MAJOR ROAD PROJECTS VICTORIA

MAY 2021

EPBC ACT OFFSET MANAGEMENT PLAN

GROWLING GRASS FROG (BRADY SWAMP)

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EPBC Act Offset Management Plan
Growling Grass Frog (Brady Swamp)

Major Road Projects Victoria

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	NAME	DATE	SIGNATURE
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOGRAPHS

LIST OF APPENDICES

GLOSSARY

DAWE	Department of Agriculture, Water and the Environment (formerly DoEE)
DELWP	Department of Environment, Land, Water and Planning
DoEE	Department of Environment and Energy (formerly DoE)
DoE	Department of the Environment
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FFG Act	Flora and Fauna Guarantee Act 1988
FMP	Fauna Management Plan
HKWR Road	Healesville-Koo Wee Rup Road
IWC	Index of Wetland Condition
MNES	Matters of National Environmental Significance
MRPV	Major Road Projects Victoria
MSA	Melbourne Strategic Assessment
OMP	Offset Management Plan
P&E Act	*Planning and Environment Act 1987*
PD	Preliminary Documentation
PMST	Protected Matters Search Tool
SCO	Specific Control Overlay
SERU	South Eastern Roads Upgrade
SRU	Suburban Roads Upgrade
TA	Technical Advisor
TPZ	Tree Protection Zone
VBA	Victorian Biodiversity Atlas

ACKNOWLEDGEMENTS

1 INTRODUCTION

1.1 CONTEXT

This Offset Management Plan (OMP) for Brady Swamp under the EPBC Act has been prepared to offset residual impacts of the Healesville-Koo Wee Rup Road Upgrade (Stage 1B) project (the Project) to the Growling Grass Frog *Litoria raniformis.* The Growling Grass Frog is a listed Matter of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Project is located approximately 55 kilometres south east of Melbourne within the Cardinia Shire Local Government Area.

Further information on the impact of the Project on MNES, proposed avoidance and mitigation measures, and the overarching approach to offsets is provided in the Preliminary Documentation for the Project (WSP 2020b) that is publicly available here https://roadprojects.vic.gov.au/projects/south-eastern-roads-upgrade/healesville-koo-wee-rup-road.

The OMP for Brady Swamp forms part of the Healesville-Koo Wee Rup Road Offset Strategy (Arup 2020). The Offset Strategy expands on the commitments in the Preliminary Documentation and provides for a package of direct offsets for the Growling Grass Frog and other MNES impacted by the Project (i.e. Southern Brown Bandicoot) *Isoodon obesulus obesulus.* The other two OMPs included as part of the Offset Strategy are Harewood (Growling Grass Frog and Southern Brown Bandicoot offsets) and Brucknell (Southern Brown Bandicoot offsets only).

The Offset Strategy (Arup 2020) describes how the offset requirements for the Project will be achieved across the three offset sites, how the objectives of the *EPBC Act Environmental Offsets Policy* (DSEWPaC 2012) will be achieved and includes the EPBC Act Offsets Assessment Guide calculations. The OMPs focus specifically on the management actions to be implemented at each site, and how these actions will benefit the MNES and other significant values at each site. Figure 1.1 below illustrates the hierarch of offset documentation submitted as part of the Project.

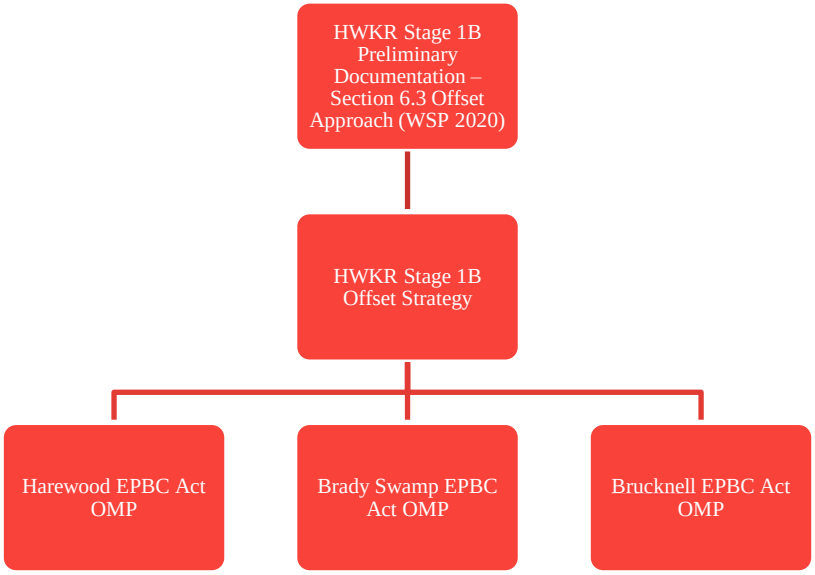

Figure 1.1 Hierarchy of documents flowchart

2 BRADY SWAMP OFFSET SITE

2.1 OFFSET SITE DETAILS

Brady Swamp is a large wetland located off North Boundary Road, west of Glenthompson in the western district of Victoria (Photo 2.1). It retains approximately 450 hectares of wetland habitat and is well-known as a biodiversity hotspot with many wetland values (Miller 2015). Brady Swamp forms part of the Wannon River floodplains and receives its waters from the Gooseneck Swamp to the northeast, and via the Bunnungal drainage line from the east (former Heifer Swamp). Brady Swamp is part of a complex of wetlands including Walker and Gooseneck Swamps (Miller 2015) and is flanked by agricultural grazing and pasture to the west and south. To the north, is the Brady Swamp Wildlife reserve which is contiguous with the Grampians National Park.

The proposed offset site is approximately 80 hectares in size (Table 2.1), of which only 16 hectares are required for the HKWR Road Upgrade project (subject to confirmation by DAWE); the remainder of the offset site will be made available for future projects requiring Federal and/or State offsets including an Advanced Offset site sunder the EPBC Act. The offset site is strategically placed within a contiguous network of known Growling Grass Frog breeding, dispersal and over-wintering habitat. The site itself is known to support Growling Grass Frogs and retains suitable habitat in the form of submergent and emergent aquatic flora. Growling Grass Frogs at this location are part of a much larger meta-population for the species, meaning there are strong prospects for long-term presence on site.

Table 2.1 Offset site details

ITEM	DETAILS
Landholder	[redacted]
Address / lot details	Street Address: North Boundary Road Glenthompson 3293 Volume: 12191 / Folio: 774 / Lot: 2 / Plan: PS829975G Parish: Bunnugal
Local Government area	Ararat
Catchment Management Authority	Glenelg Hopkins
Bioregion	Majority of the site occurs within the Dundas Tablelands bioregion with a small area located in the north-western part of the offset site inside the Victorian Volcanic Plain bioregion.
Total Offset area	76. 84 hectares
EPBC Offset area required	16 hectares (comprising 2.3 ha breeding and 13.7 ha dispersal habitat).
Planning zones & Overlays	Farming Zone — Environmental Significance Overlay (ESO3) — Significant Landscape Overlay (SLO1)

The offset site is situated on privately owned land in a Farming Zone. It is covered by an Environmental Significance Overlay (ESO3) and a Significant Landscape Overlay (SLO1). The property is currently un-encumbered and there are no conservation covenants on title. The landowner is a third party offset provider who is prepared to enter into an agreement via a Section 69 covenant under the *Conservation, Forests and Land Act 1987 (Vic)*.

2.2 OFFSET SITE HABITAT VALUES

In the 1950's, private landholders constructed drains through Walker, Gooseneck and Brady Swamps to reclaim more land and to encourage more water to flow into the Wannon River. However, this altered the depth and duration of water in the numerous swamps in the area. The Nature Glenelg Trust, a not-for-profit environmental organisation, undertook trials in 2013 and 2014, to test the feasibility of restoring water levels in three of the four wetlands in the complex of swamps, including Brady Swamp (Miller 2015). This involved community effort and government grants to block the drains with sand bags and monitor the water levels and biota to test the result. Subsequent biodiversity surveys of aquatic flora, fish and frog species revealed a highly rich and abundant array of species, which lead to permanent earthworks in 2015. The wetland, including Brady Swamp, has now been restored to better reflect more natural inundation and drying cycles (Nature Glenelg Trust 2020b).

2.2.1 GROWLING GRASS FROG

A large population of Growling Grass Frogs were recorded by WSP during targeted surveys. Targeted surveys were undertaken on 23 and 24 October 2019 by WSP at three sites shown in Figure 2.1. Male Growling Grass Frogs were recorded calling throughout the survey period. The greatest number of Growling Grass Frogs heard calling at the survey sites was estimated at >50 individuals at site 3 (Table 2-2). As not all Growling Grass Frogs would be calling during the survey period, it is estimated the population at Brady Swamp is likely to be in excess of 100 individuals. Each survey site is shown on Figure 2.1 and habitat assessment survey results are in Appendix B5.

Table 2-2 Growling Grass Frog survey results

SITE	DATE	RAINFALL (1)	TEMPERATURE (2)	PH (3)	GROWLING GRASS FROG RECORDED	TOTAL NUMBER RECORDED
1	23/10/2019	0	22.6	9.2	Yes	Heard 10-50
2	23/10/2019	0	22.6	9.2	Yes	Heard 30-50
3	24/10/2019	0	26.0	9.2	Yes	Heard 50+

(1) Rainfall recorded from weather station 089011 Dunkeld
(2) Temperature recorded from weather station 079103 Grampians (Mount William)
(3) Recorded on 2/10/2019 from Surface Water Site 238601 Brady Swamp @ Glenthompson (https://data.water.vic.gov.au/)

Water samples were not collected in October 2019, however water quality samples and eDNA samples were taken on 1 July 2020 (Table 2-3).

Table 2-3 Water quality and eDNA survey results

SITE	AREA	DATE	TEMPERATURE (°C)	PH	SALINITY		EDNA
					EC (MS)	MG/L	
1	Small swamp east of frog habitat site 1	1/07/2020	8.7	8.5	4.37	2913.3	Not detected
2	Large swamp area	1/07/2020	10.5	8.1	2.53	1686.6	Not detected

EC = electrical conductivity. This was measured in mS or decisiemens per metre. This converts to milligrams per litre (mg/l).

Two eDNA water samples were undertaken in July 2020 which tested negative to the presence of Chytrid at the time of sampling. Analysis was undertaken by CESAR (http://cesaraustralia.com/).

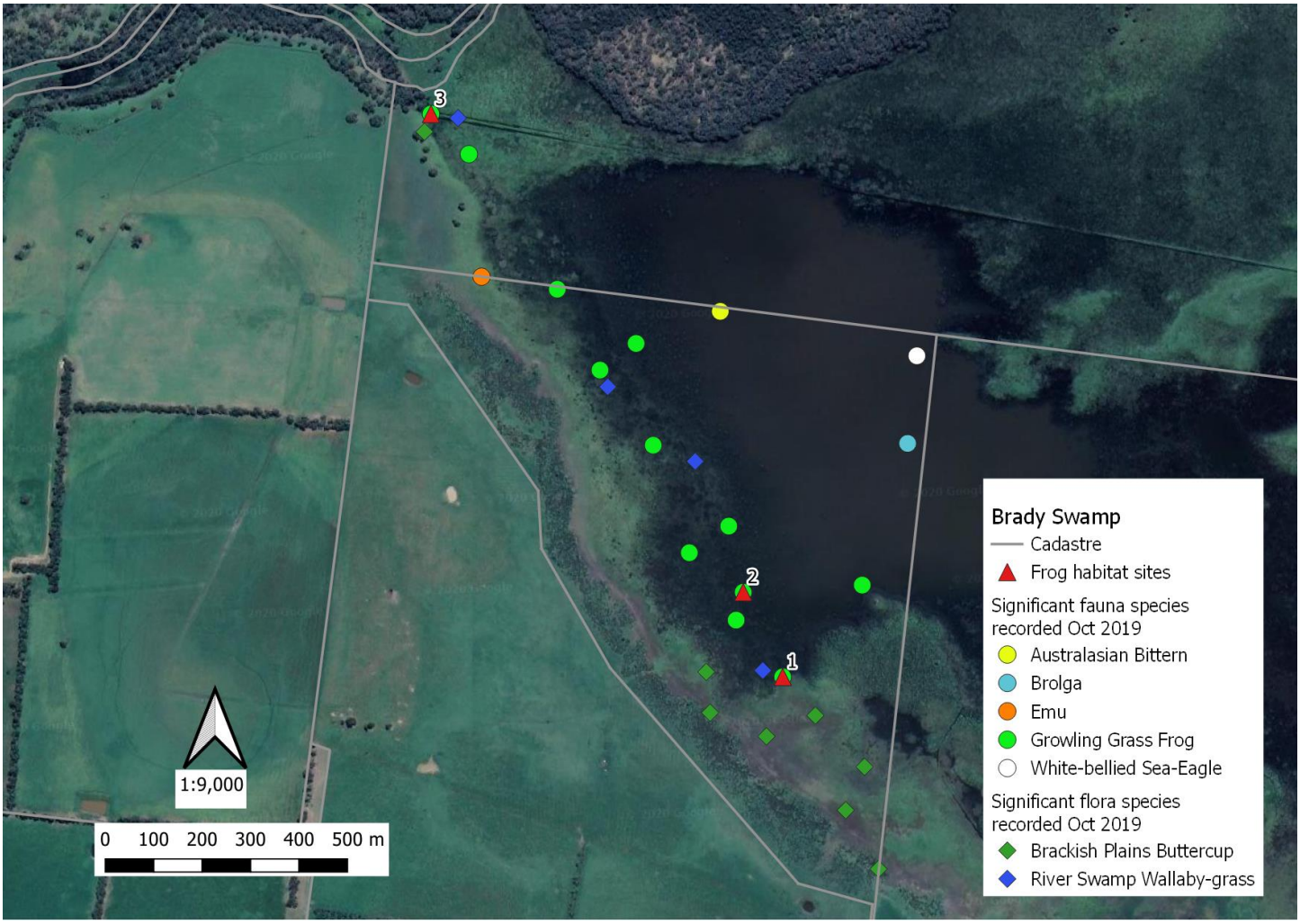

Figure 2.1 Survey sites for Growling Grass Frogs and records of significant flora and fauna at Brady Swamp

2.3 GROWLING GRASS FROG HABITAT ASSESSMENT

2.3.1 HABITAT DEFINITION

Growling Grass Frog habitat is defined by still or slow moving water bodies such as lagoons, swamps, lakes and farm dams with emergent vegetation consisting of sedges and rushes (e.g. *Typha* sp., *Phragmites* sp and *Eleocharis* sp.). Submerged vegetation is important for breeding success as it provides egg-laying sites, calling stages for males and food and shelter for tadpoles. Grassland surrounding waterbodies provides habitat for foraging, dispersal and shelter. Ideal breeding habitat is the shallow parts of lagoons (up to approximately 1.5 m deep) where there is a complex vegetation structure. Refuge habitat includes soil cracks, fallen timber, debris and dense vegetation and low, frequently inundated floodplains (Department of Environment Water Heritage and the Arts 2009).

