135 O'HERNS ROAD, EPPING

ASSESSMENT OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

O'Herns Road Developments Pty Ltd

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1. INTRODUCTION

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) contains a list of threatened species and ecological communities that are considered to be of national conservation significance. Any impacts on these species considered significant requires the approval of the Australian Minister for the Environment. If there is a possibility of a significant impact on Matters of National Environmental Significance (MNES), a Referral under the EPBC Act should be considered. The Minister will decide after 20 business days whether the project will be a 'controlled action' under the EPBC Act, in which case it cannot be undertaken without the approval of the Minister. This approval depends on a further assessment and approval process (lasting between three and nine months, depending on the level of assessment).

Brett Lane and Associates Pty Ltd (BL&A) were engaged by O'Herns Road Developments Pty Ltd, to undertake an assessment of MNES, specifically flora and fauna species and ecological communities listed under the EPBC Act within the property at 135 O'Herns Road, Epping (the 'study area'), in Melbourne's northern suburbs. The study area is proposed for subdivision for commercial and industrial development. The location of the study area in the context of the broader locale is shown in Figure 1.

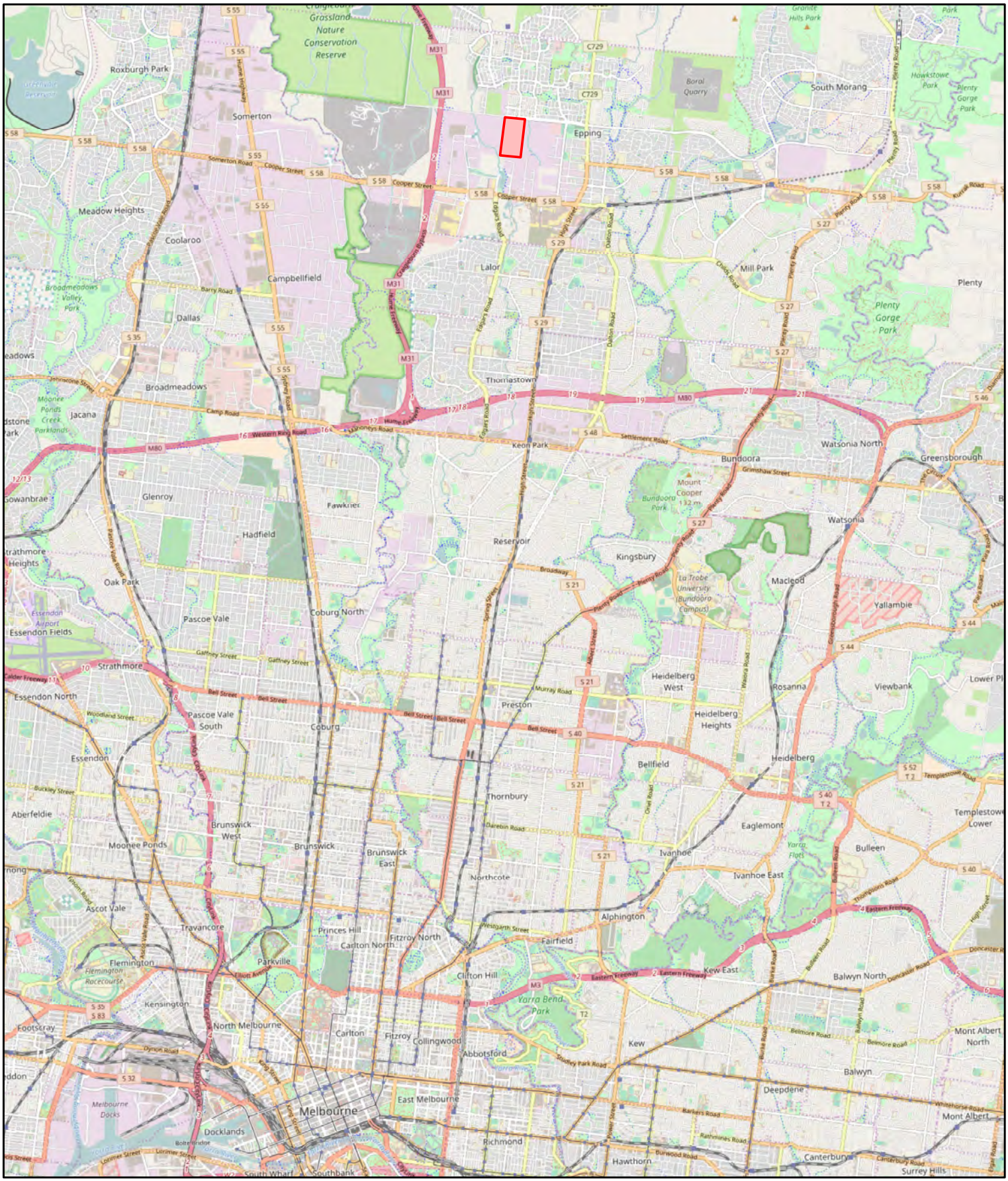
This assessment was commissioned to determine the current presence and status of any MNES which have the potential to occur in the study area, determine whether development of the study area would have a significant impact on any MNES found to occur there and provide recommendations on the next course of action.

This report incorporates the findings from a range of previous assessments undertaken by BL&A within the study area, including:

- Initial flora and fauna assessment undertaken in September 2007 (BL&A 2008a);
- Initial threatened species assessments including targeted surveys for Purple Diuris (Victorian listed flora species), Striped Legless Lizard and Golden Sun Moth between September and December 2007 (BL&A 2008b);
- Vegetation assessment undertaken in March 2016 (BL&A 2016);
- Amended native vegetation assessment undertaken in December 2016 (BL&A 2017);
- Targeted surveys for threatened flora species including Matted Flax-lily undertaken in December 2016 (methods and findings detailed in this report); and
- Golden Sun Moth surveys undertaken throughout December 2016 (methods and findings detailed in this report).

During these assessments, one MNES was recorded in the study area – Golden Sun Moth, which is listed as critically endangered under the EPBC Act.

This report was prepared by a team from BL&A, comprising Justin Sullivan (Senior Ecologist) and Brett Macdonald (Senior Ecologist and Project Manager).



Legend

Study area

Metres

0 1,000 2,000 4,000

Figure 1: Study area - Locality Map

Project: Cooper & O'Hearns Subdivision

Client: O'Herns Road Developments Pty Ltd

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2. MNES – ANALYSIS OF LIKELIHOOD OF OCCURENCE

2.1. Existing information

2.1.1. Existing reporting

The reports below relating to past flora and fauna assessments of the study area were reviewed in the preparation of this report.

- Flora, Fauna and Net Gain Assessment – BL&A Report 7145 (2.2) (BL&A 2008a)
- Threatened Species Assessment – BL&A Report 7193 (2.1) (BL&A 2008b)
- Vegetation Assessment - BL&A Report 7145 (3.2) (BL&A 2016)
- Amended Native Vegetation Assessment - BL&A Report 7145 (5.0) (BL&A 2017).

