigenous 'natives') with the ability to out-compete and substantially reduce one or more indigenous life forms in the longer term assuming on-going current site characteristics and disturbance regime.
Indigenous Vegetation	Indigenous vegetation includes vegetation that is native to Australia as well as being native to a specific geographic region.
Native Vegetation	Native vegetation includes all vegetation that is native to Australia, and its States and Territories.
Net Gain	Is where, over a specified area and period of time, losses of native vegetation and habitat, as measured by a habitat hectares assessment, are reduced, minimised and more than offset by commensurate gains.
Non-indigenous Vegetation	Vegetation that is native to Australia, but not to the geographic region to which a site is located.
Native Vegetation Offset	A native vegetation offset is any works of other actions to make reparation for the loss of native vegetation arising from the removal of native vegetation. This may include an area of existing remnant vegetation that is protected

Term	Definition
	and managed, an area that is revegetated and protected, an area that is set aside for regeneration or restoration, or any combination of these. The relative size of an offset is graded according to its conservation significance.
Remnant Patch	A continuous area of native vegetation, with or without trees, where less than 75% of the total understorey plant cover is weeds or non-native plants (bare ground not included), or a group (i.e. three or more) of trees where the tree canopy cover is at least 20%. Patches may occur across one or more land tenures, and may consist of one or more habitat zones.
Scattered Tree	Scattered trees are those canopy trees within an area where at least 75% of the total understorey plant cover is weeds or non-native plants and the overall canopy cover for a group (i.e. three or more) of trees is less than 20%.

DRAFT

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DRAFT



LEGEND

	Photo Locations With direction indicator		CA21 Boundary
	Parcel Region		No Native Vegetation
	Scattered Trees		Degraded Treeless Vegetation
	Class Size Small Tree		

PRELIMINARY

1:5,000 @A3

CONSULTANT:

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Website: www.smec.com.au

PROJECT:
GAA Biodiversity Mapping 2009-2011

TITLE:
Figure 1.1
Extent of Native Vegetation
within Contract Area 21

DRAWN BY: Christopher White **DATE:** 22/3/2010
CHECKED BY: Rob Gratton **DATE:** 14.4.2010
PROJECT MANAGER: Christopher White

DATA SOURCE:
Data Source: VICMAP, IMAGERY © The State of Victoria, Department of Sustainability and Environment Catalogue Line-Work Property (VICPROP_CAD_LINES) © The State of Victoria, Department of Sustainability and Environment, Roads (ROAD100ROAD100) © The State of Victoria, Department of Sustainability and Environment, VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

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LEGEND

Scattered Tree CA21 Boundary
 Class Size Parcel Region
● Small Tree
 Ec= Eucalyptus camaldulensis

PRELIMINARY

1:5,000 @A3
0
37.5
75
112.5
150

 Metres

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 Website: www.smec.com.au

PROJECT:

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TITLE:

Figure 2.1
Location of Scattered Trees within
Contract Area 21

DRAWN BY: Christopher White **DATE:** 15/3/2010
CHECKED BY: Rob Gratton **DATE:** 14.4.2010
PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: VICMAP_IMAGERY© The State of Victoria, Department of Sustainability and Environment Cadastral Line- Vicmap Property (VMPROP_CAD_LINE)© The State of Victoria, Department of Sustainability and Environment Roads- (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. VICMAP_HYDRO (HY_WATERCOURSE) © The State of Victoria, Department of Sustainability and Environment

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LEGEND


Vegetation Category	CA21 Boundary
No Native Vegetation	Parcel Region
Degraded Treeless Vegetation	

SMEC did not record any Habitat Zones from CA 21

PRELIMINARY

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PROJECT:
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TITLE:
Figure 3.1
Location of Habitat Zones and their Conservation Significance

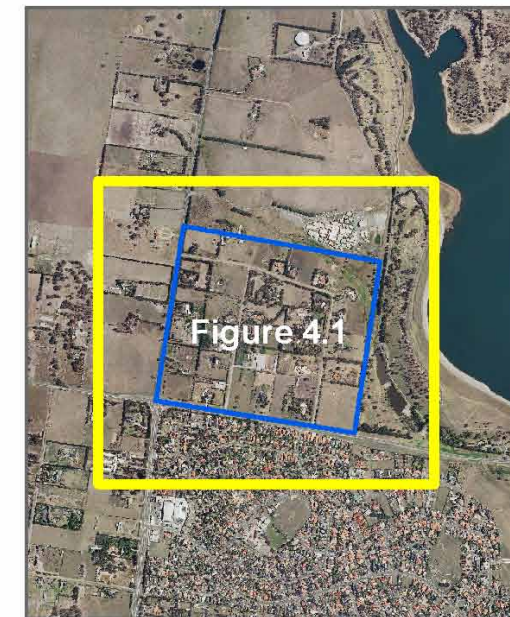
DRAWN BY: Christopher White **DATE:** 22.3.2010
CHECKED BY: Rob Gratton **DATE:** 14.4.2010
PROJECT MANAGER: Christopher White

DATA SOURCE:
 Data Source: VICMAP_IMAGERY © The State of Victoria, Department of Sustainability and Environment
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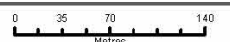
LEGEND

-  Area surveyed for threatened flora
-  CA21 Boundary
-  Parcel Region

No Database records of threatened flora exist. Smec did not record any threatened flora on site.