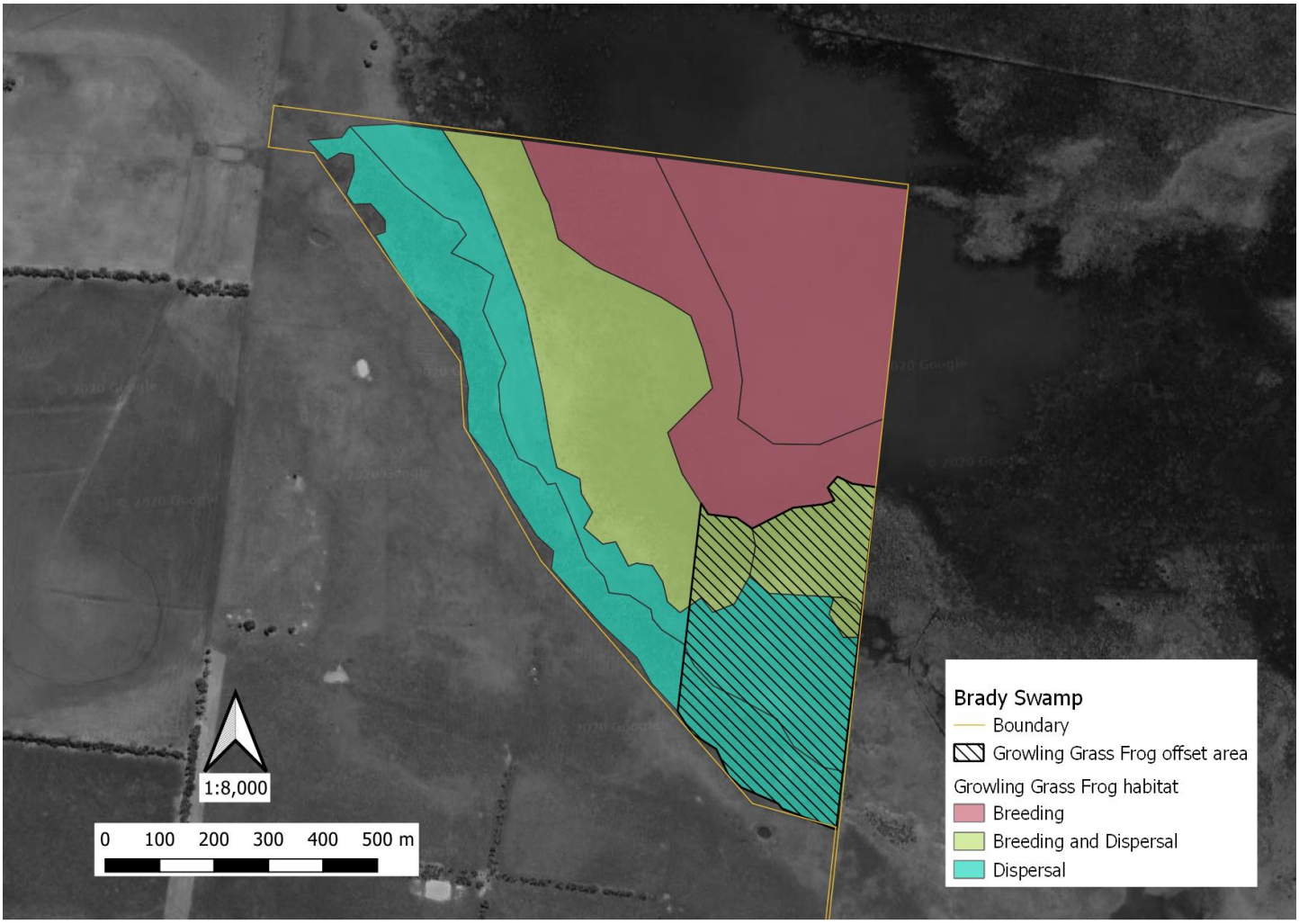

Figure 2.2 Growling Grass Frog Habitat at Brady Swamp

2.3.2 OFFSET SITE

The Growling Grass Frog offset area at Brady Swamp was mapped in three categories; breeding only, dispersal only and breeding and dispersal (See Figure 2.2), approximately two thirds of the site is suitable breeding habitat, similar to other large swamps in the local region (e.g. Bryan Swamp, Lake Buninjon) where almost the entire swamp may be considered as breeding habitat. In typical seasons with average rainfall, the majority of the swamp floor fills and areas for breeding are available along the shallower areas with aquatic and emergent semi-aquatic vegetation. In seasons with lower rainfall, breeding areas are likely to be further towards the centre of the swamp floor. For the purposes of this report, it is assumed breeding habitat is present in the deeper areas (e.g. Aquatic Herbland). Combined breeding and dispersal shallower areas align with Tall Marsh, Cane Grass Wetland and Aquatic Herbland EVCs (and complexes) and dispersal-alone habitat aligns with Brackish Herbland and Brackish Sedgeland which are on the outer fringes of the wetland. Refer to Section 2.3.4.1 for EVC descriptions and Figure 2.2 above for Growling Grass Frog habitat mapping at Brady Swamp.

The habitat is further described in Table 2.4 below, and as documented in the Preliminary Documentation (WSP 2020b) (also available on-line at http://epbcnotices.environment.gov.au/publicnoticesreferrals/). The habitat quality criteria outlined in Table 2.4 also incorporates guidelines set out in the *Sub-regional species strategy for the Growling Grass Frog* (DEPI 2013) that have been

adapted to suit the EPBC Offsets Policy. Please also note that the same assessment criteria were applied to the Growling Grass Frog habitat loss areas in order to calculate offset targets.

Photo 2.1 Growling Grass Frog habitat throughout Brady Swamp

2.3.3 CONNECTIVITY

The offset area comprises part of the greater Brady Swamp, which includes 1,086 hectares of palustrine wetlands as identified on the Wetland Current layer (DELWP 2019) . The site is directly connected to a chain of wetlands including Gooseneck Swamp upstream, an area of known Growling Grass Frog records. There is also extensive Growling Grass Frog breeding and dispersal habitat within the Wannon River floodplain and riparian complexes, downstream to the west. In addition, the northern boundary of the offset site is directly connected to the Grampians National Park which supports woodland habitat suitable for over-wintering by Growling Grass Frogs. Detailed mapping of the condition and extent of breeding and dispersal habitat for Growling Grass Frogs has not been undertaken for the broader network of wetlands around Brady Swamp. Therefore, the Wetland Current layer (DELWP 2019) was combined with the Growling Grass Frog habitat distribution model (DELWP 2017) and aerial photograph interpretation to identify the likely extent of potential habitat for the species (Figure 2.3). In addition, dispersal habitat has been defined as per the 200 m buffer requirement set out in the *Significant Impact Guidelines for the Vulnerable Growling Grass Frog* (DEWHA 2009).

Given the site's strategic location within a contiguous network of known Growling Grass Frog breeding, dispersal and over-wintering habitat, the population of Growling Grass Frogs at Brady Swamp are therefore considered to be part of a much larger metapopulation, as defined in (Clemann & Gillespie 2012).

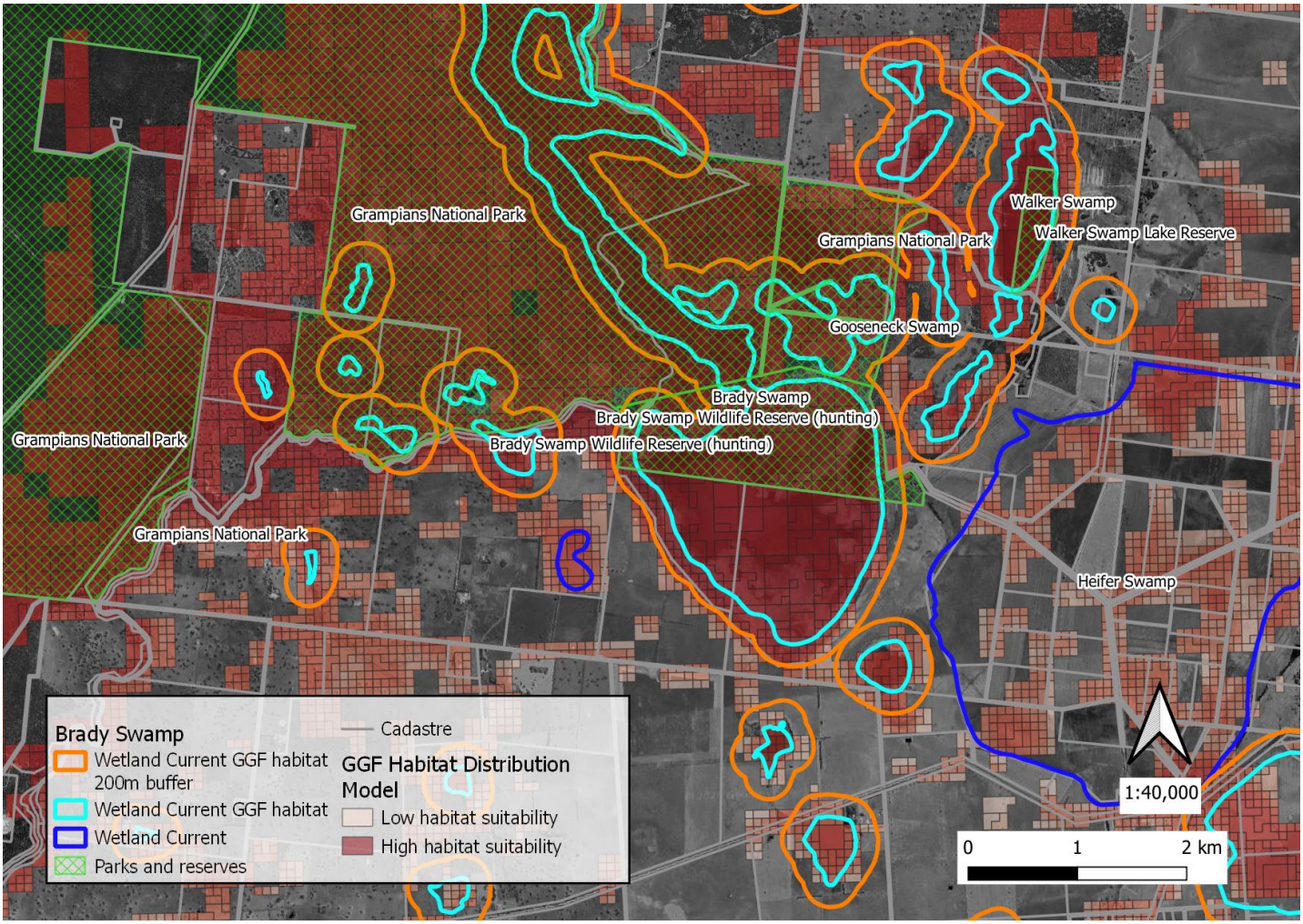

Figure 2.3 Growling Grass Frog habitat across broader region around Brady Swamp

Table 2.4 Growling Grass Frog Habitat Quality value determinations

BRADY SWAMP GROWLING GRASS FROG HABITAT VALUES		HABITAT QUALITY SCORE
Site condition	The Brady Swamp offset area comprises approx. 80 hectares (of which 16 hectares is required for the project) and makes up the southwestern quarter of a total wetland area of 450 hectares. The offset area retains submergent and emergent aquatic flora that provides for the habitat requirements of Growling Grass Frog. Large numbers (see Table 2-2) of male Growling Grass Frog were heard calling within the offset area. The wetlands were assessed using the Vegetation Quality Assessment method (Department of Sustainability and Environment 2004) and the Index of Wetland Condition (IWC) (DELWP 2016b). Refer to Appendix B3 and B4 for results. This site also qualifies as a remnant of the Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains vegetation community.	**High 2/3**
Site context	The Brady Swamp offset area is part of a larger 450 hectares of wetlands, and is contiguous with the Gooseneck Swamp upstream to the northeast and the Wannon River floodplain and riparian complexes downstream to the west, both with extensive Growling Grass Frog breeding and dispersal habitat. Woodland habitat suitable for over-wintering can be found to the north in the Grampians National Park. Growling Grass Frogs at this location are part of a much larger meta-population for the species with strong prospects for long-term presence on site. Brady Swamp has also benefitted in recent times from active water management by the Nature Glenelg Trust who are invested in retaining waters within the Wannon River wetland system to achieve water security for the Growling Grass Frog and a host of other EPBC listed flora and fauna taxa.	**High 2/3**
Species stocking rate	Large numbers (greater than 100) of Growling Grass Frogs recorded within the offset area. The Growling Grass Frog population within the offset area is contiguous with Growling Grass Frog populations (upstream) within the Gooseneck Swamp. It is likely that dispersal between connected sites occurs aiding genetic flow and creating a meta-population. Woodland habitat to the north within the Grampians National Park, and outflow habitat within the Wannon River floodplain and riparian corridor are also suitable for dispersal of Growling Grass Frog post-breeding and during seasonal drying cycles.	**High 4/4**
BRADY SWAMP GROWLING GRASS FROG BREEDING HABITAT QUALITY SCORE		**8/10**

2.3.4 OTHER VALUES

2.3.4.1 ECOLOGICAL VEGETATION CLASSES

The Brady Swamp offset site lies within the Dundas Tablelands bioregion and retains high quality remnant vegetation of brackish and freshwater vegetation communities including the following Ecological Vegetation Classes (EVCs) recorded by WSP (See Figure 2.4):

- Aquatic Herbland - EVC 653
- Brackish Herbland - EVC 538
- Brackish Sedgeland - EVC 13
- Cane Grass Wetland - EVC 291
- Cane Grass Wetland/ Aquatic Herbland Complex - EVC 602
- Tall Marsh - EVC 821.

The wetlands were assessed using the Vegetation Quality Assessment method (Department of Sustainability and Environment 2004). Where EVC benchmarks were not available for EVCs mapped and described, the closest type of EVC benchmarks were used and are identified in Appendix B3. EVC descriptions are based on those used for the Index of Wetland Condition assessment method (DELWP 2018; Frood 2009), with adaption to the specific species and conditions at Brady Swamp.

AQUATIC HERBLAND - EVC 653

Aquatic Herbland is widespread across Victoria and is a semi-permanent to seasonal wetland vegetation type. This EVC is dominated by herbaceous aquatic species such as Water Ribbons *Triglochin procera*, Water Milfoil *Myriophyllum spp.*, Common Spike-sedge *Eleocharis acuta*, River Swamp Wallaby-grass *Amphibromus fluitans* and typically much lower levels of Southern Cane-grass *Eragrostis infecunda* where the water is deeper and inundated for a longer period of time. Few weeds occur in this EVC when inundated apart from Thread Water-starwort **Callitriche brutia subsp. brutia*.

BRACKISH HERBLAND - EVC 538

This EVC is scattered across Victoria in inland and near-coastal areas, including estuarine sites. Brackish Herbland EVC is a low herbland dominated by species tolerant of mildly saline conditions and intermittent inundation. Species recorded at Brady Swamp include: Milky Beauty-heads *Calocephalus lacteus*, Australian Salt-grass *Distichlis distichophylla*, Common Spike-sedge *Eleocharis acuta*, Variable Willow-herb *Epilobium billardierianum*, Common Blown-grass *Lachnagrostis filiformis s.l*, Salt Pratia *Lobelia irrigua*, Brackish Plains Buttercup *Ranunculus diminutus*, Creeping Brookweed *Samolus repens var. repens*, White Sebaea *Sebaea albidiflora*, Yellow Sebaea *Sebaea ovata*, Shiny Swamp-mat *Selliera radicans*, Sand Spurrey *Spergularia spp*, Swamp Starwort *Stellaria angustifolia subsp. angustifolia*, Streaked Arrowgrass *Triglochin striata* and Round-leaf Wilsonia *Wilsonia rotundifolia*. Also recorded were exotic species Buck's-horn Plantain **Plantago coronopus* and Squirrel-tail Fescue **Vulpia bromoides*.

BRACKISH SEDGELAND - EVC 13

Medium to tall sedgeland, dominated by salt-tolerant sedges in association with a low grassy/herbaceous ground-layer. This EVC has scattered occurrences in near-coastal and western inland areas. At Brady Swamp, this EVC was dominated by Chaffy Saw-sedge *Gahnia filum*, Toad Rush *Juncus bufonius* and Brackish Plains Buttercup *Ranunculus diminutus*. Common Reed *Phragmites australis* was also recorded but to a lesser extent. Exotic species include Cape Weed **Arctotheca calendula*, Perennial Rye-grass **Lolium perenne* , Toowoomba Canary-grass **Phalaris aquatica*, Buck's-horn Plantain **Plantago coronopus* and White Clover **Trifolium repens var. repens*.