These reports should be read in conjunction with this MNES Assessment Report.

2.1.2. Existing MNES records and habitat modelling

Existing EPBC Act listed flora and fauna species records and information about the potential occurrence of other MNES was obtained from an area termed the 'search region', defined here as an area with a radius of ten kilometres from the approximate centre point of the study area (coordinates: latitude 37˚ 38' 23" S and longitude 145˚ 00' 31" E).

A list of the EPBC Act listed flora and fauna species recorded in the search region was obtained from the Victorian Biodiversity Atlas (VBA), a database administered by DELWP (2017).

The online *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (PMST) (Department of the Environment and Energy, DoEE 2017) was accessed to determine whether nationally listed species or communities potentially occurred in the search region based on existing records and habitat modelling.

The above listed data was obtained on the 13th January 2017.

2.2. Ecological communities

According to the attached PMST report (Appendix 1), dated 13th January 2017, six EPBC Act listed ecological communities have the potential to occur in the study area:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain;
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia;
- Natural Damp Grassland of the Victorian Coastal Plains;
- Natural Temperate Grassland of the Victorian Volcanic Plain;
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains; and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Based on descriptions of the habitat in the study area from previous flora and fauna assessment reports (BL&A 2008; BL&A 2017), only two of these listed ecological communities were given further consideration as having the potential to occur, the Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) and the Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP). These two communities are discussed further below.

Assessments to determine the presence/absence of NTGVVP and SHWTLP in the study area were undertaken during the most recent native vegetation assessment at the site in December (BL&A 2017). The results of these assessments are provided in Section 3.1 of this report. The remaining four ecological communities were not considered to potentially occur in the study area, as the vegetation does not support any woodland habitat and is located inland, away from the coast.

2.3. Species

The review of existing information indicated that 24 EPBC Act listed fauna species and 14 flora species have previously been recorded within the search region or for which potential habitat occurs according to the PMST. Based on the findings from the previous flora and fauna assessment reports (BL&A 2008a; BL&A 2008b; BL&A 2017), the likelihood of occurrence of these species in the study area was analysed and the results are presented in Table 1.

This analysis of potential occurrence of EPBC Act listed species excludes:

- Marine fauna given that the study area is inland;
- Freshwater fish given the absence of water bodies in the study area;
- Most wetland bird species given the absence of wetlands in the study area of a size large enough to support wetland species;
- Migratory oceanic bird species (such as albatrosses and petrels) and migratory shorebirds given that the study area is inland and does not support any wetlands of a reasonable size.

Species considered 'likely to occur' are those that have a high chance of being in the study area given the existence of numerous records in the search region and

suitable habitat in the study area. Using the precautionary approach, species considered to have the 'potential to occur' are those where suitable habitat exists, but either the habitat is degraded or marginal or recent records are scarce.

The analysis of likelihood of occurrence also has taken into account the results of targeted surveys that have been undertaken in the study area for various listed species. The results of the targeted surveys undertaken by BL&A are provided in the next section of this report.

Targeted surveys undertaken in the study area include:

- Striped Legless Lizard tile-grid surveys, undertaken by BL&A from September to December in 2007;
- Golden Sun Moth targeted surveys undertaken by BL&A initially in November to December 2007, and repeated in December 2016; and
- Targeted flora species undertaken by BL&A in December 2016.

This analysis indicates that two listed species either occur, are likely to occur or have the potential to occur in the study area (Table 1). These species are:

- White-throated Needletail (potential to occur in the study area); and
- Golden Sun Moth (recorded – occurs in the study area).

Table 1: EPBC Act listed species from the 10 km search region and likelihood of occurrence in the study area

Common Name	Scientific Name	EPBC-thrt	EPBC-mig	Habitat	Number of records	Date of last record	Likelihood of occurrence
Flora							
Adamson's Blown-grass	*Lachnagrostis adamsonii*	EN		Confined to slow moving creeks, swamps, flats, depressions or drainage lines that are seasonally inundated or waterlogged and usually moderately to highly saline. Appear to favour sites that have some shelter from the wind.	None	N/A	Limited suitable habitat present within the study area. Targeted flora surveys carried out in December 2016 failed to detect the species. Therefore, considered **unlikely to occur.** *Regular flowering period: November to December (DoEE SPRAT file)*
Charming Spider-orchid	*Caladenia amoena*	EN		Typically found in grassy dry forest on sandy loams derived from sandstone and mudstone.	1	22/08/1996	Suitable habitat not present within the study area - **unlikely to occur**
Clover Glycine	*Glycine latrobeana*	VU		Found across south-eastern Australia in native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer. In Victoria, populations occur in lowland grasslands, grassy woodlands and sometimes in grassy heath.	1	7/12/1995	Suitable habitat not present within the study area - **unlikely to occur**
Large-headed Fireweed	*Senecio macrocarpus*	VU		In Victoria, Large-fruit Fireweed occurs most commonly in grasslands on red-brown earth soils. It may also occur in grassy woodlands and open woodlands predominantly in the Western (Basalt) Plains grassland on red brown earth soils found on recent Quaternary (basalt) deposits.	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Leafy Greenhood	*Pterostylis cucullata*	VU		Tea-tree scrubs on tall sandy and calcareous dunes, in moist, open or even deep shaded locations (Jones 1994).	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Maroon Leek-orchid	*Prasophyllum frenchii*	EN		Grows mainly in open sedge swampland or in wet grassland and wet heathland generally bordering swampy regions. Sites are generally low altitude, flat and moist. Soils are generally moderately rich damp sandy or black clay loams. Climate is mild, with an annual rainfall of 600–1100 mm, occurring predominantly in winter and spring.	None	N/A	Limited suitable habitat present within the study area. Targeted flora surveys carried out in December 2016 failed to detect the species. Therefore, considered **unlikely to occur.** *Regular flowering period: October to December (DoEE SPRAT file)*
Matted Flax-lily	*Dianella amoena*	EN		Lowland grassland and grassy woodlands on well-drained to seasonally waterlogged fertile sandy loams to heavy cracking soils derived from sedimentary or volcanic Geology. It is widely distributed from eastern to south-western Victoria (Carter 2010).	333	11/12/2014	Limited suitable habitat present within the study area. Targeted flora surveys carried out in December 2016 failed to detect the species. Therefore, considered **unlikely to occur.** *Regular flowering period: October to April (DoEE SPRAT file)*
River Swamp Wallaby-grass	*Amphibromus fluitans*	VU		River Swamp Wallaby-grass grows mostly in permanent swamps and also lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground; conditions that are caused by seasonally-fluctuating water levels.	5	14/11/2006	Limited suitable habitat present within the study area. Targeted flora surveys carried out in December 2016 failed to detect the species. Therefore, considered **unlikely to occur.** *Regular flowering period: November to March (DoEE SPRAT file)*
Round-leaf Pomaderris	*Pomaderris vacciniifolia*	CR		Occurs in damp forest and herb-rich foothill forest north-east of Melbourne in the upper catchments of the Yarra, Plenty and Yea rivers.	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**