PRELIMINARY

1:5,000 @A3 

CONSULTANT:



PROJECT:

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TITLE:

Figure 4.1
Location of Significant Flora species recorded within CA 21

DRAWN BY: Christopher White **DATE:** 22.3.2010

CHECKED BY: Rob Gratton **DATE:** 14.4.2010

PROJECT MANAGER: Christopher White

DATA SOURCE:

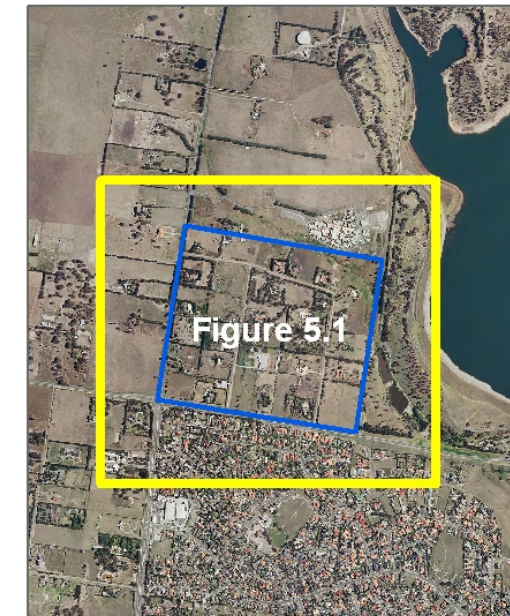
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LEGEND

Database Records of Threatened Fauna

- ▲ Nationally Significant Species
- ▲ State Significant Species
- CA21 Boundary
- Parcel Region

Smec did not record any targeted threatened fauna on site.

PRELIMINARY

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PROJECT:

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TITLE:

Figure 5.1
 Location of Significant Fauna
 species recorded within CA 21

DRAWN BY: Christopher White **DATE:** 22.3.2010
CHECKED BY: Rob Gratton **DATE:** 14.4.2010
PROJECT MANAGER: Christopher White

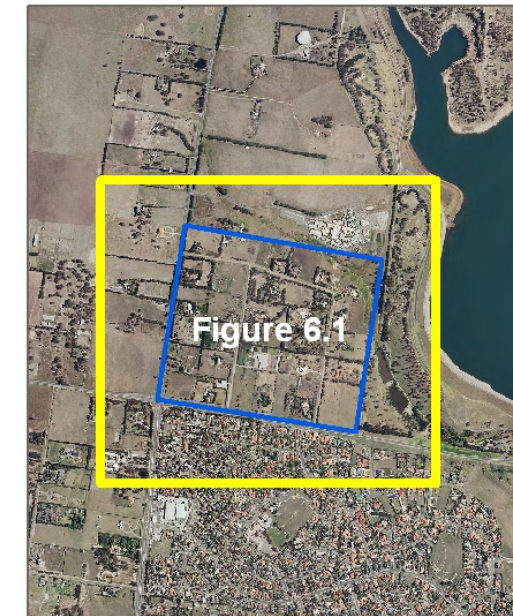
DATA SOURCE:

Data Source: "VICMAP_IMAGERY" © The State of Victoria, Department of Sustainability and Environment Cadastral Line: Vicmap Property (VMPROP_CAD_LINE) © The State of Victoria, Department of Sustainability and Environment. Roads: (ROAD100/ROAD100) © The State of Victoria, Department of Sustainability and Environment. "VICMAP_HYDRO (HY_WATERCOURSE)" © The State of Victoria, Department of Sustainability and Environment

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LEGEND

CA21 Boundary
 Potential fauna Habitat- Wetlands
 Parcel Region

Wetland habitat may be important as Growing Grass Frog habitat or as a breeding site for Blue-billed Duck and/or Musk Duck.

PRELIMINARY

N
 1:5,000 @A3

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PROJECT:

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TITLE:

Figure 6.1
 Location of known or potential habitat/
 breeding sites/wetlands and waterways
 related to significant faunal species

DRAWN BY: Christopher White **DATE:** 22.3.2010
CHECKED BY: Rob Gratton **DATE:** 20.4.2010
PROJECT MANAGER: Christopher White

DATA SOURCE:

Data Source: "VICMAP_IMAGERY" © The State of Victoria, Department of Sustainability and Environment; "VICMAP_CADSTRAL_LINE" © The State of Victoria, Department of Sustainability and Environment; "VICMAP_ROADS" © The State of Victoria, Department of Sustainability and Environment; "VICMAP_HYDRO" © The State of Victoria, Department of Sustainability and Environment.

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