CANE GRASS WETLAND - EVC 291

A species-poor EVC dominated by Southern Cane-grass *Eragrostis infecunda* occurring in association with seasonal wetlands of low rainfall plains areas, typically on extremely heavy, grey clay soils. This EVC has scattered occurrences in drier plains in the west and north of Victoria. At Brady Swamp, this EVC was dominated by Southern Cane-grass *Eragrostis infecunda*. The area also supported River Swamp Wallaby-grass *Amphibromus fluitans*, Common Spike-sedge *Eleocharis acuta*, Swamp Starwort *Stellaria angustifolia subsp. angustifolia*, Water Ribbons *Triglochin procera* and weeds Pennyroyal **Mentha pulegium* and Thread Water-starwort **Callitriche brutia subsp. brutia*.

CANE GRASS WETLAND/AQUATIC HERBLAND COMPLEX - EVC 602

At Brady Swamp, the edges of EVC Cane Grass Wetland have been mapped as Cane Grass Wetland/Aquatic Herbland Complex. This complex consists of wetland vegetation with open stands of Southern Cane-grass in association with freshwater aquatic herbs. This EVC complex is rare, with scattered occurrences in the west and north of Victoria. At Brady Swamp, flora species recorded in this complex include; Southern Cane-grass *Eragrostis infecunda*, River Swamp Wallaby-grass *Amphibromus fluitans*, Small Loosestrife *Lythrum hyssopifolia*, River Buttercup *Ranunculus inundates* and Swamp Starwort *Stellaria angustifolia subsp. angustifolia*. Exotic species recorded in the complex include Thread Water-starwort **Callitriche brutia subsp. brutia*, Water Buttons **Cotula coronopifolia*, Pennyroyal **Mentha pulegium* and Strawberry Clover **Trifolium fragiferum var. fragiferum*.

TALL MARSH - EVC 821

Tall Marsh can be found scattered across lowland Victoria. Tall Marsh EVC is a wetland habitat dominated by tall emergent graminoids, typically in thick, species-poor swards. The structure is variously rushland, sedgeland or reedbed, locally closed or in association with Aquatic Herbland. The vegetation is typically treeless, but sparse River Red Gum *Eucalyptus camaldulensis* or Swamp Gum *Eucalyptus ovata* can be dispersed through some sites. At Brady Swamp, Tall Marsh EVC was dominated by Giant Rush *Juncus ingens*, Common Spike-sedge *Eleocharis acuta*, Willow Herb *Epilobium spp*, Common Nardoo *Marsilea drummondii*, White Purslane *Montia australasica*, Swamp Starwort *Stellaria angustifolia subsp. angustifolia* and, in deeper areas, Water Ribbons *Triglochin procera*. Exotic species recorded within Tall Marsh areas included Water Buttons, **Cotula coronopifolia*, Strawberry Clover **Trifolium fragiferum var. fragiferum* and White Clover **Trifolium repens var. repens.*

The offset area is a seasonal fresh to slightly brackish wetland that is inundated on a seasonal basis (typically filling after winter-spring rains) followed by a drying out period (typically over summer and into autumn). Preliminary examination of key diagnostic characteristics and condition thresholds in (DoEE 2019) suggests/indicates that part of Brady Swamp would qualify as the EPBC listed Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains vegetation community. Areas dominated by Southern Cane Grass such as in the EVC Cane Grass Wetland or Tall Marsh are contra-indicators for inclusion in Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains. However, other areas such as those with the EVCs Aquatic Herbland can be considered to be part of this community. The salinity levels of the water samples, indicate that the wetland is freshwater to brackish (DoEE 2019) (refer Table 2-3) and could be part of the community. However more detailed assessment against key diagnostic characteristics and condition thresholds should be undertaken to confirm if this community is present.

Brady Swamp was assessed in the state-wide assessment of Victorian wetlands 2010/11 and received an overall wetland condition category of 'good' or 7 out of 10, using the Index of Wetland Condition scoring (DELWP 2018) (see Appendix B4).

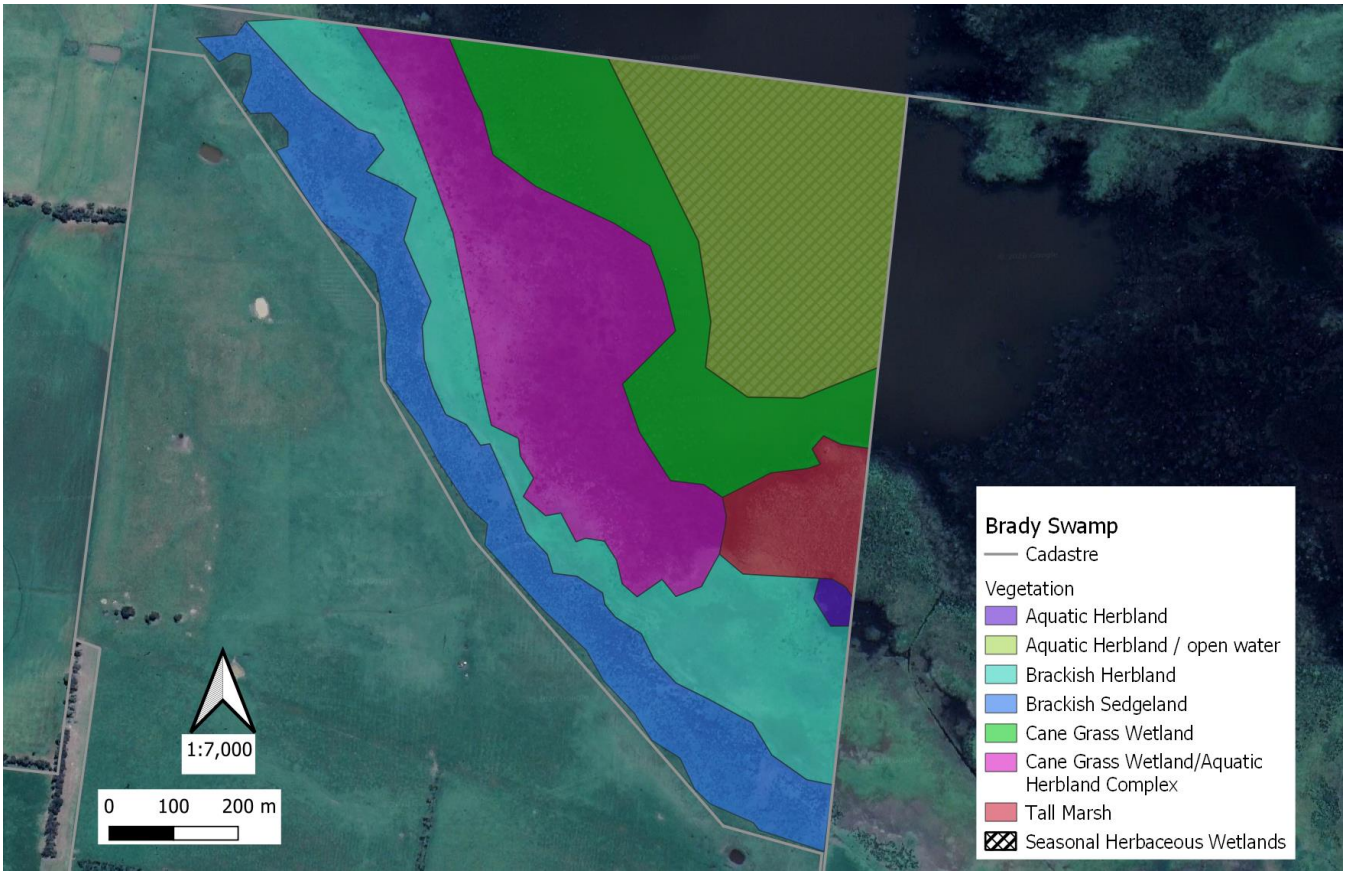

Figure 2.4 Ecological Vegetation Classes & Ecological Communities within the Offset Area at Brady Swamp

	
Aquatic Herbland	Brackish Herbland
	
Brackish Sedgeland	Cane Grass Wetland

	
Cane Grass Wetland/ Aquatic Herbland Complex	Tall Marsh
	
River Swamp Wallaby-grass seed	River Swamp Wallaby-grass
	
Brackish Plains Buttercup	Several Brolga recorded at Brady Swamp

Photo 2.2 Photos of EVCs and significant species from the Offset Area at Brady Swamp

2.3.4.2 FLORA AND FAUNA SPECIES

DATATBASE SEARCH

The Commonwealth EPBC Act Protected Matters Search Tool (PMST) was used to determine the likely ecological values of the proposed offset site. The PMST query returned a total of 38 EPBC listed flora and fauna species that are predicted to occur within a 5 km radius of the offset site, including eight birds, one crustacean, one fish, one frog, one insect, eight mammals, one reptile, and 17 plant species (see Appendix C). The PMST query also returned a total of 12 listed migratory species, including one migratory marine bird species, four migratory terrestrial species and seven migratory wetland species. Of these EPBC listed species, one plant and three fauna species have been recorded on site (refer to Table 2.5).

FIELD RECORDS

FLORA

A total of 89 plant species have been recorded by WSP and a list supplied by the landholder at the proposed offset site, of which 65 species (73%) are native and 24 species (27%) are exotic (refer to Appendix B1). Of these, one species is listed under the EPBC Act, and another is listed as rare on the *Advisory list of rare or threatened plants in Victoria* (DEPI 2014) (refer Table 2.5).

FAUNA

A total of 58 native fauna species have been recorded by WSP and a list supplied by the landholder at the Brady Swamp offset site (refer to Appendix B2). Of these, three are listed under the EPBC Act, seven are listed under the FFG Act and 13 are listed on the *Advisory List of Threatened Vertebrate Fauna in Victorian* (DSE 2013) (refer Table 2.5).

Table 2.5 Significant flora and fauna species recorded at Brady Swamp

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS	WSP RECORDED	RECORDS SUPPLIED BY LANDOWNER
FLORA				
Brackish Plains Buttercup	*Ranunculus diminutus*	r	✓	
River Swamp Wallaby-grass	*Amphibromus fluitans*	VU X	✓	
FAUNA				
Australasian Bittern	*Botaurus poiciloptilus*	EN en L	✓	
Australasian Shoveler	*Anas rhynchotis*	vu		✓
Brolga	*Grus rubicunda*	vu L	✓	✓
Little Galaxias	*Galaxiella toourtkoourt*	VU en L ^		✓
Eastern Great Egret	*Ardea modesta*	vu L		✓
Eastern Snake-necked Turtle	*Chelodina longicollis*	dd		✓
Emu	*Dromaius novaehollandiae*	nt	✓	
Glossy Ibis	*Plegadis falcinellus*	nt		✓
Growling Grass Frog	*Litoria raniformis*	VU en L	✓	✓
Royal Spoonbill	*Platalea regia*	nt		✓

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS	WSP RECORDED	RECORDS SUPPLIED BY LANDOWNER
Western Swamp Crayfish	*Gramastacus insolitus*	L cr		✓
Whiskered Tern	*Chlidonias hybridus javanicus*	nt		✓
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	vu L	✓	

Key for table above:
EPBC Act: EN = Endangered, VU = Vulnerable
FFG Act: L = listed as threatened, X = rejected for listing as threatened
Victorian Advisory List: en = Endangered, vu = Vulnerable, nt = near threatened, dd = Data Deficient
^ Little Galaxias was split from Dwarf Galaxias as a separate species. Assume conservation status applies to Little Galaxias.

Brady Swamp is also known to support several other ecological values listed under the EPBC Act including Australasian Bittern *Botaurus poiciloptilus* (recorded by WSP in 2019), Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (recorded by WSP in 2019), Little Galaxias *Galaxiella toourtkoourt* (Nature Glenelg Trust 2020a) and River Swamp Wallaby-grass *Amphibromus fluitans* (recorded by WSP in 2020). Latham's Snipe *Gallinago hardwickii* are also recorded within the adjacent Gooseneck Wetlands (Bachmann 2014) and likely to be found on site. In addition, the FFG Act and Vic Advisory Listed Western Swamp Crayfish *Gramastacus insolitus* has been recorded at the site (Nature Glenelg Trust 2020a). Refer to Figure 2.1 above for the location of some significant species that have been recorded within and in close proximity to the proposed offset site.

There are no historical Growling Grass Frog records in the Victorian Biodiversity Atlas (VBA) from the site, however, Growling Grass Frogs are reported in the Gooseneck Swamp, to the northeast, in the Gooseneck Swamp Restoration Trial 2013 – Project Summary Report (Bachmann 2014) and in (Nature Glenelg Trust 2020a). The Glenelg Nature Trust collect water quality annually and this data will be supplied. In addition, water quality and eDNA sampling was undertaken as a part of the OMP.

2.3.5 KEY THREATS

The following section summarises the key threats to the Growling Grass Frog as identified in the National Recovery Plan (Clemann & Gillespie 2012).

2.3.5.1 LOSS AND FRAGMENTATION OF HABITAT

Most of the Growling Grass Frog's historical geographic range has been subject to land clearing for agriculture and urban developments. The species relies on movement between waterbodies to maintain population viability. Habitat loss has resulted in a significant reduction in connectivity among populations.

The draining of wetlands to create more available land for agriculture has also resulted in habitat losses across parts of the species range.

2.3.5.2 DISEASE

The disease Chytridiomycosis caused by a fungal pathogen has been found to infect the Growling Grass Frog. The waterborne pathogen infects both tadpoles and the skins of adults impacting their physiological function, ultimately resulting in high mortality. It is highly likely that Chytridiomycosis plays a key role in the decline of this species.

2.3.5.3 PREDATION

Eggs and tadpoles of Growling Grass Frogs are vulnerable to predation from fish predators such as the introduced Eastern Gambusia *Gambusia holbrooki*. Foxes *Vulpes vulpes* and Cats *Felis catus* are effective predators found within the range of the Growling Grass Frog which may also be contributing to the species decline.

2.3.5.4 BIOCIDES

The semi-permeable skin of amphibians renders them particularly susceptible to biocides and other pollutants. A herbicide has been implicated in the decline of at least some populations of Growling Grass Frogs. The overall impact is unknown but could be considerable.

3 BRADY SWAMP SITE MANAGEMENT OBLIGATIONS

The property is currently un-encumbered, and there are no conservation covenants that would prohibit agricultural land-use that is consistent with a Farm Zone, including grazing by stock and cultivation. Therefore, a key component of securing offsets at this site will be the establishment of a conservation covenant on Title under Section 69 of the *Conservation, Forests and Land Act 1987 (Vic).*

The conservation covenant will enact this OMP and the management requirements and objectives set out below. The covenant will also mandate monitoring of the Growling Grass Frog population on site, with annual reports to be supplied to both DAWE and to MRPV (to be published on the MRPV EPBC compliance website) for 10 years.

Figure 3.1 identifies the extent of the conservation covenant to be placed on the Title and includes all areas of wetland habitat that is to be made available for EPBC Growling Grass Frog offset credits. Please note that not all of this area is required for offsetting the HKWR Road Upgrade works program, and that excess offset credits within this area may be made available for future projects as an *EPBC Advanced Offset Site* (subject to confirmation by DAWE). We note also that State offset credits, under the *Guidelines 2017* policy, may also be available from the remaining offset area (subject to confirmation by DELWP). Figure 3.2 shows the habitat zones mapped within the proposed offset site (see Section 3.3.1).