Common Name	Scientific Name	EPBC-thrt	EPBC-mig	Habitat	Number of records	Date of last record	Likelihood of occurrence
Small Golden Moths	*Diuris basaltica*	EN		Grows in herb-rich native grasslands, dominated by Kangaroo Grass (Themeda triandra) on heavy basaltic soils, often embedded with basalt boulders. All locations that the species is known to occur form part of the 'Natural Temperate Grassland of the Victorian Volcanic Plain'.	1	19/09/1902	Suitable habitat not present within the study area - **unlikely to occur**
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	CR		Grasslands or open shrublands on basalt derived soils (Entwisle 1996). Prefers shallow depressions and drainage lines with moderate soil moisture (D.Coppolino pers. obs.).	None	N/A	Limited suitable habitat present within the study area. Closest Spiny Rice-flower records occur approximately 20 kilometres to the south west of the study area, west of the Maribyrnong River in Sunshine North. Therefore considered **unlikely to occur**.
Spiral Sun-orchid	*Thelymitra matthewsii*	VU		Slightly elevated sites to 300m in well-drained soils (sandy loams to gravelly limestone soils) in light to dense forest; sometimes in coastal sandy flats (Weber & Entwisle 1994).	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Swamp Everlasting	*Xerochrysum palustre*	VU		Sedge-rich swamps and wetlands, usually on black cracking clay soils (Walsh and Entwisle 1999). Scattered occurrences in Victoria range from the South Australian border in the west to the Cobberas, near Benambra, in the East (DSE 2008).	1	29/11/2005	Limited suitable habitat present and limited number of recent records within the study area. Targeted flora surveys carried out in December 2016 failed to detect the species. Therefore, considered **unlikely to occur.** *Regular flowering period: November to March (DoEE SPRAT file)*
White Sunray	*Leucochrysum albicans var. tricolor*	EN		In Victoria, occurs almost exclusively on acidic clay soils derived from basalt, occasionally on nearby sandy-clay soils derived from sedimentary material. All known Victorian occurrences are in grassland communities dominated by *Themeda triandra, Dichelachne crinita, Austrostipa spp*., Short Wallaby-grass and other wallaby grasses, along with the graminoids Common Bog-rush and Rush species. (Sinclair 2010b).	None	N/A	Lack of suitable habitat within the study area. Targeted flora surveys carried out in December 2016 failed to detect the species. Therefore, considered **unlikely to occur.** *Regular flowering period: November to December (*Sinclair 2010b*)*
Birds							
Australasian Bittern	*Botaurus poiciloptilus*	EN		Terrestrial wetlands, including a range of wetland types but prefers permanent water bodies with tall dense vegetation, particularly those dominated by sedges, rush, reeds or cutting grass (Marchant and Higgins 1990).	3	20/12/1986	Wetland habitat in the study area is of low quality and very small (0.05 ha). Also a lack of recent records in the search region - **unlikely to occur**
Australian Painted Snipe	*Rostratula australis*	EN		Generally inhabits shallow terrestrial freshwater wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes tea-tree (Melaleuca). Sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber.	1	1/01/1977	Wetland habitat in the study area is of low quality and very small (0.05 ha). Also a lack of recent records in the search region - **unlikely to occur**

Common Name	Scientific Name	EPBC-thrt	EPBC-mig	Habitat	Number of records	Date of last record	Likelihood of occurrence
Black-faced Monarch	*Monarcha melanopsis*		M (Bonn Convention (A2H))	Rainforests, eucalypt woodlands, coastal scrub and damp gullies (Higgins et al. 2006)	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Fork-tailed Swift	*Apus pacificus*		M (JAMBA, CAMBA, ROKAMBA)	The species can occur in wet sclerophyll forest but mainly prefers open forest or plains. It is almost exclusively aerial and feeds up to hundreds on metres above the ground, but can feed among open forest canopy. The species breeds internationally and seldom roosts in trees and is unlikely to be impacted by the development (Higgins et al 2006b).	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Latham's Snipe	*Gallinago hardwickii*		M (JAMBA, CAMBA, ROKAMBA, Bonn A2H)	Occurs in wide variety of permanent and ephemeral wetlands; it prefers open freshwater wetlands with dense cover nearby, such as the edges of rivers and creeks, bogs, swamps, waterholes. The species is wide spread in southeast Australia and most of its population occurs in Vic. Except in the northwest of the state. (Naarding 1983; Higgins and Davies 1996).	None	N/A	Wetland habitat in the study area is of low quality and very small (0.05 ha). Also a lack of recent records in the search region - **unlikely to occur**
Orange-bellied Parrot	*Neophema chrysogaster*	CE	M (JAMBA)	The Orange-bellied Parrot is endemic to south-eastern Australia. Its current non-breeding mainland distribution is from the mouth of the Murray River in South Australia, along the coast, to the east of Jack Smith Lake in South Gippsland, Victoria, covering approximately 1000 km of coastline. The most used sites in Victoria are around Port Phillip Bay and Bellarine Peninsula. During winter on the mainland, found mostly within 3 km of the coast. In Victoria, they mostly occur in sheltered coastal habitats, such as bays, lagoons and estuaries, or, rarely, saltworks.	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Painted Honeyeater	*Grantiella picta*	VU		Inhabits box-ironbark forests and woodlands and mainly feeds on the fruits of mistletoe. Strongly associated with mistletoe around the margins of open forests and woodlands. Occurs at few localities. Uncommon breeding migrant from further north, arriving in October and leaving in February. (Higgins et al. 2001; Tzaros 2005).	1	21/12/1990	Suitable habitat not present within the study area - **unlikely to occur**
Plains-wanderer	*Pedionomus torquatus*	CR		This species inhabits native grasslands with sparse cover, preferring grasslands that include wallaby grass and spear grass species (Marchant and Higgins 1993).	5	23/09/1991	Suitable habitat not present within the study area - **unlikely to occur**
Regent Honeyeater	*Anthochaera phrygia*	CR	M (JAMBA)	Inhabits dry box-ironbark eucalypt forests near rivers and creeks on inland slopes of the Great Dividing Range. It could also occur in small remnant patches or in mature trees in farmland or partly cleared agricultural land (Higgins et al. 2001).	16	16/01/2001	Suitable habitat not present within the study area - **unlikely to occur**
Rufous Fantail	*Rhipidura rufifrons*		M (Bonn Convention (A2H))	Primarily found in dense, moist habitats. Less often present in dry sclerophyll forests and woodlands (Higgins et al. 2006).	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Satin Flycatcher	*Myiagra cyanoleuca*		M (Bonn Convention (A2H))	Tall forests and woodlands in wetter habitats but not in rainforest (Higgins et al. 2006)	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**