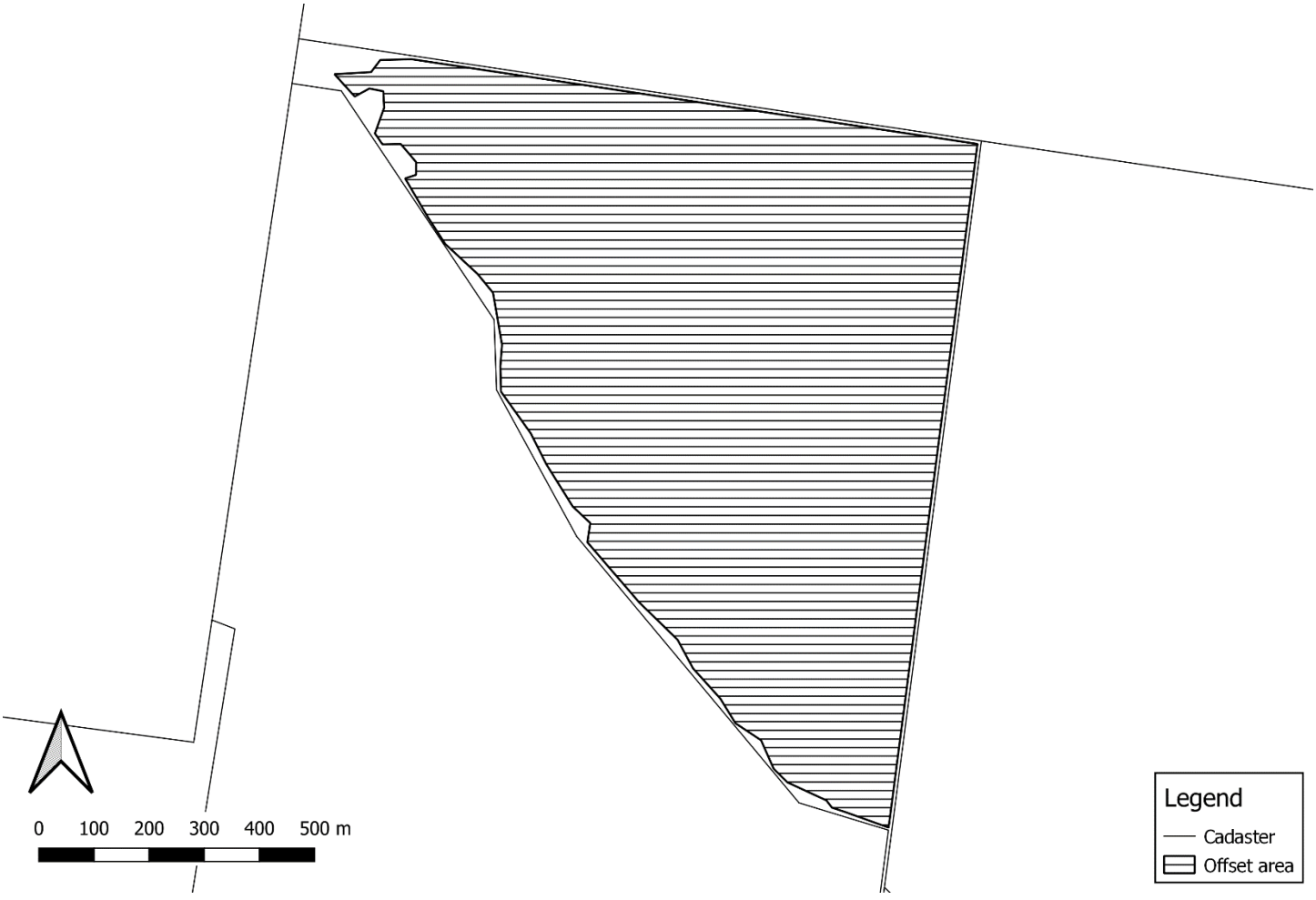

Figure 3.1 The total area of Brady Swamp potentially available as an EPBC Growling Grass Frog offset area

Aerial Site Plan
VC_CFL-3714 Site 01

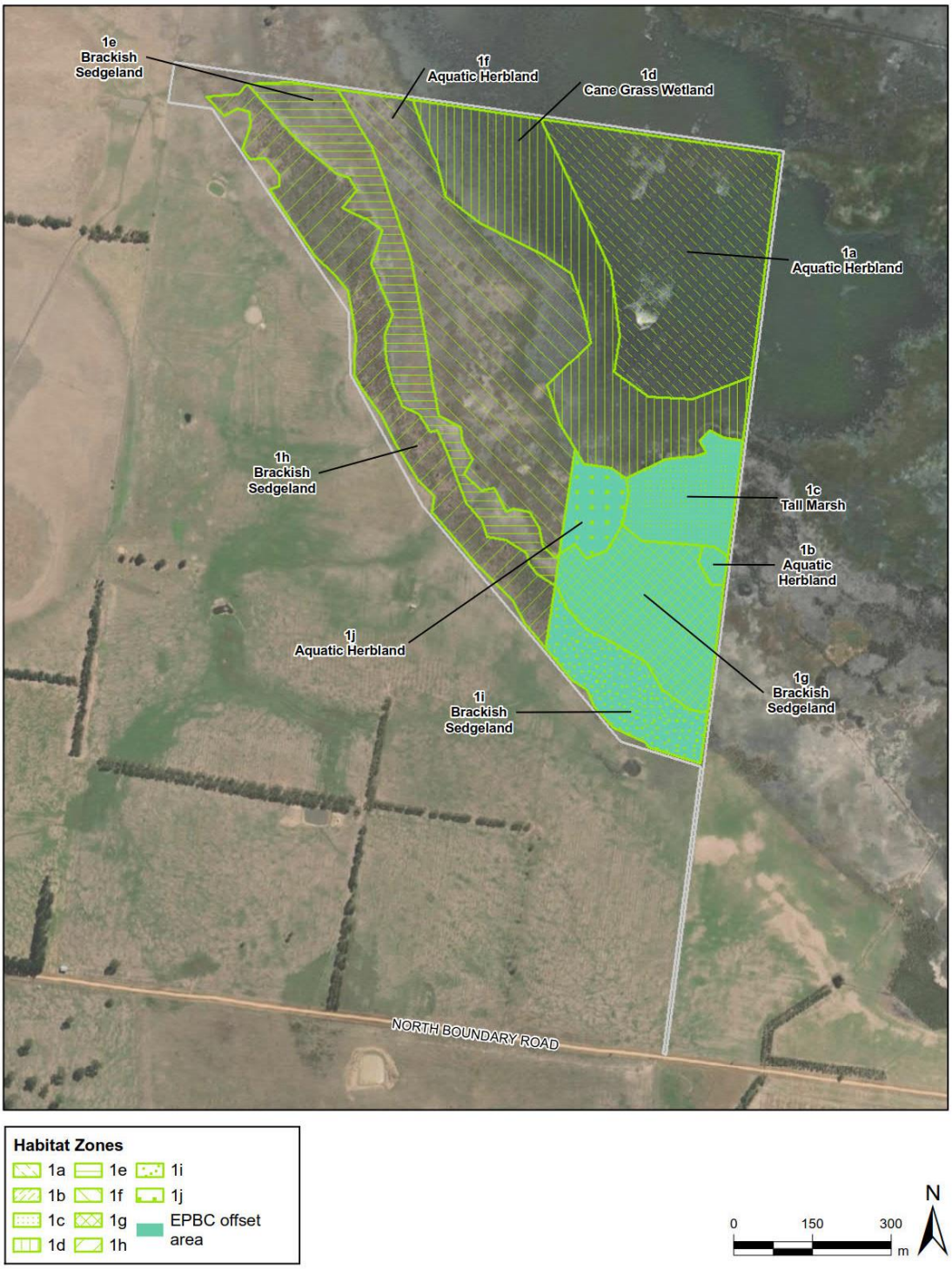

Figure 3.2 EVCs and equivalent habitat zones used to conform with state offset Management Plan and Assessors Report – EVCs represented in this plan are different to those on Figure 2.4

Native vegetation was assessed using the Vegetation Quality Assessment method (Department of Sustainability and Environment 2004). Where EVC benchmarks were not available for EVCs mapped and described, the closest type of EVC benchmarks were used and are identified in Appendix B3. Additionally, EVCs represented in Figure 3.2 are different to those on Figure 2.4 as they need to conform with state offset Management Plan and Assessors Report requirements. Table 3-1 outlines the differences in this OMP and state offset reports. EVCs referred to in sections below correspond to those in this OMP.

Table 3-1 EVCs and equivalent habitat zones used in the state offset Management Plan and Assessors Report

BIOREGION	ZONE	EVCS USED IN THIS OMP	BENCHMARK AND EVC USED IN STATE OFFSET REPORTS
Dundas Tablelands	1A	Aquatic Herbland / open water	Aquatic Herbland
Dundas Tablelands	1B	Aquatic Herbland	Aquatic Herbland
Dundas Tablelands	1C	Tall Marsh	Tall Marsh
Dundas Tablelands	1D	Cane Grass Wetland	Cane Grass Wetland (VVP)
Dundas Tablelands	1E & 1G	Brackish Herbland	Brackish Sedgeland
Dundas Tablelands	1F & 1J	Cane Grass Wetland/Aquatic Herbland Complex	Aquatic Herbland
Dundas Tablelands	1H & 1I	Brackish Sedgeland	Brackish Sedgeland

3.1 OFFSET SITE MANAGEMENT OBLIGATIONS

3.1.1 SECURITY AND ALLOCATION OF OFFSET CREDITS

The EPBC OMP is to be secured on Title with a Section 69 covenant under the *Conservation, Forests and Lands Act 1987* (Vic) in perpetuity. As such, the OMP must meet the management requirements and standards of a Section 69 agreement. Section 69 agreements are administered by the DELWP who undertake quality assurance of management plans for areas to be secured as offsets, and set management requirements and standards by which this is done. Further to S69 standards and requirements, additional management actions will be undertaken that will further reduce any other residual threats to Growling Grass Frog on site.

A total of 16 hectares of Growling Grass Frog habitat within the offset area, comprising 2.3 ha of breeding habitat and 13.7 ha of dispersal habitat, is to be allocated as a direct offset for the Project. This quantum of offset is to be allocated from suitable habitat zones as identified in Table 3-2 and once the covenant is secured on Title and the management actions and commitments outlined below in this OMP are initiated.

Table 3-2 Allocation of habitat zones

HABITAT TYPE	APPROPRIATE EVC	AREA OF ALLOCATION
Growling Grass Frog breeding habitat	Aquatic Herbland / open water (EVC 653)	2.3 hectares
Growling Grass Frog dispersal habitat	Aquatic Herbland (EVC 653) Cane Grass Wetland (EVC 291) Tall Marsh (EVC 821) Brackish Herbland (EVC 538) Brackish Sedgeland (EVC 13)	13.7 hectares

Figure 3.2 conceptualises a suitable 16 ha area in the south-eastern corner of the offset site which is comprised of a mix of suitable EVCs; namely Aquatic Herbland for breeding habitat, and a mix of Tall Marsh, Brackish Herbland and Brackish Sedgeland for dispersal habitat. Table 3-3 identifies these habitat zones and their EVCs, and identifies an indicative portion of each which can be allocated to the project via the DELWP Offset Credit Register. This approach will ensure that the areas allocated to the project meet the required offset target (total of 16 hectares), and that the offset credits are allocated from the most suitable habitat areas on site.

Table 3-3 Allocation of offset credits

HABITAT TYPE & OFFSET TARGET	APPROPRIATE HABITAT ZONE	AREA OF ALLOCATION
Growling Grass Frog breeding habitat (2.3 ha)	HZ1A Aquatic Herbland / open water (EVC 653)	2.3 hectares (being 14.9% of habitat zone)
Growling Grass Frog dispersal habitat (13.7 ha)	HZ1C Tall Marsh (EVC 821)	3.54 hectares (being 100% of habitat zone)
	HZ1G Brackish Herbland (EVC 538)	6.61 hectares (being 100% of habitat zone)
	HZ1H Brackish Sedgeland (EVC 13)	3.55 hectares (being 27% of habitat zone)

Once the required offset targets for the HKWR Road Upgrade project are allocated and the transfer registered on the DELWP Offset Register the remaining offset credits may be made available for future projects, for both Federal or State offset credit requirements.

3.2 SUMMARY OF MANAGEMENT OBLIGATIONS

At a minimum, management actions across the entire site are to include the following:

- retain all native vegetation
- install/upgrade fences and exclude stock/illegal access;
- monitor fences and address new or emerging stock impacts
- control ALL high threats (e.g. grazing threats from introduced animals or overgrazing by native herbivores (eg kangaroos), inappropriate fire or flooding regime, other threats as identified)
- monitor for and control emerging threats
- stop all water extraction from offset site currently used for grazing and domestic purposes
- eliminate all woody weeds to <1 percent cover
- reduce weed cover and facilitate successional recruitment of indigenous flora

- improve long-term population viability for the target species through improvement of habitat values within the offset area, establishment/maintenance of habitat connectivity to neighbouring habitat areas, and the reduction of population pressures associated with introduced predators
- conduct monitoring for both management progress and delivery of environmental improvements
- conduct monitoring of Growling Grass Frog populations on site and implementation of management actions, and provide results in annual reports to be submitted to DAWE and MRPV.

3.3 MANAGEMENT

3.3.1 OFFSET MANAGEMENT AREAS

The offset site identified above in Figure 3.2 is comprised of management areas for the provision of Growling Grass Frog breeding and dispersal offsets. Each management area is comprised of different habitat zones, where each habitat zone was defined and assessed as per the *Vegetation Quality Assessment* (VQA) methodology (Department of Sustainability and Environment 2004). The management areas therefore represent sites of similar habitat type and ecological function, and will be managed and improved on site by the landowner in accordance with the management prescriptions set out below.

The areas for management are divided into three distinct areas, based on their similarity and management needs and similarity of EVCs present – see Table 3.4 and Figure 3.2.

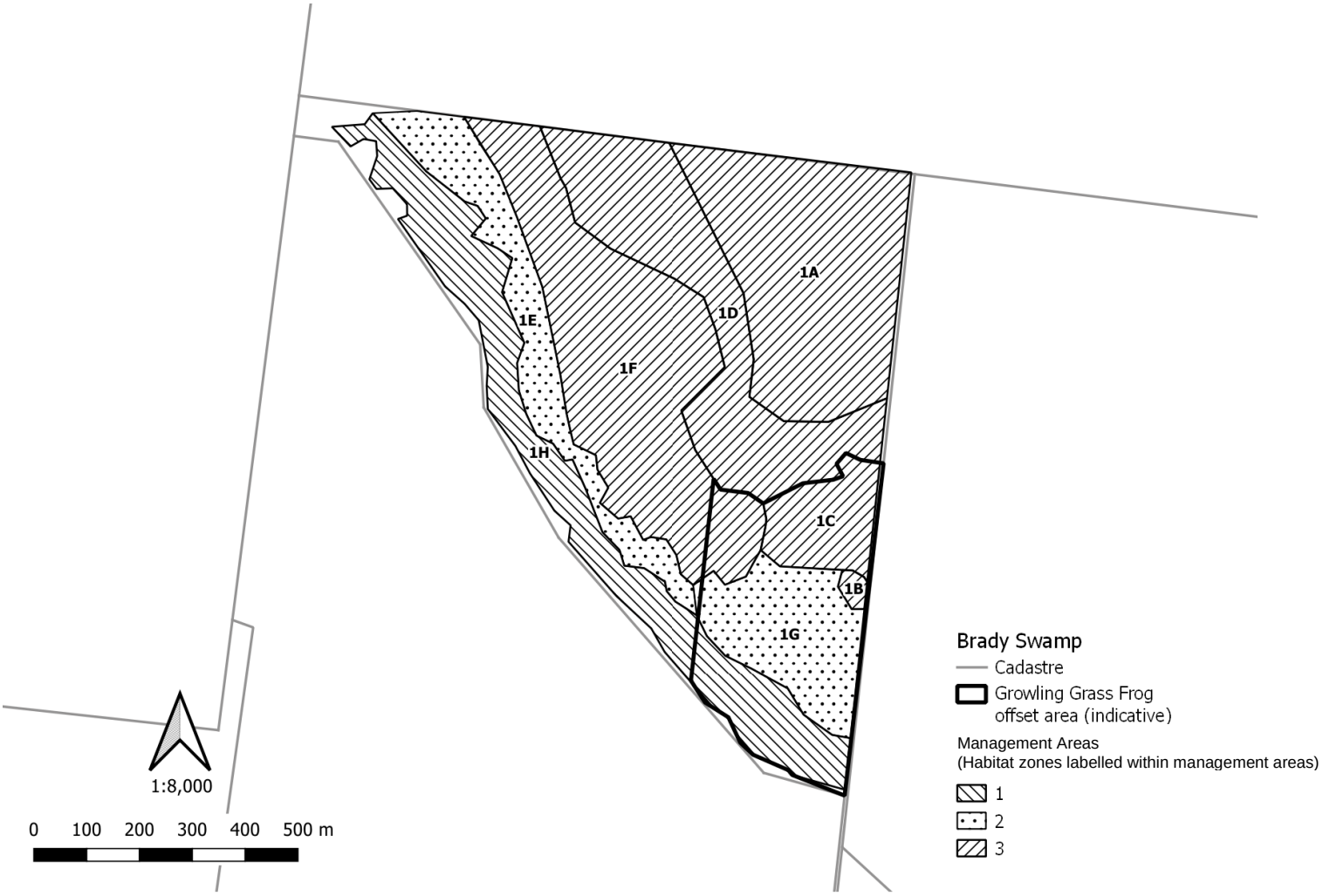

Figure 3-3 Management areas (and habitat zones) within the Brady Swamp offset site

Table 3.4 Management areas and respective EVCs within the 76 ha Brady Swamp

MANAGEMENT AREAS	AREA (HA)	BROAD VEGETATION / HABITAT TYPE	EVCS PRESENT	MANAGEMENT OBJECTIVES AND METHODS
Management area 1	3.878621	Growling Grass Frog dispersal habitat	Brackish Sedgeland habitat zone 1I	Management of Toowoomba Canary-grass
Management area 2	6.600717	Growling Grass Frog dispersal habitat; wetland margin	Brackish Herbland habitat zones 1G	Maintenance of wetlands and wetland margin; monitoring for spread of Toowoomba Canary-grass.
Management area 3	5.614601	Growling Grass Frog breeding and dispersal habitat	Aquatic Herbland habitat zones 1B Cane Grass Wetland habitat zones 1J Tall Marsh habitat zones 1C	Maintenance of wetland and open water habitat. Maintenance of Seasonal Herbaceous Wetlands.