Common Name	Scientific Name	EPBC-thrt	EPBC-mig	Habitat	Number of records	Date of last record	Likelihood of occurrence
Superb Parrot	*Polytelis swainsonii*	VU		It occurs in riparian River Red Gum forests and adjacent areas of box eucalypt vegetation from the Murrumbidgee and Murray Rivers northwards to the Namoi Valley. Breed in hollow branch or trunk of tall eucalypts within 9 km of feeding areas. Mostly feed in box woodlands and wooded farmlands; less often in riparian forests. (Higgins 1999).	2	1/01/1940	Suitable habitat not present within the study area - **unlikely to occur**
Swift Parrot	*Lathamus discolor*	CR		Prefers a narrow range of eucalypts in Victoria, including White Box, Red Ironbark and Yellow Gum as well as River Red Gum when this species supports abundant 'lerp'. Breeds in Tasmania and migrates to the mainland of Australia for the autumn, winter and early spring months. It lives mostly north of the Great Dividing Range, passing through two areas of Victoria on migration: the Port Phillip district and Gippsland. (Emison et al. 1987; Higgins 1999; Kennedy and Tzaros 2005).	26	20/03/2003	Suitable habitat not present within the study area - **unlikely to occur**
White-throated Needletail	*Hirundapus caudacutus*		M (JAMBA, CAMBA, ROKAMBA)	Aerial, over all habitats, but probably more over wooded areas, including open forest and rainforest. Often over heathland and less often above treeless areas such as grassland and swamps or farmland (Higgins 1999).	None	N/A	May occasionally forage over the study area, though would not make any direct use of habitat there - **potential to occur**, though would not be impacted by development of the study area.
Yellow Wagtail	*Motacilla flava*		M (JAMBA, CAMBA, ROKAMBA)	Extremely uncommon migrant. Few sightings in Victoria. Mostly occurs in well-watered open grasslands on the fringes of wetlands. Roosts in mangroves and other dense vegetation (DotE 2015).	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Mammals							
Grey-headed Flying-fox	*Pteropus poliocephalus*	VU		Brisbane, Newcastle, Sydney and Melbourne are occupied continuously. Elsewhere, during spring, they are uncommon south of Nowra and widespread in other areas of their range. Roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban.	9	21/01/2016	Suitable habitat not present within the study area - **unlikely to occur**
Greater Glider	*Petauroides volans*	VU		Forest habitats including peppermint, stringybark, ash and gum dominated (Menkhorst 1995).	None	N/A	Suitable habitat not present within the study area - **unlikely to occur**
Eastern Barred Bandicoot	*Perameles gunnii*	EN		The habitat of the Eastern Barred Bandicoot (mainland) is perennial tussock grassland and eucalypt woodland with a grassy ground layer (Dufty 1994b; Seebeck 1995a, 2001). Drainage lines and areas of high vegetative cover have been identified as prime habitat. The key determining factor for persistence of this species appears to be high structural complexity and heterogeneity within the environment, reflected in its absence from agricultural areas but persistence in rubbish dumps and other variable habitats.	1	1/01/1930	Suitable habitat not present within the study area - **unlikely to occur**
Eastern Quoll	*Dasyurus viverrinus*			Widespread in Tasmania and was previously widespread in mainland south-eastern Australia. The species is considered extinct on the mainland, with the last confirmed mainland sighting at Vaucluse in 1963 (Dickman et al., 2001).	3	1/01/1930	Known to be extinct on mainland Australia since the 1960's – **unlikely to occur**

Common Name	Scientific Name	EPBC-thrt	EPBC-mig	Habitat	Number of records	Date of last record	Likelihood of occurrence
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	EN		Rainforest, wet and dry forest, coastal heath and scrub and River Red-gum woodlands along inland rivers (Menkhorst 1995).	2	1/01/1930	Suitable habitat not present within the study area - **unlikely to occur**
Reptiles							
Striped Legless Lizard	*Delma impar*	VU		Grassland specialist. Known to occur in some areas dominated by introduced species such as Phalaris aquatica, Serated Tussock (Nasella trichotoma) and Hypocharis radicata(Corrigan et al. 1996; Coulson 1990; Hadden 1995; Kukolic 1994; O'Shea 1996; Rauhala 1996; Rauhala et al. 1995) and at sites with a history of grazing and pasture improvement (Coulson 1995; Dorrough 1995; Smith & Robertson 1999). shelter in grass tussocks, thick ground cover, soil cracks, under rocks, spider burrows, and under ground debris such as timber (Smith & Robertson 1999). The majority of sites in Victoria and NSW occur on cracking clay soils with some surface rock which provide shelter for the species (Cogger et al. 1993; Coulson 1995).	4	28/11/1991	Preferred habitat (remnant grassland) not present within the study area. Two limited patches of potential habitat (Stony Knoll Shrubland) exist in the study area though are disjunct, surrounded by disturbed areas and small (0.25 ha and 0.02 ha). Targeted tile grid surveys undertaken for Striped Legless Lizards between September to December in 2007 (BL&A 2008b) did not record the species - **unlikely to occur**
Frogs							
Growling Grass Frog	*Litoria raniformis*	VU		Permanent, still or slow flowing water with fringing and emergent vegetation in streams, swamps, lagoons and artificial wetlands such as farm dams and abandoned quarries (Clemann and Gillespie 2004).	244	19/12/2015	Numerous recent records occur in the search region. However, potential habitat in the study area is limited to one small patch of Plains Grassy Wetland (0.05 ha). This area is of low quality and is disjunct from other waterbodies, therefore the species is considered **unlikely to occur.**
Invertebrates							
Eltham Copper Butterfly	*Paralucia pyrodiscus lucida*	EN		In the Eltham area of its range, this Butterfly appears to require a well-drained gentle slope, with a north to west aspect. Its known habitat is sparse dry woodland (Webster 2003).	1	1/01/1922	Suitable habitat not present within the study area - **unlikely to occur**
Golden Sun Moth	*Synemon plana*	CR		Areas that are, or have been native grasslands or grassy woodlands. It is known to inhabit degraded grasslands with introduced grasses being dominant, with a preference for the native wallaby grass being present (DEWHA 2009).	1027	7/12/2015	Suitable habitat present within the study area. Numerous individuals recorded during most recent targeted Golden Sun Moth surveys undertaken in late 2016. **Recorded** in the study area.

Notes: EPBC-T = threatened species status under EPBC Act; EX = presumed extinct in the wild; CE = critically endangered; EN = endangered; VU = vulnerable; **EPBC-M** = migratory status under the EPBC Act; M = listed migratory taxa; Bonn Convention (A2H) - Convention on the Conservation of Migratory Species of Wild Animals – listed as a member of a family; Bonn Convention (A2S) - Convention on the Conservation of Migratory Species of Wild Animals - species listed explicitly; CAMBA - China- Australia Migratory Birds Agreement; JAMBA - Japan-Australia Migratory Birds Agreement; ROKAMBA - Republic of Korea Australia Migratory Birds Agreement.

3. TARGETED SURVEYS UNDERTAKEN FOR MNES

3.1. Ecological communities

3.1.1. Survey methods

A targeted survey to determine the presence/absence of *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP) and *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* (SHWTLP) in the study area was undertaken on the 1st December 2016 (BL&A 2017).

During this survey, the landform and vegetation in the study area was assessed against the published qualifying criteria for the NTGVVP (Threatened Species Scientific Committee 2008) and SHWTLP (Threatened Species Scientific Committee 2012) communities.

3.1.2. Survey limitations

There were no significant limitations during the field assessment, which was undertaken at an optimal time of year and under ideal survey conditions.

3.1.3. Results

As noted in the amended native vegetation assessment report (BL&A 2017), the majority of the study area is dominated by introduced flora and does not support the potential for any listed communities. Three small patches of native vegetation occur in the study area including two areas of Stony Knoll Shrubland and one area of Plains Grassy Wetland (Figure 2). The Stony Knoll Shrubland patches were both dominated by a shrub layer and lacked the native grassy cover to allow consideration as NTGVVP as per the key diagnostic features and condition thresholds for NTGVVP (TSSC 2008).

The patch of Plains Grassy Wetland recorded in the southern part of the study area is 0.054 hectares and falls well below the minimum wetland size as documented in Part C of the condition thresholds for the SHWTLP (TSSC 2012). The Plains Grassy Wetland also did not meet the condition thresholds for NTGVVP (TSSC 2008).

Based on the above considerations, NTGVVP and SHWTLP are not considered to occur in the study area. Therefore, no EPBC Act listed ecological communities occur in the study area.

Legend

Study area

Native vegetation

Plains Grassy Wetland (EVC 125)

Stony Knoll Shrubland (EVC 649)

Metres

0 50 100 200

Figure 2: Study area and native vegetation

Project: Cooper & O'Hearns Subdivision

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3.2. Flora species

3.2.1. Survey methods

A targeted survey for EPBC Act listed flora species was undertaken at the study area on 1st December 2016, by a suitably qualified and experienced botanist from BL&A. The targeted flora survey was carried out for flora species that were considered to have the potential to occur in areas of suitable habitat, namely within the three remnant patches of native vegetation in the study area (See Figure 2). The known regular flowering periods of each species is provided below.

Species

- Adamson's Blown-grass (November to December)
- Maroon Leek-orchid (October to December)
- Matted Flax-lily (October to April)
- River Swamp Wallaby-grass (November to March)
- Swamp Everlasting (November to March)
- White Sunray (November to December)

The targeted flora survey was undertaken in December 2016 in accordance with the field methods set out in the relevant online DoEE Species Profile and Threats Databases (SPRAT Profiles), national recovery plans and where relevant, the Victorian Department of Sustainability and Environment's (DSE) *Biodiversity Precinct Structure Planning Kit* (DSE 2010). This involved visually searching all suitable habitat in the study area (within the three remnant patches of native vegetation, see Figure 2) along transects spaced at five metres apart or less. This transect spacing was considered adequate for detection of the targeted species as it is in accordance with the relevant survey guidelines.

3.2.2. Survey limitations

Targeted flora surveys can fail to record some species (or individuals of the same species) that are present for various reasons such as short survey duration or vegetation condition. However, the targeted survey was carried out during the regular known flowering period for all targeted species. The survey period was therefore considered optimal for detecting any presence and locations of all the targeted species.

3.2.3. Results

None of the targeted flora species listed above were detected during the targeted flora survey, therefore they are now considered unlikely to occur in the study area. As such, no EPBC Act listed flora species occur within the study area.

3.3. Fauna species

3.3.1. White-throated Needletail

The White-throated Needletail, the largest of the swifts in Australia, is listed as *migratory* under the EPBC Act. It is aerial and occurs mainly over forested regions, but also often over treeless areas such as grassland and farmland. While no records exist for the species in the search region, there is potential that the species may occasionally forage over the study area.

However, given the species is mainly aerial, the proposed action at the study area would not impact on the species. As such, the White-throated Needletail has been excluded from consideration against the DoEE's significant impact criteria for EPBC Act listed migratory species (DoE 2013).

3.3.2. Striped Legless Lizard

The Striped Legless Lizard (SLL) is listed as *vulnerable* under the EPBC Act, listed under the FFG Act and listed as *endangered* in Victoria on the DELWP threatened species Advisory list (DSE 2013). The Striped Legless Lizard inhabits dense native grasslands, often with rocky rises, that were once extensive on the volcanic plains west of Melbourne (Webster *et al.* 1992).

The VBA holds four records of the Striped Legless Lizard in the search region, the latest record being from 1991 (DELWP 2017). While no native grassland vegetation was recorded within the study area, the small area of Stony Knoll Shrubland was originally considered to provide potential habitat for the species during the initial flora and fauna assessment in 2007.

To determine the presence/absence of the species in the study area, a targeted SLL tile-grid survey was undertaken between September and December in 2007. The methodology used for the SLL tile-grid survey followed the technique used by the Victorian Striped Legless Lizard Working Group, which was the standard method for assessing presence/absence of SLL in Victoria at the time. Similarly to the current survey standards, this technique laid out a grid of 73 terracotta roof tiles within the largest patch of Stony Knoll Shrubland in the study area (Habitat Zone C1, See Figure 2), as a means of creating refugia for the species. The tiles were set out in early September 2007, with six checks being undertaken on separate days from 26th October through to 21st December 2007. Full details on the methodologies used for the targeted SLL tile-grid survey are provided in the BL&A Threatened Species Assessment Report (BL&A 2008b).

No SLL were recorded in the study area during the targeted tile-grid survey undertaken in 2007 (See BL&A 2008b for further details). This result, along with the consideration that the areas of suitable of habitat within the study area (the two areas of Stony Knoll Shrubland) are very small and disjunct from other areas of suitable habitat, suggests that the Striped Legless Lizard is unlikely to occur in the study area. As such, SLL has been excluded from consideration against the DoEE's significant impact criteria for EPBC Act listed species (DoE 2013).

3.3.3. *Golden Sun Moth*

Status and Habitat description

The Golden Sun Moth *Synemon plana* is listed as 'critically endangered' under the EPBC Act, threatened under the Flora and Fauna Guarantee Act 1988 (FFG Act) and is listed as critically endangered in Victoria (DSE 2013).