3.3.2 FENCING

Threats including uncontrolled stock grazing and unauthorised access by the public (in particular illegal use of this site by duck shooters) must be excluded from the offset site at all times. The intention of fencing is to protect the offset site area from threats including the introduction of soil pathogens and environmental weeds, pugging by stock, soil compaction or loss of vegetated aquatic margins and habitat values due to vehicle activity, and the introduction of chytrid fungus from external sources. The location of fencing is not important as long as the offset site is protected from all threats in perpetuity.

Much of the offset area is already protected by well-maintained fences. Upgrades of existing fences may be required at some locations, particularly areas that have been damaged by native fauna (i.e. kangaroos and wallabies). Maintenance of fences damaged by flooding will also be required after high water events.

It is also acknowledged that the current landowner has been successfully managing Toowoomba Canary-grass **Phalaris aquatica* within the Brackish Sedgeland area (western extent of the wetlands) by application of pulse grazing with cattle. Whilst this management approach has been effective in the past, it will no longer be suitable as the landowner no longer adjusts cattle at the site. Therefore, management control of Toowoomba Canary-grass will occur through a combination of careful spot spraying and passive grazing by kangaroos, which are plentiful on the site.

Any stock observed to be inside of the area identified in Figure 3.4 and described in Table 3.5 are to be removed immediately by the landowner. More permanent fences must be installed or repaired within three months of commencing the security agreement, unless stock and other threats are not present or can be prevented from entering the offset site. Damage to fences is to be immediately rectified in order to ensure that there are no inadvertent stock access issues, and to ensure that the offset site can be adequately protected against threats. Table 3.5 and Figure 3.4 identify the existing fences within the Brady Swamp property that require upgrading and the approved site access points for monitoring and management programs.

Table 3.5 Fence types

FENCE ID	TYPE	LENGTH	COMMENTS
1	Existing property boundary	1,200m	Maintain existing fence posts in order to delineate the northern property boundary; upgrade if required to manage stock using methods that are friendly to native fauna movements.
2	Existing stock fence	1,700m	Maintain fence to keep stock out
3	Existing stock fence	77m	Maintain fence to keep stock out
4	Existing stock fence	1,280m	Maintain and upgrade fence to ensure stock are kept out in summer when water levels are low. Fence needs to withstand seasonal inundation.

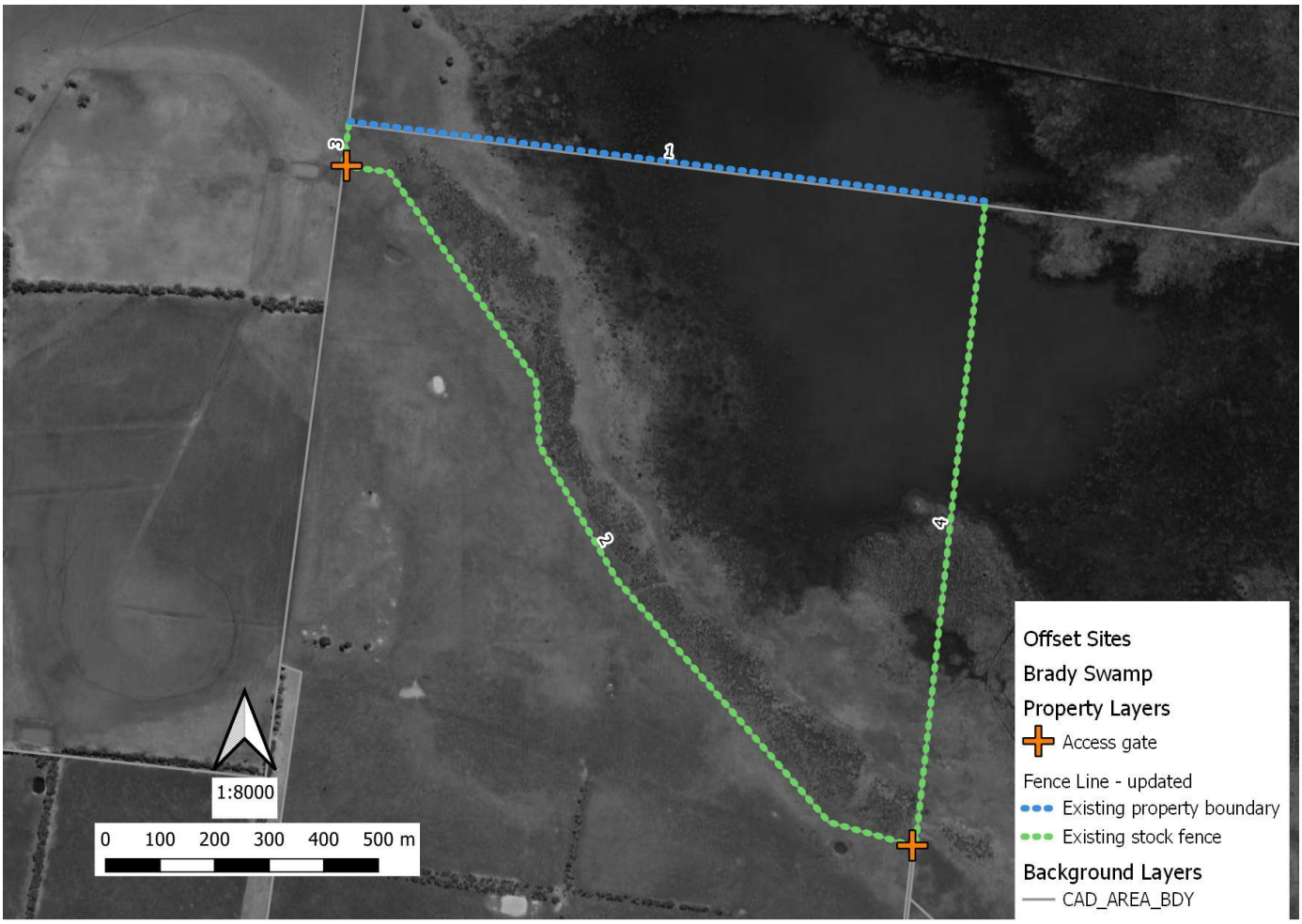

Figure 3.4 Existing and proposed fences at Brady Swamp

3.3.3 WEED CONTROL

Weed levels on site are relatively low within wetland areas, and relatively stable since wetland flora cover rates are generally high and regular inundation facilitates natural maintenance of a 'clean' site. The elimination (to less than 1% cover) of woody weeds, and the control of herbaceous weeds are key management actions required for the maintenance and improvement of Growling Grass Frog habitat, and is a management requirement that applies to the whole of the offset site. Each of these are discussed below.

The intent of the weed control program will be to improve habitat values within the offset areas and improve floristic diversity through successional recruitment of EVC appropriate flora, and to ensure that the ecological gains are maintained in perpetuity.

General weed management requirements will therefore include (at minimum):

- eliminate woody weeds to less than 1% projected foliage cover within the offset area
- control herbaceous weeds and ensure that weed cover does not increase within the offset site area
- monitor for and control new and emerging weeds within the offset area.

3.3.3.1 ELIMINATION OF WOODY WEEDS

Currently there are no woody weeds within the offset site. Any outbreaks are to be eliminated (to less than 1% cover) on site and any new and emerging woody weeds are to be similarly eliminated in a timely fashion. The use of herbicides is to be in accordance with the manufacturer's instructions (label instructions) and is to be minimised wherever practicable, with preference given to manual control techniques.

3.3.3.2 HERBACEOUS WEEDS

The spread of high-threat herbaceous weeds is to be controlled within the offset site and, where practicable to do so, infestations are also to be eliminated. This will entail treatment of all herbaceous weeds on site through careful and judicious use of herbicides and slashing of Toowoomba Canary-grass within the Brackish Sedgeland area (see Section 3.3.1 for details), and the application of manual control methods wherever practicable (particularly when treating weeds in inundated areas). Controlled (cool) burns may also be a useful management option subject to endorsement by DELWP and in consideration of management requirements set out in the Section 69 covenant and State offset management obligations.

Emphasis is to be placed on ensuring that herbaceous weed cover levels do not increase within the offset site, and that infestations are not able to spread into neighbouring areas. Monitoring of control efforts is to be conducted for the 10 year duration of the management plan including photographs of the works program demonstrating successful control efforts. New and emerging herbaceous weed infestations are to be treated in a timely fashion and contained to prevent spread.

All care must be taken to avoid off-target impacts on aquatic fauna including frogs and tadpoles and the loss of native vegetation or habitat, and to ensure that there is no spill or inadvertent drift of chemical into neighbouring wetland areas or the offset site. The use of herbicides is to be in accordance with the manufacturer's instructions (label instructions) and is to be minimised wherever practicable, with preference given to manual control techniques. Herbicides should be selected for use that are of lower impact to aquatic fauna, such as those that do not contain surfactants harmful to amphibians, if available.

High-threat weeds were determined using determinations for EVCs made in *Benchmarks for wetland Ecological Vegetation Classes in Victoria* (DELWP 2016a) in combination with site-specific risks certain weeds pose to each of the management areas (Table 3.6).

Table 3.6 High-threat (HT) herbaceous weeds identified within the offset site

	SCIENTIFIC NAME	COMMON NAME	MA1	MA2	MA3	METHOD	TIMING
*	*Agrostis capillaris*	Brown-top Bent	HT	HT		Spot spraying with selective or non-selective herbicide.	Winter/Spring
*	*Anthoxanthum odoratum*	Sweet Vernal-grass	HT	HT		Spot spraying with selective or non-selective herbicide.	Winter/Spring
*	*Aster subulatus*	Aster-weed		HT		Spot spraying or hand weeding prior to flowering and seeding period.	Target mature plants during September to November. Control new germinants at other times of year.
*	*Cirsium vulgare*	Spear Thistle	HT			Spot Spraying prior to flowering and seeding period.	Target mature plants during September to November. Control new germinants at other times of year.
*	*Cotula coronopifolia*	Water Buttons			HT	Spot spraying or hand weeding prior to flowering and seeding period.	Target mature plants during September to November. Control new germinants at other times of year.
*	*Hordeum leporinum*	Barley-grass		HT	HT	Spot spraying with selective or non-selective herbicide.	Winter/Spring
*	*Leontodon saxatilis subsp. saxatilis*	Hairy Hawkbit		HT	HT	Spot spraying prior to flowering and seeding period.	Target mature plants during September to November. Control new germinants at other times of year.
*	*Mentha pulegium*	Pennyroyal		HT	HT	Spot spraying prior to flowering and seeding period.	Target mature plants during September to November. Control new germinants at other times of year.
*	*Phalaris aquatica*	Toowoomba Canary-grass	HT	HT		Spot spraying with selective or non-selective herbicide in Habitat Zone 1 and 2 and slashing in Habitat Zone 1.	Winter/Spring
*	*Plantago coronopus*	Buck's-horn Plantain		HT		Spot spraying with selective or non-selective herbicide.	Winter/Spring
*	*Trifolium fragiferum var. fragiferum*	Strawberry Clover		HT		Spot spraying with selective or non-selective herbicide.	Winter/Spring
*	*Vulpia bromoides*	Squirrel-tail Fescue		HT		Spot spraying with selective or non-selective herbicide.	Winter/Spring

3.3.4 PEST / FERAL ANIMAL CONTROL

The intent of feral animal control programs is to reduce ecological pressures associated with grazing and degradation of habitat areas, and the predation of Growling Grass Frogs and other native fauna. Feral animals include grazers – rabbit, hare, deer, goat and livestock – and predators – fox, cat and dog. Responsive control measures are to be promptly implemented within the offset areas should other feral species be identified during the monitoring programs. The intent is to prevent the spread of, and as far as possible eradicate, any established pest animals within the offset site. Successful control of pest and feral animals will result in material gains in the habitat conditions on site and will directly benefit the Growling Grass Frog population and its long-term population viability.

An integrated approach to pest animal management is outlined in Table 3.7. A combination of control techniques will achieve the best outcomes because different methods will target different sections of the pest populations at different times. All care must be taken to avoid off-target impacts or inadvertent harm to native fauna. Regardless of the control option(s) used, these must be the most effective, safe and humane methods available.

Monitoring and reporting of pest and feral animal control programs conducted on site is also required, and any new or emerging threats are to be treated promptly by the landowner. The landowner is also encouraged to participate in any regional or landscape scale control programs being conducted by neighbours or government bodies.

Table 3.7 Pest and feral animals identified within the offset site

HABITAT ZONE(S)	COMMON NAME	METHOD	TIMING
All	Rabbits, hares & foxes	Fumigation and hand collapse rabbit burrows and fox dens	Ongoing
All	Rabbits & hares	Baiting	Summer
All	Rabbits & hares	When baiting, collect and dispose of carcasses to prevent poisoning of native predators	Summer
All	Rabbits, hares & foxes	Remove or disperse surface harbour	Ongoing
All	Rabbits, hares & foxes	Monitor and control	Ongoing
All	Goat, pig and/or deer	Monitor and control	Ongoing
All	New & emerging pest animals	Monitor and control	Ongoing

3.3.5 GROWLING GRASS FROG POPULATION MANAGEMENT AND MONITORING

The intent of this OMP is to conserve and maintain the existing Growling Grass Frog population within the offset site area. Annual monitoring of the Growling Grass Frog population is therefore a requirement of this OMP and is to be implemented by the landowner with supervision by a suitably qualified and experience ecological consultancy.

Growling Grass Frog management objectives and targets, in addition to those already outlined above, will include:

- maintain population dynamics and increase fecundity
- no water extraction or pumping from the offset area during the breeding and dispersal period
- maintenance of natural water flow patterns and drying cycles
- maintenance of water sources and connectivity to adjoining waterways/wetlands
- no introduction of pollutants, no ground-water pumping, and no vehicle access during wet cycles
- establishment and maintenance of Chytrid quarantine measures (if required based on positive eDNA test results)
- maintenance of habitat connectivity to neighbouring wetland and riparian habitat, and Growling Grass Frog populations including, the following management measures:
  - maintenance of habitat connectivity with the Wannon River floodplains, Gooseneck Swamp, and the Bunnungal drainage line (former Heifer Swamp)

- maintenance of dispersal habitat and over-wintering areas on site.

3.3.6 WATER SECURITY

Growling Grass Frog breeding and dispersal success is largely dependent on natural wetting and filling of the wetlands during the breeding season, and natural drying of the wetlands during summer months putting pressure on the species to disperse into the wider landscape. Water security arrangements ensuring that natural hydrological inundation and drying cycles are maintained at this site and within the wetlands are therefore critical for the long-term viability of a Growling Grass Frog population at this site.

The landowner will be responsible for ensuring that there is no direct pumping from the wetlands for stock watering, in particular during the Growling Grass Frog breeding season. The landowner will also be responsible for ensuring that there are no artificial impediments to natural inundation / flow patterns from upstream water sources on the property, and no artificial impediments to natural downstream outflow and drying cycles from the wetlands during summer months.

Furthermore, there is to be no introduction of pollutants to the wetlands, no vehicle access during wet cycles, no stock grazing and associated pugging of the wetlands during wet seasons, and no pumping of ground-water from the property that may impact the natural hydrology of this site.

3.3.7 OFFSET SITE MONITORING AND REPORTING

This OMP requires the landowner to submit a report annually for each year of the ten years of this OMP (see Table 3.8 – Management Actions) and thereafter at the reasonable request of DAWE or MRPV. The monitoring report is to be provided annually and is to include details of the monitoring and management works conducted within the offset site.

3.3.7.1 POPULATION MONITORING

The intent of this OMP is to conserve and maintain the existing Growling Grass Frog population within the offset site area. Monitoring of the Growling Grass Frog population is therefore a requirement of this OMP. The results of the monitoring will also be used to assess the efficacy of other actions conducted on site, and will inform responsive, adaptive management actions if required (see Section 3.3.7.5). The monitoring will also be conducted against baseline Growling Grass Frog populations currently present on site and as detailed in Section 2.2.1.

The specific monitoring programs are to be in general accord with Growling Grass Frog EPBC survey guidelines and as set out below.

GROWLING GRASS FROG POPULATION MONITORING

Monitoring methods are based on the survey guidelines in the *Significant impact guidelines for the vulnerable growling grass frog (Litoria raniformis)* (DEWHA 2009) and the *Survey guidelines for Australia's threatened frogs* (DEWHA 2010). Growling Grass Frog will be monitored twice per monitoring period, and surveyed for approximately 20 minutes using call playback followed by spotlighting/visual searches. Call playback will involve a one minute calling period followed by a 30 second listening period, repeated once. Occupancy as well as the number of frogs detected is to be recorded in the monitoring reports.

Monitoring is to be conducted at intervals of years 1, 2, 3, 5 and 10, which is consistent with the *Healesville-Koo Wee Rup Road Upgrade - Fauna Monitoring Program* (WSP 2020a). If targets are not being met (i.e. Growling Grass Frog are not recorded the habitat management actions set out in this OMP are to be reviewed and alternative programs adopted in consultation with DAWE and MRPV (see also Section 3.3.7.5) until targets are met.

Monitoring of nearby Reference sites will help to control for climatic variability in detection. Annual monitoring targeting November-December, but extending into the broader survey season where required, is also proposed.

3.3.7.2 PHOTOPOINTS

Permanent photo-points are to be established in each Habitat Zone within the offset site, and where access is practicable (some habitat zones will be immersed). Photographs taken from these points are to be representative of the annual habitat

conditions and are to provide a visual, temporal assessment of the effectiveness of meeting objectives set out in this OMP. Photographs are therefore to be taken from each photo-point annually and will use the same direction, trajectory and camera settings as is practicable. The location of photo-points is to be permanently marked on site using painted star-pickets (or equivalent) and as recorded on an aerial map of the offset site.

Photographs and annual monitoring reports are to be submitted at least two months prior to the anniversary date of the execution of the covenant to allow time for compliance to be assessed before the anniversary date.

3.3.7.3 CHYTRID DISEASE

As part of the monitoring, assessment of the fungus *Batrachochytrium dendrobatidis* which causes Chytridomycosis (Chytrid) in frogs will also occur. Monitoring of the fungus via eDNA analysis of water samples is recommended to be completed at least once (e.g. year four) throughout the ten year management in conjunction with annual monitoring at three accessible locations. Sample supplies and analysis can be obtained and undertaken by CESAR (http://cesaraustralia.com/).

Maintenance of a Chytrid free site will be difficult, however, the following preventative protocols and hygiene controls, as adopted from the Commonwealth's *Hygiene protocols for the control of diseases in Australian frogs* (DSEWPaC 2011), will be implemented on the property and within the offset area in an effort to avoid and minimise this potential risk:

- No frogs will be introduced to the property or handled as part of the monitoring surveys
- No water from external sources will be introduced to the property or offset site (natural water inflows excepted)
- Footwear and any sampling equipment used such as dipping nets will be thoroughly cleaned and disinfected prior to and after surveying the site using bleach solution (1% sodium hypochlorite) or other disinfectant known to kill Chytrid Fungus (e.g. Phytoclean).

3.3.7.4 ANNUAL REPORTING

The annual monitoring reports are to detail progress made against the commitments set out in this OMP. Annual monitoring reports should therefore provide enough detail in the form of written comments and supporting evidence that an assessor can easily determine the completion of/progress against the commitments for each zone.

Details of the monitoring reports are to include (but not be limited to):

- results of monitoring conducted on site of fencing, weed control programs and pest/feral animal control actions
- management works completed within the offset site including the results of fencing maintenance, upgrades and new installation
- results of the Growling Grass Frog monitoring program including any findings on population dynamics
- details of any events or impacts that have affected the offset site such as water pollution events, changes to natural hydrology and water flow regimes, illegal access by pedestrians, uncontrolled stock access and any associated impacts, or any events that have had a material impact on the Growling Grass Frog population and its long-term viability on site.

The results of the monitoring programs is to be reported to MRPV for publication on the MRPV EPBC Compliance website. Any major breaches of the management programs and/or impacts on the target species is to be reported immediately to MRPV by the landowner and/or their appointed contractors.

3.3.7.5 RESPONSIVE / ADAPTIVE MANAGEMENT

The monitoring program is required to identify any significant failings in the implementation or outcomes of the OMP, and any new or emerging threats that require an immediate and adaptive response. The development of an appropriate and responsive addition or variation of the OMP will be developed in consultation with the landowner and MRPV, and, if necessary, is to be endorsed by DAWE. It will also be necessary to involve DELWP in any management variations that are likely to impact on the provision of State offset credits.

Examples of significant failings in the implementation or outcomes of the OMP would include bushfire, habitat and/or water contamination due to chemical spills, significant population decline of the target species, major fence failures and/or stock impacts within habitat areas, or events that are considered to be significant enough to warrant an adaptive management approach within the offset areas.

In the event of a significant detrimental impact within the offset area and/or failing of the OMP, the landowner will:

- promptly notify MRPV and DAWE
- develop responsive management plan to address impacts
- update the OMP and/or review implementation period (i.e. extend if required to address impacts).

3.4 MANAGEMENT ACTION TABLE

The table below sets out a timeline for delivery of management commitments, to be used for reporting purposes.

Table 3.8 Management actions table – Year 1–10

MANAGEMENT ACTION	ZONE	MANAGEMENT ACTION DESCRIPTION	REFERENCE SECTION FOR ACTION	TIMING	TARGET TO BE ACHIEVED	PERSON RESPONSIBLE
Year 1						
Offset security	All	Ensure offset secured via S69 agreement and that agreement is signed by Landowner and lodged and approved through DELWP QA.	Section 3.1.1	At commencement of agreement	Ensure offset secured via S69 agreement	Landowner / contractor
Fencing	All	Upgrade fencing around the south, west and east boundaries of the offset site as required to ensure that stock from neighbouring properties can be managed – approx. 3.4 km Maintain fence-posts on northern boundary in order to identify this property boundary; upgrade as required to ensure that stock from neighbouring properties can be managed – approx. 1.2 km	Section 3.3.2	Within 3 months of commencement of the agreement	Upgrade existing fences as required to ensure no stock access from the property or neighbouring properties (see map in Section 3.3 above).	Landowner / contractor
	All	No threats to the offset site currently exist. If a new or emerging threat arises erect a fence immediately to ensure that the new threats are controlled.	Section 3.3.2	Immediately on identification of new or emerging threat	Construct and/or upgrade fencing as required to control new and/or emerging threats.	Landowner / contractor
	All	Maintain fencing in good condition around entire boundary of the offset site where fencing exists or is required. Conduct yearly monitoring to ensure all fencing meets the required standard.	Section 3.3.2	Ongoing	Maintain fencing generally to DELWP fencing standards outlined in *Management standards for native vegetation offset sites, September 2019*; adapt maintenance to suit inundation requirements.	Landowner / contractor
Woody Weeds	All	Currently there are no woody weeds. Should they occur, monitor for and work towards the elimination of all woody weeds. Monitor for any re-sprouting or seedlings and eradicate (either spot spray or hand pull)	Section 3.3.3	Ongoing	Eliminate all listed woody weeds, with no mature plants present by end of Year 1 <1% cover of all listed woody weeds, with no mature plants present at the end of Year 10 Minimise off-target damage (avoid all native plants)	Landowner / contractor
Herbaceous Weeds	All	Monitor for and control all herbaceous weeds. Refer to Section 3.3.3.2 for list of herbaceous weeds, their control method and timing of actions	Section 3.3.3		No increase in cover of herbaceous weeds within the offset site Minimise off-target damage (avoid all native plants)	Landowner / contractor
	All	Monitor for and eliminate all new & emerging herbaceous weeds	n/a	Ongoing	<1% cover of all new and emerging herbaceous weeds at the end of Year 10	Landowner / contractor
Pest Animals	All	Monitor for and control rabbits. Refer to Section 3.3.4 for a list of control methods and timing of actions	Section 3.3.4		No surface disturbance within the offset site No active rabbit warrens to be present No rubbish or surface harbour	Landowner / contractor

MANAGEMENT ACTION	ZONE	MANAGEMENT ACTION DESCRIPTION	REFERENCE SECTION FOR ACTION	TIMING	TARGET TO BE ACHIEVED	PERSON RESPONSIBLE
					Minimal artificial piles of logs and rocks	
	All	Monitor for and control foxes. Refer to Section 3.3.4 for a list of control methods and timing of actions	Section 3.3.4	Ongoing	Participate in regional control programs	Ongoing
	All	Monitor for and control all new and emerging pest animals including deer	n/a	Ongoing	Control numbers of any new & emerging pest animals	Landowner / contractor
Water security	All	Develop water security arrangements that ensure maintenance of natural wet/dry cycles and which prohibit water extraction during key Growling Grass Frog breeding cycles.	Section 3.3.6	Within 3 months of commencement of the agreement	No disturbance of water flows (inflow and outflow) within the property limits	Landowner / contractor
	All	No pumping for stock watering, maintenance of natural flow patterns and drying cycles, maintenance of water sources and connectivity to waterways/wetlands, no introduction of pollutants, no ground-water pumping, no vehicle access during wet cycles.	Section 3.3.6	Ongoing	No take of water	Landowner / contractor
Monitoring	All	Conduct seasonal monitoring of Growling Grass Frog generally in accordance with *Significant impact guidelines for the vulnerable growling grass frog* (DEWHA 2009) and the *Survey guidelines for Australia's threatened frogs* (DEWHA 2010)	Section 3.3.7	Summer	Annual monitoring of Growling Grass Frog population including establishing photo points Reporting of Growling Grass Frog population dynamics within the offset site	Ecological consultant
Adaptive Management	All	Monitor for new high threats. For each new threat identified, develop an integrated program of management and control actions to be implemented	Section 3.3.7.5	Ongoing – develop program within three months of identifying a new threat.	Develop an integrated program of management and control actions for MRPV / DAWE approval Implement program upon MRPV / DAWE approval Notify and consult with DELWP if actions are considered likely to impact State offset obligations	Landowner / Ecological consultant / MRPV & DAWE
Annual Reporting	All	Prepare and submit an annual report	Section 3.3.7.4	Submit at least two months prior to agreement anniversary date for 10 years	Annual report is signed, dated and submitted by the landowner at least two months prior to the anniversary date of the agreement. Report provides enough detail in the form of written comments and supporting evidence that an assessor can easily determine the completion of / progress against the commitments for each zone. Obligations of the landowner have been met and the obligations form is read, signed, dated and submitted with the annual report.	Landowner / MRPV

MANAGEMENT ACTION	ZONE	MANAGEMENT ACTION DESCRIPTION	REFERENCE SECTION FOR ACTION	TIMING	TARGET TO BE ACHIEVED	PERSON RESPONSIBLE
					Progress and actions, as well as failings or any new and emerging threats, are reported on the MRPV EPBC compliance website and reported to DAWE.	
Year 2						
Fencing	All	No threats to the offset site currently exist. If a new or emerging threat arises erect a fence immediately to ensure that the new threats are controlled.	Section 3.3.2	Immediately on identification of new or emerging threat	Construct and/or upgrade fencing as required to control new and/or emerging threats.	Landowner / contractor
	All	Maintain fencing in good condition around entire boundary of the offset site where fencing exists or is required. Conduct yearly monitoring to ensure all fencing meets the required standard.	Section 3.3.2	Ongoing	Maintain fencing to DELWP fencing standards outlined in *Management standards for native vegetation offset sites, September 2019*	Landowner / contractor
Woody Weeds	All	Monitor for and eliminate all new & emerging woody weeds	n/a	Ongoing	<1% cover of all woody weeds, with no mature plants present at the end of Year 10 Minimise off-target damage (avoid all native plants)	Landowner / contractor
Herbaceous Weeds	All	Monitor for and control all herbaceous weeds. Refer to Section 3.3.3.2 for list of herbaceous weeds, their control method and timing of actions	Section 3.3.3		No increase in cover of herbaceous weeds within the offset site Minimise off-target damage (avoid all native plants)	Landowner / contractor
	All	Monitor for and eliminate all new & emerging herbaceous weeds	n/a	Ongoing	<1% cover of all new and emerging herbaceous weeds at the end of Year 10	Landowner / contractor
	All	Facilitate successional recruitment of indigenous flora and improvement of habitat values	Section 3.3.3		Improved indigenous flora recruitment rates Improved habitat values, greater floristic cover and diversity	Landowner / contractor
Pest Animals	All	Monitor for and control rabbits. Refer to Section 3.3.4 for a list of control methods and timing of actions	Section 3.3.4		No surface disturbance within the offset site No active rabbit warrens to be present No rubbish or surface harbour Minimal artificial piles of logs and rocks	Landowner / contractor
	All	Monitor for and control foxes. Refer to Section 3.3.4 for a list of control methods and timing of actions Bait using Canid Pest Ejectors and/or engage professional shooters.	Section 3.3.4	Ongoing	Participate in regional control programs All identified dens collapsed within 3 months of detection	Landowner / contractor
	All	Monitor for and control all new and emerging pest animals including deer	n/a	Ongoing	Control numbers of any new & emerging pest animals	Landowner / contractor