Once wide-spread over south-eastern Australia, the Golden Sun Moth (GSM) is now restricted to fragmented populations across Victoria, NSW and ACT (DEWHA 2009). They are found in native grassland with a good cover of wallaby grass *(Rytidosperma* spp.) (Cook & Edwards 1993). More recently it has been recorded in sites that support a limited cover of wallaby grass and even in sites dominated by exotic species, such as Chilean Needle-grass (*Nassella neesiana*).

Methods

Existing Information

Existing information on the GSM was obtained from the search region on the 13th January 2017, as detailed in Section 2.1.2.

Field Methodology

Habitat assessment

The GSM habitat assessment was undertaken in two stages:

- Potential habitat determination. An initial pre-targeted survey assessment was undertaken to identify and map parts of the study area that were considered to potentially support GSM, based on the presence and density of known GSM food plants – particularly wallaby grasses and Chilean Needle-grass. An arbitrary threshold of 50% cover or more of Chilean Needle-grass and wallaby grasses (combined cover) was applied when mapping this potential habitat. The GSM targeted survey was undertaken in these mapped areas of potential GSM habitat, which are presented below in Figure 3; and
- Refined (actual) habitat determination. Over the course of the targeted survey, potential GSM habitat areas were refined to represent the actual extent of GSM habitat based on published information on the habitat requirements of GSM, from sources such as DEWHA (2009a; 2009b); DoEE (2017); DSE (2014); Cook & Edwards (1993); O'Dwyer & Attiwil (1999) and Van Praagh (2006). From this information, the following habitat characteristics we used to guide the habitat mapping exercise:
  - Areas where known food plants are present and dominant (i.e. Chilean Needle-grass and wallaby grasses);
  - Structure is relatively open and bare ground is evident (to allow for successful mating and recruitment); and
  - The area has not undergone any recent significant ground disturbance (which would be assumed to have destroyed any larvae present).

It was assumed that any GSM recorded within 200 metres of the actual mapped areas of habitat would have originated from that habitat, as it is well known that GSM rarely fly more than 200 metres from their point of origin (DEWHA 2009a; 2009b & DoEE 2017).

Targeted survey

To determine presence/absence, population size and distribution of GSM within the study area, a series of transect surveys were undertaken. Surveys were conducted from the 1st to 23rd December 2016. Potential habitat was surveyed for GSM in accordance with the method set out in the EPBC Act policy statement 3.12 – *Significant impact guidelines for the critically endangered golden sun moth* (Synemon plana) published by the Commonwealth Government in 2009 (DEWHA 2009).

GSM are not as active on cooler days and do not fly as freely as on warm to hot days. When undertaking surveys to prove absence of GSM from an area, surveys of a nearby reference site that support GSM are required to determine if the species are flying on the day of the survey.

Surveys were conducted in suitable conditions, specifically including the following.

- Surveys were timed to coincide with the GSM activity season, i.e. November to January.
- Where practicable, surveys were undertaken during suitable weather conditions, including the following:
  - Warm to hot days (above 20°C by 10 am);
  - During the warmest part of the day;
  - Clear to mostly cloudless sky;
  - Still or relatively still wind conditions during the survey period;
  - At least two days since rain.
- Surveys were undertaken when male moths were flying. This was determined by visiting a nearby reference site known to support a population of the species on the day of the survey of the study area. The nearest reference site to the study area was 2 kilometres west of the study area, at 260 O'Herns Road, Epping.
- Where practicable, surveys commenced from 10 am and terminated at 3 pm.
- Transect locations were recorded using a hand-held GPS.
- Surveying involved walking transects at the following spacings:
  - During the first survey, transects were spaced 50 metres apart;
  - During the second survey, transects were spaced 25 metres apart;
  - During the third and fourth surveys, transects were spaced 10 metres apart.
- Surveys were approximately one week apart.

The aim of the surveys was to identify GSM presence/absence, population size and distribution. As per the guidelines this is achieved by undertaking a total of

four surveys in areas of suitable habitat. The area of potential GSM habitat which was covered in the transect survey is shown in Figure 3.

Legend

- Study area
- Potential GSM habitat (CNG dominated)

Metres

0 50 100 200

Figure 3: Study area and potential GSM habitat

Project: Cooper & O'Hearns Subdivision

Client: O'Herns Road Developments Pty Ltd

Project No.: 7145.3	Date: 7/12/2016	Created By: N. May / B. O'Callaghan

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GSM's observed were captured to confirm identification and their locations recorded on a hand held GPS to approximately five metre accuracy. Where practicable, all surveys took place during fine and sunny conditions, on days when temperatures reached 20°C by 10 am (See Table 2).

Limitations

Where practicable, all efforts are made to schedule GSM field surveys in optimal weather conditions with regular intervals between surveys. All four surveys for GSM in December 2016 were undertaken in appropriate weather conditions, when males were recorded flying at a nearby reference site (See Appendix 2). While surveying was not undertaken at exactly weekly intervals, the time between surveys was considered appropriate to ensure surveys were conducted on optimal weather days.

As such, the timing of the GSM survey and the weather conditions were considered suitable for detecting the species and estimating its abundance and distribution.

The detection of adult females is considered very difficult due to their poor flying ability, as they are more likely to walk between tussock grasses (DEWHA 2009). Males can only be surveyed with reasonable confidence as searching for females has proven laborious and unreliable (Gibson and New 2007). However, it is assumed that GSM have an equal sex ratio (Gibson 2006), like many other similar invertebrates.

Results

Existing Information

The VBA holds 1,027 records of GSM within ten kilometres of the study area, dated from 1906 to 2015, with the highest number of records (941) being from 2008.

Habitat Assessment results

During the targeted survey for GSM, transects were located at appropriate spacings within all areas of potential GSM habitat, as depicted in Figure 3 above.

Refined (actual) GSM habitat mapped in the study area is presented below in Figure 5. The dominant flora species in these areas of GSM habitat were Chilean Needle-grass (introduced), wallaby grasses (native) and fescue (Vulpia spp. - introduced). Other common introduced species present included bent grass (Agrostis spp. - introduced), Ribwort (Plantago lanceolata – introduced) and Cat's Ear (Hypochaeris spp. – introduced). Sites mapped as GSM habitat had a bare ground cover between 5 and 15%, and a low cover of organic litter (<10%). A representative photo of the Golden Sun Moth habitat in the study area is shown in Figure 4.

Note that areas of very high Chilean Needle-grass cover and low covers of wallaby grass were excluded from this habitat mapping as the structure was considered too dense to allow for effective mating and recruitment.