MANAGEMENT ACTION	ZONE	MANAGEMENT ACTION DESCRIPTION	REFERENCE SECTION FOR ACTION	TIMING	TARGET TO BE ACHIEVED	PERSON RESPONSIBLE
Water security	All	No pumping for stock watering, maintenance of natural flow patterns and drying cycles, maintenance of water sources and connectivity to waterways/wetlands, no introduction of pollutants, no ground-water pumping, no vehicle access during wet cycles.	Section 3.3.6	Ongoing	No take of water	Landowner / contractor
Monitoring	All	Conduct seasonal monitoring of Growling Grass Frog generally in accordance with *Significant impact guidelines for the vulnerable growling grass frog* (DEWHA 2009) and the *Survey guidelines for Australia's threatened frogs* (DEWHA 2010)	Section 3.3.7	Summer	Annual monitoring of Growling Grass Frog population Reporting of Growling Grass Frog population dynamics within the offset site	Ecological consultant
Adaptive management	All	Monitor for new high threats. For each new threat identified, develop an integrated program of management and control actions to be implemented	Section 3.3.7.5	Ongoing – develop program within three months of identifying a new threat.	Develop an integrated program of management and control actions for MRPV / DAWE approval Implement program upon MRPV / DAWE approval.	Landowner / Ecological consultant / MRPV & DAWE
Annual reporting	All	Prepare and submit an annual report	Section 3.3.7.4	Submit at least two months prior to agreement anniversary date	Annual report is signed, dated and submitted by the landowner at least two months prior to the anniversary date of the agreement. Report provides enough detail in the form of written comments and supporting evidence that an assessor can easily determine the completion of / progress against the commitments for each zone. Obligations of the landowner have been met and the obligations form is read, signed, dated and submitted with the annual report. Progress and actions, as well as failings or any new and emerging threats, are reported on the MRPV EPBC compliance website and reported to DAWE.	Landowner / MRPV
Year 3						
Fencing	All	No threats to the offset site currently exist. If a new or emerging threat arises erect a fence immediately to ensure that the new threats are controlled.	Section 3.3.2	Immediately on identification of new or emerging threat	Construct and/or upgrade fencing as required to control new and/or emerging threats.	Landowner / contractor
	All	Maintain fencing in good condition around entire boundary of the offset site where fencing exists or is required. Conduct yearly monitoring to ensure all fencing meets the required standard.	Section 3.3.2	Ongoing	Maintain fencing to DELWP fencing standards outlined in *Management standards for native vegetation offset sites, September 2019*	Landowner / contractor

MANAGEMENT ACTION	ZONE	MANAGEMENT ACTION DESCRIPTION	REFERENCE SECTION FOR ACTION	TIMING	TARGET TO BE ACHIEVED	PERSON RESPONSIBLE
Woody Weeds	All	Monitor for and eliminate all new & emerging woody weeds	n/a	Ongoing	<1% cover of all woody weeds, with no mature plants present at the end of Year 10 Minimise off-target damage (avoid all native plants)	Landowner / contractor
Herbaceous Weeds	All	Monitor for and control all herbaceous weeds. Refer to Section 3.3.3.2 for list of herbaceous weeds, their control method and timing of actions	Section 3.3.3		No increase in cover of herbaceous weeds within the offset site Minimise off-target damage (avoid all native plants)	Landowner / contractor
	All	Monitor for and eliminate all new & emerging herbaceous weeds	n/a	Ongoing	<1% cover of all new and emerging herbaceous weeds at the end of Year 10	Landowner / contractor
	All	Facilitate successional recruitment of indigenous flora and improvement of habitat values	Section 3.3.3		Improved indigenous flora recruitment rates Improved habitat values, greater floristic cover and diversity	Landowner / contractor
Pest Animals	All	Monitor for and control rabbits. Refer to Section 3.3.4 for a list of control methods and timing of actions	Section 3.3.4		No surface disturbance within the offset site No active rabbit warrens to be present No rubbish or surface harbour Minimal artificial piles of logs and rocks	Landowner / contractor
	All	Monitor for and control foxes. Refer to Section 3.3.4 for a list of control methods and timing of actions	Section 3.3.4	Ongoing	Participate in regional control programs Collapse dens Bait using Canid Pest Ejectors and/or engage professional shooters	Landowner / contractor
	All	Monitor for and control all new and emerging pest animals including deer	n/a	Ongoing	Control numbers of any new & emerging pest animals	Landowner / contractor
Water security	All	No pumping for stock watering, maintenance of natural flow patterns and drying cycles, maintenance of water sources and connectivity to waterways/wetlands, no introduction of pollutants, no ground-water pumping, no vehicle access during wet cycles.	Section 3.3.6	Ongoing	No take of water	Landowner / contractor
Monitoring	All	Conduct seasonal monitoring of Growling Grass Frog generally in accordance with *Significant impact guidelines for the vulnerable growling grass frog* (DEWHA 2009) and the *Survey guidelines for Australia's threatened frogs* (DEWHA 2010)	Section 3.3.7	Summer	Annual monitoring of Growling Grass Frog population Redo Chytrid disease test Reporting of Growling Grass Frog population dynamics within the offset site	Ecological consultant

MANAGEMENT ACTION	ZONE	MANAGEMENT ACTION DESCRIPTION	REFERENCE SECTION FOR ACTION	TIMING	TARGET TO BE ACHIEVED	PERSON RESPONSIBLE
Adaptive management	All	Monitor for new high threats. For each new threat identified, develop an integrated program of management and control actions to be implemented	Section 3.3.7.5	Ongoing – develop program within three months of identifying a new threat.	Develop an integrated program of management and control actions for MRPV / DAWE approval Implement program upon MRPV / DAWE approval.	Landowner / Ecological consultant / MRPV & DAWE
Annual reporting	All	Prepare and submit an annual report	Section 3.3.7.4	Submit at least two months prior to agreement anniversary date	Annual report is signed, dated and submitted by the landowner at least two months prior to the anniversary date of the agreement. Report provides enough detail in the form of written comments and supporting evidence that an assessor can easily determine the completion of / progress against the commitments for each zone. Obligations of the landowner have been met and the obligations form is read, signed, dated and submitted with the annual report. Progress and actions, as well as failings or any new and emerging threats, are reported on the MRPV EPBC compliance website and reported to DAWE.	Landowner / MRPV
Year 4-10						
Fencing	All	No threats to the offset site currently exist. If a new or emerging threat arises erect a fence immediately to ensure that the new threats are controlled.	Section 3.3.2	Immediately on identification of new or emerging threat	Construct and/or upgrade fencing as required to control new and/or emerging threats.	Landowner / contractor
	All	Maintain fencing in good condition around entire boundary of the offset site where fencing exists or is required. Conduct yearly monitoring to ensure all fencing meets the required standard.	Section 3.3.2	Ongoing	Maintain fencing to DELWP fencing standards outlined in *Management standards for native vegetation offset sites, September 2019*	Landowner / contractor
Woody Weeds	All	Monitor for and eliminate all new & emerging woody weeds	n/a	Ongoing	<1% cover of all woody weeds, with no mature plants present at the end of Year 10 Minimise off-target damage (avoid all native plants)	Landowner / contractor
Herbaceous Weeds	All	Monitor for and control all herbaceous weeds. Refer to Section 3.3.3.2 for list of herbaceous weeds, their control method and timing of actions	Section 3.3.3		No increase in cover of herbaceous weeds within the offset site Minimise off-target damage (avoid all native plants)	Landowner / contractor
	All	Monitor for and eliminate all new & emerging herbaceous weeds	n/a	Ongoing	<1% cover of all new and emerging herbaceous weeds at the end of Year 10	Landowner / contractor

MANAGEMENT ACTION	ZONE	MANAGEMENT ACTION DESCRIPTION	REFERENCE SECTION FOR ACTION	TIMING	TARGET TO BE ACHIEVED	PERSON RESPONSIBLE
	All	Facilitate successional recruitment of indigenous flora and improvement of habitat values	Section 3.3.3		Improved indigenous flora recruitment rates Improved habitat values, greater floristic cover and diversity	Landowner / contractor
Pest Animals	All	Monitor for and control rabbits. Refer to Section 3.3.4 for a list of control methods and timing of actions	Section 3.3.4		No surface disturbance within the offset site No active rabbit warrens to be present No rubbish or surface harbour Minimal artificial piles of logs and rocks	Landowner / contractor
	All	Monitor for and control foxes. Refer to Section 3.3.4 for a list of control methods and timing of actions	Section 3.3.4	Ongoing	Participate in regional control programs Collapse dens Bait using Canid Pest Ejectors and/or engage professional shooters	Landowner / contractor
	All	Monitor for and control all new and emerging pest animals including deer	n/a	Ongoing	Control numbers of any new & emerging pest animals	Landowner / contractor
Water security	All	No pumping for stock watering, maintenance of natural flow patterns and drying cycles, maintenance of water sources and connectivity to waterways/wetlands, no introduction of pollutants, no ground-water pumping, no vehicle access during wet cycles.	Section 3.3.6	Ongoing	No take of water	Landowner / contractor
Monitoring	All	Conduct seasonal monitoring of Growling Grass Frog generally in accordance with *Significant impact guidelines for the vulnerable growling grass frog* (DEWHA 2009) and the *Survey guidelines for Australia's threatened frogs* (DEWHA 2010)	Section 3.3.7	Summer	Annual monitoring of Growling Grass Frog population Reporting of Growling Grass Frog population dynamics within the offset site	Ecological consultant
Adaptive management	All	Monitor for new high threats. For each new threat identified, develop an integrated program of management and control actions to be implemented	Section 3.3.7.5	Ongoing – develop program within three months of identifying a new threat.	Develop an integrated program of management and control actions for MRPV / DAWE approval Implement program upon MRPV / DAWE approval.	Landowner / Ecological consultant / MRPV & DAWE
Annual reporting	All	Prepare and submit an annual report	Section 3.3.7.4	Submit at least two months prior to agreement anniversary date	Annual report is signed, dated and submitted by the landowner at least two months prior to the anniversary date of the agreement. Report provides enough detail in the form of written comments and supporting evidence that an assessor can easily determine	Landowner / MRPV

MANAGEMENT ACTION	ZONE	MANAGEMENT ACTION DESCRIPTION	REFERENCE SECTION FOR ACTION	TIMING	TARGET TO BE ACHIEVED	PERSON RESPONSIBLE
					the completion of / progress against the commitments for each zone. Obligations of the landowner have been met and the obligations form is read, signed, dated and submitted with the annual report. Progress and actions, final report, as well as failings or any new and emerging threats, are reported on the MRPV EPBC compliance website and reported to DAWE.	

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APPENDIX A

EPBC CALCULATORS

A1 OFFSET ASSESSMENT CALCULATIONS

Table A.1 below outlines the rationale and assumptions used to determine values used in the EPBC calculators in Appendix A2. Values used in the calculators are deliberately conservative to account for the uncertainty associated with delivery of 'future' ecological outcomes; these values have also been developed in consultation with DAWE and are based on the EPBC *how to guide* (undated, available online).

Table A.1 EPBC offset site value assumptions

EPBC CALCULATOR ATTRIBUTE DESCRIPTION	VALUE USED	VALUE RATIONALE
Time over which loss is averted (max. 20 years) The foreseeable timeframe (in years) over which changes in the level of risk to a proposed offset site can be considered and quantified.	20	The OMP for Brady Swamp includes a 10 year program for delivery of conservation outcomes, which will be secured on Title with an in-perpetuity conservation covenant. The conservation covenant will protect the offset area against detrimental land-use and loss of 'accumulated' environmental Gains for the target species.
Time until ecological benefit Estimated time (in years) that it will take for the habitat quality improvement of the proposed offset to be realised.	10	Improvement works aimed at increasing the habitat values within the offset site, as well as implementation of predator control programs, will be included in the OMP. These programs will run for a minimum period of 10 years, with gains to be maintained in perpetuity under covenant. Whilst ecological benefits will be realised at commencement of the management programs, the timeframe used in the calculators is 10 years in order to ensure that all benefits are accounted for in offset calculations.
Risk of loss (%) without Offset Describes the chance that the habitat on the proposed offset site will be completely lost (i.e. no longer hold any value for the protected matter) over the foreseeable future (in this case 20 years) in the absence of active conservation management.	Brady Swamp: 20%	This equates to the 'business as usual' scenario that is a current option at Brady Swamp, and accounts for the likelihood of habitat values decreasing on site via an adverse impact, change in landuse or by gradual degradation over time. Whilst it is expected that habitat values will persist, as they have to date, there remains a risk of loss if these sites are not actively managed and the gains secured with a conservation covenant. The Brady Swamp offset area is currently only lightly grazed by the landowner, however, given this site's Farm Zone and existing grazing right, we cannot preclude grazing and detrimental impacts within the wetlands in the future. Seasonal water flow variations, as well as the potential for detrimental alterations to water sources in the future, are also considered to be a risk to the habitat values offered at this site.
Risk of loss (%) with Offset Describes the chance that the habitat on the proposed offset site will be completely lost (i.e. no longer hold any value for the protected matter) over the foreseeable future (in this case 20 years) in the presence of active conservation management.	Brady Swamp: 10%	This value accounts for risk mitigation measures, such as (but not limited to) implementation of an OMP and an on-Title conservation covenant, leading to maintenance and improvement of habitat values and, by default, improvements in the fecundity and long-term population viability of the target species. The offset area will be encumbered with a conservation covenant placed on Title which will enforce conservation management processes that are to be implemented on site. These will include, at minimum, management of environmental weeds and predators, maintenance and improvement of habitat values, and monitoring and reporting on each of the target species' population dynamics and fecundity. Details of the OMP are to be developed in consultation with DAWE and secured on Title at initiation of EPBC Permit conditions for the project. Whilst the risk of loss is reduced with the incorporation of active offset management, a small risk of loss associated with unplanned burning, climate change and unforeseen impacts remains and is therefore factored into the values used in the EPBC calculators. The primary risk of loss of habitat value at Brady Swamp is associated with uncontrolled (increased) stock grazing and water security. Water inflows have recently been improved through implementation of the *Gooseneck Swamp Restoration* project (Bachmann 2014), however, these works are indicative of the potential for future managed manipulation of water security.

EPBC CALCULATOR ATTRIBUTE DESCRIPTION	VALUE USED	VALUE RATIONALE
Confidence in result Level of certainty that the proposed conservation outcomes can be achieved (based on existing evidence) and surety that the Offset Site will not decline.	70%	The OMP will be secured on Title with a conservation covenant. The covenants are an effective and reliable means of ensuring that the OMP and ecological outcomes set out therein are delivered over the 10 year period, and that gains are maintained into the future (minimum 20 years with covenants in perpetuity). The higher degree of site security imposed through the conservation covenants will also ensure that future landowners are aware of the ecological commitments that encumber the property, including the 'loss of right' to graze, subdivide or develop the site. The OMP will also contain a monitoring and reporting component that will further ensure that commitments are adhered to and delivered. The progress of offset management will also be reported on the MRPV EPBC compliance website, with notifications to DAWE as required in the EPNC Permit conditions.
Confidence in result Level of certainty about the overall likelihood of the success of the proposed offset.	70%	Monitoring within the offset site undertaken by WSP has confirmed that Brady Swamp retains meta-populations of Growling Grass Frog. The Brady Swamp Growling Grass Frog meta-population has contiguous habitat to Growling Grass Frog populations within the Gooseneck Swamp (upstream) and the Wannon River floodplains (downstream). Therefore, there is no expectation that this offset site cannot provide for this Growling Grass Frog population into the future.

Table A.2 below provides a breakdown of future habitat values at Brady Swamp with and without future offset management regimes. These values have been developed in consultation with DAWE and reflect conservative assessments of habitat values for Growling Grass Frog at the site. Habitat values associated with the 'continuance of current landuse rights' take into account rights to develop, graze or clear the habitat areas, whereas habitat value gains associated with the implementation of conservation management works (as secured on Title) reflect future values that can confidently be delivered based on current knowledge of the offset habitat area and the capacity of current landowners to deliver positive outcomes.

Table A.2 EPBC offset site projected habitat values

EPBC CALCULATOR ATTRIBUTE DESCRIPTION	CURRENT / PROJECTED HABITAT VALUE	HABITAT VALUE RATIONALE
BRADY SWAMP GROWLING GRASS FROG BREEDING / DISPERSAL HABITAT QUALITY		
Current habitat quality (scale of 0-10) As provided in the PD.	8	-
Future quality without Offset (scale of 0-10) Habitat quality of the offset site predicted to occur without active improvement.	7	There is potential for loss of site condition within the Brady Swamp Growling Grass Frog breeding /dispersal habitat areas due stock grazing (an existing landuse right within this property's Farm Zone) and associated impacts due to pugging and increased turbidity.
Future quality with offset (scale of 0-10) Habitat quality of the offset site predicted to occur with active improvement.	9	There is potential to increase site condition within the Brady Swamp offset area through controlled grazing (outside of Growling Grass Frog breeding and dispersal seasons) to manage environmental weeds at the wetland's margin, and the removal of stock as required to control pugging and stock impacts. Greater water security, through imposed limits on water extraction rates for stock, can also be implemented through the conservation covenant placed on Title.