Figure 4: GSM habitat in the study area (dominant grasses are Chilean Needle-grass, wallaby grass and fescue)

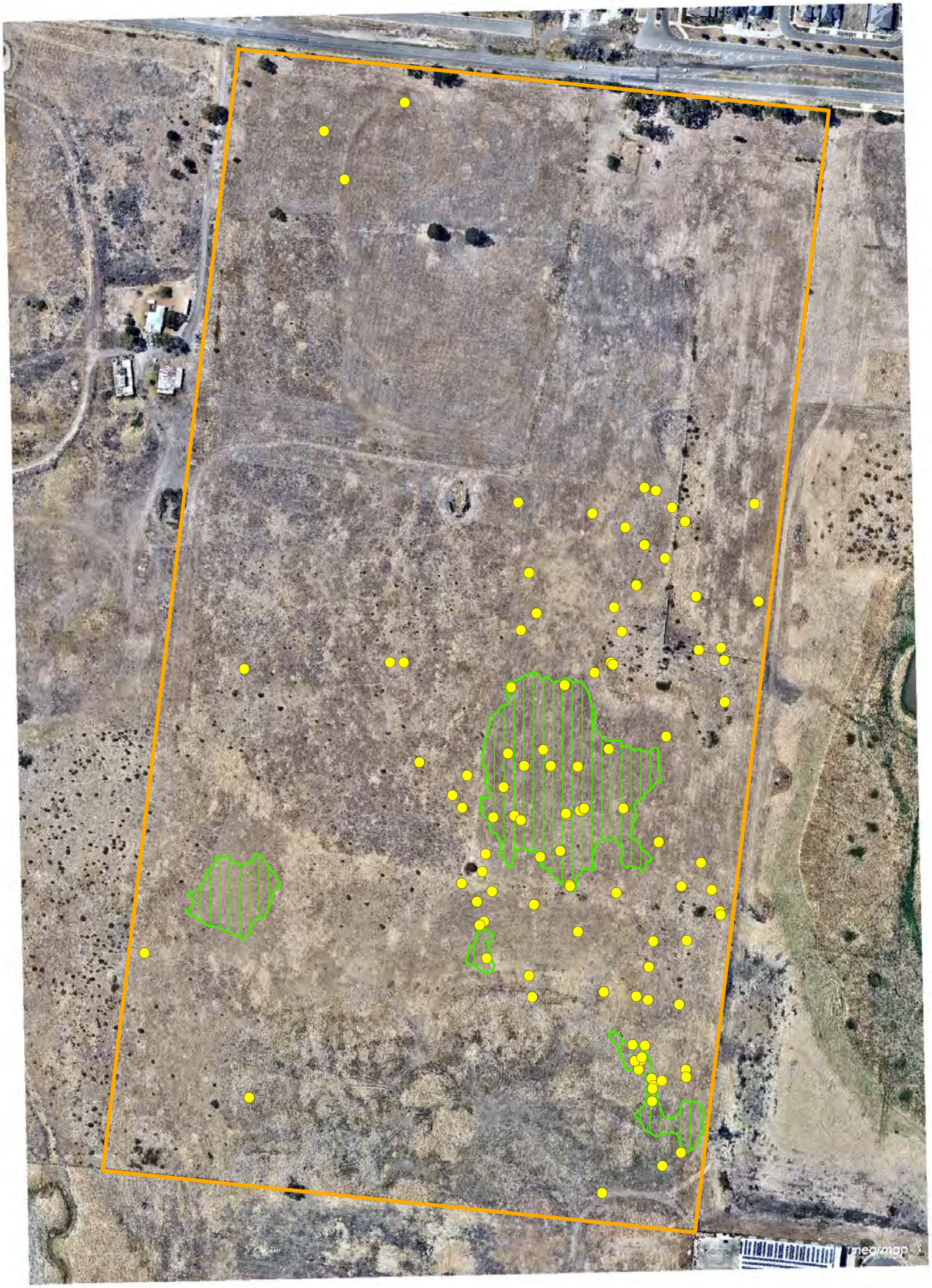
Targeted survey Results

Golden Sun Moth was detected in the study area during the second, third and fourth survey. Golden Sun Moth was not recorded during the first survey (50m transect spacings). Golden Sun Moth survey results are provided in Table 2. Refined GSM habitat mapping, along with the locations of GSM recorded during the targeted survey are shown in Figure 5.

Weather conditions recorded during the surveys as well as details of the relevant GSM reference site are provided in Appendix 2.

Table 2: Golden Sun Moth survey results

Date	Transect separation distance (m)	Survey Start time	Survey End time	Number of Golden Sun Moths recorded	Notes
1/12/2016	50m	12:20	14:40	None	N/A
12/12/2016	25m	12:10	14:50	22	Only male GSM recorded flying over vegetation
19/12/2016	10m	11:05	15:05	18	Only male GSM recorded flying over vegetation
23/12/2016	10m	10:50	14:35	74	Mostly male GSM recorded flying over vegetation. One female recorded mating with male moth on grass tussock



Legend

- Study area
- GSM habitat
- GSM observations

Metres

0 50 100 200

Figure 5: GSM habitat and records

Project: Cooper & O'Hearns Subdivision

Client: O'Herns Road Developments Pty Ltd

Project No.: 7145.3	Date: 11/01/2017	Created By: N. May / B. O'Callaghan

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4. SIGNIFICANT IMPACT ASSESSMENT

4.1. Proposed development

The proposed development will involve subdivision of the subject land for commercial and industrial development. The majority of the property is proposed to be developed, with the largest area of native vegetation to be retained within an area of open space.

4.2. Significant impact assessment for Golden Sun Moth

To determine whether the proposed action at the study area would result in a significant impact, an assessment was conducted against the *Significant impact guidelines for the critically endangered golden sun moth (Synemon plana) EPBC Policy statement 3.12* (DEWHA 2009a). This guideline document states that there is a real chance or possibility that that an action would have a significant impact on the Golden Sun Moth if the action resulted in the loss, degradation or fragmentation of GSM habitat. Further impact thresholds are provided based on the area of impact compared to the overall area of GSM habitat recorded. Area impact thresholds are as follows:

- For large or contiguous areas of GSM habitat (>10 hectares in area), an action would be considered as having a significant impact if the action resulted in the loss, degradation or fragmentation of >0.5 hectares of GSM habitat.
- For small or fragmented areas of GSM habitat (<10 hectares in area), an action would be considered as having a significant impact if the action resulted in the loss, degradation or fragmentation of **any** area of GSM habitat.
- For areas of GSM habitat that provide connectivity between other areas of GSM habitat, an action would be considered as having a significant impact if the action resulted in the fragmentation of a population (i.e. through the introduction of a barrier to dispersal).

Given that the area of GSM habitat being removed within the study area (1.55 hectares) is below the 10 hectare threshold, it is considered that **the proposed action will result in a significant impact on the Golden Sun Moth** according to the above criteria.

5. IMPLICATIONS AND RECOMMENDATIONS

One Matter of National Environmental Significance (MNES), the Golden Sun Moth, listed as critically endangered under the EPBC Act was recorded in the study area during the current investigation.

As it was determined that development of the study area would result in a significant impact on Golden Sun Moth, it is recommended that the proposed action be referred to the Commonwealth Minister for the Environment under the EPBC Act.

The Minister would then decide after 20 business days whether the proposed action will be a 'controlled action' or not. Should the Minister decide that the proposed action will be a controlled action, approval will be required under the EPBC Act, which would most likely be assessed by *preliminary documentation*, which is a detailed report in which all aspects of the proposed action are detailed. Should the Minister decide that the proposed action will not be a controlled action, then approval under the EPBC Act will not be required.

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Appendix 1: EPBC Act Protected Matters Search Tool report (13th January 2017)

Australian Government
Department of the Environment and Energy

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.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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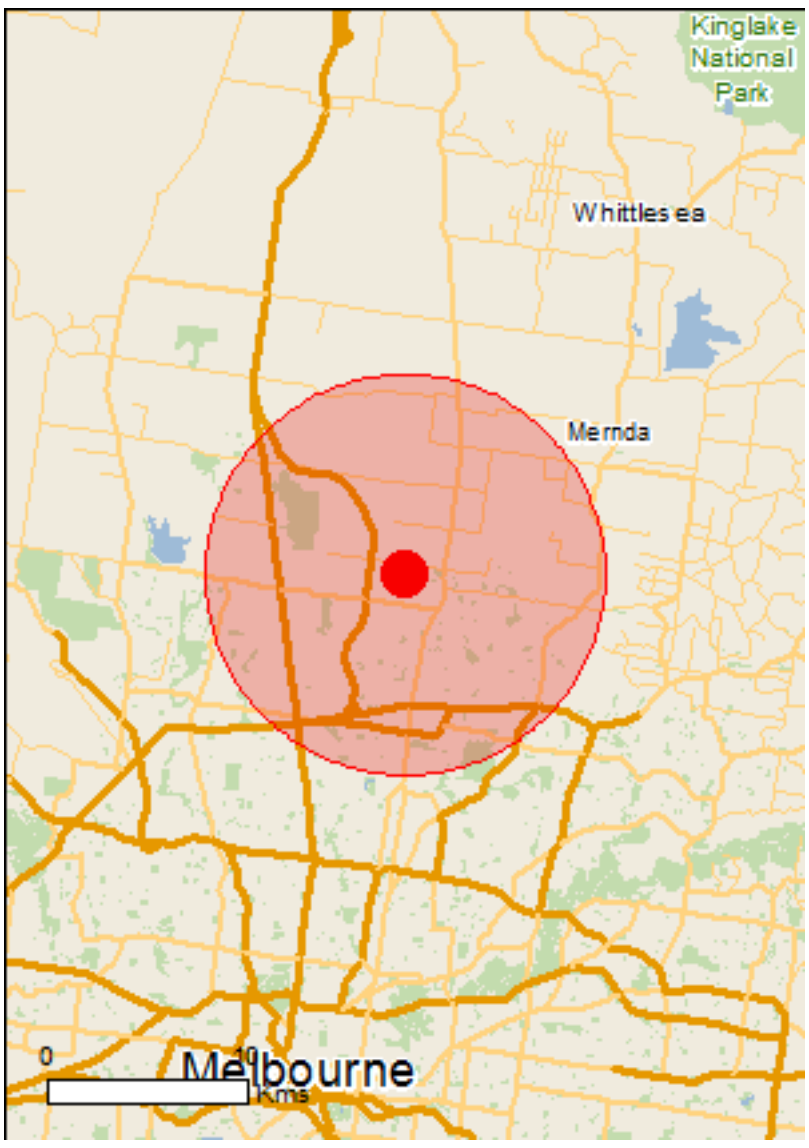

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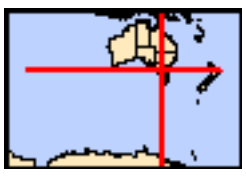

Summary

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.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	33
Listed Migratory Species:	11

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. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

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.

Commonwealth Land:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	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:	4
Regional Forest Agreements:	2
Invasive Species:	51
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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.

Name	Status	Type of Presence
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	Community known to occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community may occur within area
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community may occur within area
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community likely to occur within area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	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 likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Galaxiella pusilla		
Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat known to occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Nannoperca obscura		
Yarra Pygmy Perch [26177]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Insects		
Paralucia pyrodiscus lucida		
Eltham Copper Butterfly [66766]	Endangered	Species or species habitat likely to occur within area
Synemon plana		
Golden Sun Moth [25234]	Critically Endangered	Species or species habitat known to occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Amphibromus fluitans		
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area
Caladenia amoena		
Charming Spider-orchid [64502]	Endangered	Species or species habitat likely to occur within area
Dianella amoena		
Matted Flax-lily [64886]	Endangered	Species or species habitat known to occur within area
Glycine latrobeana		
Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat known to occur within area
Lachnagrostis adamsonii		
Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat likely to occur within area
Leucochrysum albicans var. tricolor		
Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Pimelea spinescens subsp. spinescens](#) Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat may occur within area
[Pomaderris vacciniifolia](#) Round-leaf Pomaderris [4256]	Critically Endangered	Species or species habitat likely to occur within area
[Prasophyllum frenchii](#) Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
[Pterostylis cucullata](#) Leafy Greenhood [15459]	Vulnerable	Species or species habitat may occur within area
[Senecio macrocarpus](#) Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat likely to occur within area
[Thelymitra matthewsii](#) Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
[Xerochrysum palustre](#) Swamp Everlasting [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
[Delma impar](#) Striped Legless Lizard [1649]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat known to occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat likely to occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Breeding known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Defence - LOGISTIC FACILITY(Maygar Barracks) - BROADMEADOWS
Defence - RANAD SOMERTON

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Cooper St Grassland N.C.R.	VIC
Craigieburn Grassland N.C.R.	VIC
Gresswell Forest (part a) N.C.R.	VIC
Gresswell Forest (part b) N.C.R.	VIC

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Central Highlands RFA	Victoria
West Victoria RFA	Victoria

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

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 and National Heritage properties, Wetlands of International and National 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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

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.

Coordinates

-37.63972 145.00861

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-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, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix 2: Weather conditions during the Golden Sun Moth surveys and reference site location details

Date	Study area							Reference Site	
	Transect separation distance (m)	Cloud cover (%)	Wind strength	Wind direction	Survey Start time	Survey End time	Temp range (°C)	Name	GSM at ref site? (Yes/No)
1/12/2016	50m	30	Gentle	W	12:20	14:40	22 to 25	260 O'Herns Rd, Epping	Yes
12/12/2016	25m	10	Gentle to Fresh	N	12:10	14:50	30 to 31	260 O'Herns Rd, Epping	Yes
19/12/2016	10m	20	Strong	NW	11:05	15:05	26 to 28	260 O'Herns Rd, Epping	Yes
23/12/2016	10m	10	Gentle	E	10:50	14:35	31 to 35	260 O'Herns Rd, Epping	Yes