A2 EPBC CALCULATOR

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Brady Swamp - Growling Grass Frog (Breeding)

Matter of National Environmental Significance	
Name	Growling Grass Frog
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Breeding PLUS Category 1 habitat: vegetated 200m buffer breeding habitat	**Area**	3.855	Hectares	Consultancy report, EPBC referral and GIS mapping
			Quality	**7**	Scale 0-10	
			Total quantum of impact	2.70	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	2.70	Adjusted hectares	Brady Swamp GGF breeding habitat	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	16	**Risk of loss (%) without offset**	20%	**Risk of loss (%) with offset**	10%	1.60	70%	1.12	1.08	2.73	100.98%	Yes	
									Future area without offset (adjusted hectares)	12.8	**Future area with offset (adjusted hectares)**	14.4								
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**8**	**Future quality without offset (scale of 0-10)**	**7**	**Future quality with offset (scale of 0-10)**	**9**	2.00	70%	1.40	1.37				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	2.6985	2.73	100.98%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

APPENDIX B

OFFSET SITE ASSESSMENT

B1 SITE FLORA LIST

STATUS	SCIENTIFIC NAME	COMMON NAME	CALP ACT	WSP	RECORDS SUPPLIED BY LANDOWNER	MA1	MA2	MA3
*	*Agrostis capillaris*	Brown-top Bent	-	✓		HT	HT	
	Althenia cylindrocarpa	Long-fruit Water-mat	-	✓	✓			
VU, X	*Amphibromus fluitans*	River Swamp Wallaby-grass	-	✓				
*	*Anthoxanthum odoratum*	Sweet Vernal-grass	-	✓		HT	HT	
	Apium annuum	Annual Celery	-	✓				
*	*Arctotheca calendula*	Cape weed	-	✓				
*	*Aster subulatus*	Aster-weed	-	✓			HT	
*	*Atriplex prostrata*	Hastate Orache	-	✓				
*	*Callitriche brutia subsp. brutia*	Thread Water-starwort	-	✓				
	Calocephalus lacteus	Milky Beauty-heads	-	✓				
	Carex appressa	Tall Sedge	-	✓				
*	*Centaurium erythraea*	Common Centaury	-	✓				
	Centipeda cunninghamii	Common Sneezeweed	-		✓			
*	*Cerastium glomeratum s.l.*	Common Mouse-ear Chickweed	-	✓				
*	*Cirsium vulgare*	Spear Thistle	R	✓		HT		
*	*Cotula coronopifolia*	Water Buttons	-	✓	✓			HT
	Crassula colorata	Dense Crassula	-	✓				

STATUS	SCIENTIFIC NAME	COMMON NAME	CALP ACT	WSP	RECORDS SUPPLIED BY LANDOWNER	MA1	MA2	MA3
	Crassula helmsii	Swamp Crassula	-		✓			
	Cycnogeton procerum s.s.	Common Water-ribbons	-	✓				
	Cyperus gunnii	Flecked Flat-sedge	-	✓	✓			
	Distichlis distichophylla	Australian Salt-grass	-	✓				
	Elatine gratioloides	Waterwort	-	✓				
	Eleocharis acuta	Common Spike-sedge	-	✓	✓			
	Eleocharis gracilis	Slender Spike-sedge	-	✓				
	Epilobium billardierianum	Variable Willow-herb	-	✓				
	Epilobium spp.	Willow Herb	-	✓				
	Eragrostis infecunda	Southern Cane-grass	-	✓	✓			
X	*Eucalyptus camaldulensis*	River Red-gum	-	✓				
	Eucalyptus camaldulensis var. camaldulensis	River Red-gum	-		✓			
	Gahnia filum	Chaffy Saw-sedge	-	✓				
	Helichrysum luteoalbum	Jersey Cudweed	-		✓			
*	*Hordeum leporinum*	Barley-grass	-	✓	✓		HT	HT
	Isolepis cernua	Nodding Club-sedge	-	✓				
	Isolepis fluitans	Floating Club-sedge	-		✓			
	Juncus bufonius	Toad Rush	-	✓				

STATUS	SCIENTIFIC NAME	COMMON NAME	CALP ACT	WSP	RECORDS SUPPLIED BY LANDOWNER	MA1	MA2	MA3
	Juncus holoschoenus	Joint-leaf Rush	-	✓				
	Juncus ingens	Giant Rush	-	✓				
	Juncus pallidus	Pale Rush	-		✓			
	Juncus procerus	Tall Rush	-	✓				
	Lachnagrostis filiformis s.l.	Common Blown-grass	-	✓	✓			
*	*Leontodon saxatilis subsp. saxatilis*	Hairy Hawkbit	-	✓			HT	HT
	Lobelia irrigua	Salt Pratia	-	✓				
	Lobelia spp.	Lobelia	-	✓				
*	*Lolium perenne*	Perennial Rye-grass	-	✓				
	Lotus spp.	Trefoil	-	✓				
	Lythrum hyssopifolia	Small Loosestrife	-	✓				
*	*Malva spp.*	Mallow	-	✓				
	Marsilea drummondii	Common Nardoo	-	✓	✓			
	Mentha diemenica	Slender Mint	-	✓				
*	*Mentha pulegium*	Pennyroyal	-	✓			HT	HT
	Montia australasica	White Purslane	-	✓				
	Myriophyllum amphibium	Broad Water-milfoil	-	✓?				
	Myriophyllum muelleri	Slender Water-milfoil	-		✓			

STATUS	SCIENTIFIC NAME	COMMON NAME	CALP ACT	WSP	RECORDS SUPPLIED BY LANDOWNER	MA1	MA2	MA3
	Myriophyllum simulans	Amphibious Water-milfoil	-		✓			
	Myriophyllum verrucosum	Red Water-milfoil	-	✓				
	Opercularia ovata	Broad-leaf Stinkweed	-		✓			
*	*Phalaris aquatica*	Toowoomba Canary-grass	-	✓		HT	HT	
	Phragmites australis	Common Reed	-	✓				
*	*Plantago coronopus*	Buck's-horn Plantain	-	✓	✓		HT	
*	*Poa annua*	Annual Meadow-grass	-	✓				
	Potamogeton cheesemanii	Red Pondweed	-	✓				
	Ranunculus amphitrichus	Small River Buttercup	-	✓	✓			
r	*Ranunculus diminutus*	Brackish Plains Buttercup	-	✓				
	Ranunculus inundatus	River Buttercup	-	✓	✓			
*	*Ranunculus muricatus*	Sharp Buttercup	-	✓				
	Rumex bidens	Mud Dock	-	✓				
	Rumex dumosus	Wiry Dock	-	✓				
	Samolus repens var. repens	Creeping Brookweed	-	✓				
	Sarcocornia quinqueflora	Beaded Glasswort	-	✓				
	Sebaea albidiflora	White Sebaea	-	✓				
	Sebaea ovata	Yellow Sebaea	-	✓				

STATUS	SCIENTIFIC NAME	COMMON NAME	CALP ACT	WSP	RECORDS SUPPLIED BY LANDOWNER	MA1	MA2	MA3
	Selliera radicans	Shiny Swamp-mat	-	✓				
	Senecio biserratus	Jagged Fireweed	-	✓				
	Senecio glomeratus	Annual Fireweed	-	✓				
	Senecio pinnatifolius var. pinnatifolius	Rock Groundsel	-	✓				
	Senecio quadridentatus	Cotton Fireweed/ Auricled Groundsel	-	✓	✓			
*	*Sonchus asper subsp. asper*	Rough Sow-thistle	-	✓				
	Spergularia spp.	Sand Spurrey	-	✓				
	Stellaria angustifolia subsp. angustifolia	Swamp Starwort	-	✓	✓			
	Thyridia repens	Creeping Monkey-flower	-	✓	✓			
*	*Trifolium dubium*	Suckling Clover	-	✓				
*	*Trifolium fragiferum var. fragiferum*	Strawberry Clover	-	✓			HT	
*	*Trifolium repens var. repens*	White Clover	-	✓				
	Triglochin procera	Water Ribbons	-	✓	✓			
	Triglochin striata	Streaked Arrowgrass	-	✓				
*	*Vulpia bromoides*	Squirrel-tail Fescue	-	✓			HT	
	Wilsonia rotundifolia	Round-leaf Wilsonia	-	✓				

Key for table above:

** = Introduced, VU = listed as Vulnerable under the EPBC Act, X = rejected for listing as threatened under the FFG Act, r = listed as Rare on the Victorian Advisory List*
R = Restricted weeds under the CaLP Act

B2 SITE FAUNA LIST – INCIDENTAL

STATUS	COMMON NAME	SCIENTIFIC NAME	WSP RECORDED	RECORDS SUPPLIED BY LANDOWNER
EN en L	Australasian Bittern	*Botaurus poiciloptilus*	✓	
vu	Australasian Shoveler	*Anas rhynchotis*		✓
	Australian Shelduck	*Tadorna tadornoides*	✓	✓
	Australian White Ibis	*Threskiornis molucca*		✓
	Australian Wood Duck	*Chenonetta jubata*		✓
	Banded Lapwing	*Vanellus tricolor*		✓
	Banded Stilt	*Cladorhynchus leucocephalus*		✓
	Black Swan	*Cygnus atratus*	✓	✓
	Black-winged Stilt	*Himantopus himantopus*	✓	✓
vu L	Brolga	*Grus rubicunda*	✓	✓
	Brown Falcon	*Falco berigora*		✓
	Cattle Egret	*Bubulcus ibis*		✓
	Chestnut teal	*Anas castanea*		✓
	Clamorous Reed Warbler	*Acrocephalus stentoreus*	✓	
	Common Froglet	*Crinia signifera*	✓	
	Common Galaxias	*Galaxias maculatus*		✓
	Common Yabby	*Cherax destructor destructor*		✓
	Dusky Moorhen	*Gallinula tenebrosa*		✓
VU en L	Dwarf Galaxias	*Galaxiella pusilla*		✓
vu L	Eastern Great Egret	*Ardea modesta*		✓
	Eastern Grey Kangaroo	*Macropus giganteus*	✓	
dd	Eastern Snake-necked Turtle	*Chelodina longicollis*		✓
nt	Emu	*Dromaius novaehollandiae*	✓	
	Eurasian Coot	*Fulica atra*		✓
nt	Glossy Ibis	*Plegadis falcinellus*		✓
	Golden-headed Cisticola	*Cisticola exilis*	✓	✓
	Great Cormorant	*Phalacrocorax carbo*		✓
	Grey Teal	*Anas gracilis*		✓
VU en L	Growling Grass Frog	*Litoria raniformis*	✓	✓
	Hoary-headed Grebe	*Poliocephalus poliocephalus*		✓
	Little Grassbird	*Megalurus gramineus*	✓	✓

STATUS	COMMON NAME	SCIENTIFIC NAME	WSP RECORDED	RECORDS SUPPLIED BY LANDOWNER
	Little Pied Cormorant	*Microcarbo melanoleucos*		✓
	Masked Lapwing	*Vanellus miles*		✓
	Mountain Galaxias	*Galaxias olidus*		✓
	Nankeen Kestrel	*Falco cenchroides*		✓
	Pacific Black Duck	*Anas superciliosa*		✓
	Peregrine Falcon	*Falco peregrinus*	✓	
	Plains Froglet	*Crinia parinsignifera*	✓	
	Pobblebonk Frog	*Limnodynastes dumerilii dumerilii*	✓	
nt	Royal Spoonbill	*Platalea regia*		✓
	Sharp-tailed Sandpiper	*Calidris acuminata*		✓
	Silver Gull	*Chroicocephalus novaehollandiae*	✓	✓
	Southern Boobook	*Ninox novaeseelandiae*	✓	
	Southern Pygmy Perch	*Nannoperca australis*		✓
	Spotted Marsh Frog	*Limnodynastes tasmaniensis*	✓	
	Straw-necked Ibis	*Threskiornis spinicollis*		✓
	Striped Marsh Frog	*Limnodynastes peronii*	✓	
	Swamp Harrier	*Circus approximans*		✓
	Wedge-tailed Eagle	*Aquila audax*		✓
	Western Crayfish	*Geocharax falcata*		✓
L	Western Swamp Crayfish	*Gramastacus insolitus*		✓
nt	Whiskered Tern	*Chlidonias hybridus javanicus*		✓
	Whistling Kite	*Haliastur sphenurus*	✓	✓
vu L	White-bellied Sea-Eagle	*Haliaeetus leucogaster*	✓	
	White-faced Heron	*Egretta novaehollandiae*		✓
	White-fronted Chat	*Epthianura albifrons*		✓
	White-necked Heron	*Ardea pacifica*		✓
	Yellow-billed Spoonbill	*Platalea flavipes*		✓

Key for table above:

EPBC Act: EN = Endangered, VU = Vulnerable

FFG Act: L = listed as threatened

Victorian Advisory List: en = Endangered, vu = Vulnerable, nt = near threatened, dd = Data Deficient

B3 VEGETATION QUALITY ASSESSMENT RESULTS

As mentioned in Table 2.4, the wetlands were assessed using Victoria's Vegetation Quality Assessment method (Department of Sustainability and Environment 2004). Vegetation Quality Assessment results are provided in Table B.1. Where EVC benchmarks were not available for EVCs in the study area, the closest type of EVC benchmarks were used and are identified in the table below.

Table B.1 Vegetation Quality Assessment results – Brady Swamp

BIOREGION	**DUNDAS TABLELANDS**	**DUNDAS TABLELANDS**	**DUNDAS TABLELANDS**	**DUNDAS TABLELANDS**	**DUNDAS TABLELANDS**	**DUNDAS TABLELANDS**	**DUNDAS TABLELANDS**
Zone	1A	1B	1C	1D	1E & 1G	1F & 1J	1H & 1I
EVC	Aquatic Herbland / open water	Aquatic Herbland	Tall Marsh	Cane Grass Wetland	Brackish Herbland	Cane Grass Wetland/Aquatic Herbland Complex	Brackish Sedgeland
Benchmark used	Aquatic Herbland	Aquatic Herbland	Tall Marsh	Cane Grass Wetland (VVP)	Brackish Sedgeland	Aquatic Herbland	Brackish Sedgeland
EVC #	653/990	653	821	291	657	291/653	13
Conservation significance	E	E	V	E	E	E	E
Site condition score							
Lack of Weeds	15	9	7	9	9	7	7
Understorey	5	15	15	25	15	15	10
Recruitment	3	6	6	3	6	6	3
Organic Litter	5	5	3	5	5	5	4
EVC Standardiser	1.36	1.36	1.36	1.36	1.36	1.36	1.36
Landscape Context							
Patch Size	8	8	8	8	8	8	8

BIOREGION	DUNDAS TABLELANDS	DUNDAS TABLELANDS	DUNDAS TABLELANDS	DUNDAS TABLELANDS	DUNDAS TABLELANDS	DUNDAS TABLELANDS	DUNDAS TABLELANDS
Neighbourhood	3	3	3	3	3	3	3
Distance to Core Area	4	4	4	4	4	4	4
Final Habitat Score	**53.08**	**62.6**	**57.16**	**72.12**	**62.6**	**59.88**	**47.64**

B4 INDEX OF WETLAND CONDITION

Output from Index of Wetland Condition (IWC) database, using IWC method (DELWP 2018) assessed in the state-wide assessment of Victorian wetlands 2010/11.

Project name	Statewide assessment 2010/11: Glenelg Hopkins CMA			
Wetland name	Brady Swamp			
Wetland number	26714			
Corrick ID	7322277378			
Started	21 Dec 2010 at 09:00			
Ended	21 Dec 2010 at 16:30			
Assessment		**score:**	**7.0**	**Good**
General Info	**score:**			
measure	value		category	score
Water cover (non peatbed wetlands)				
Dry or moist soil	0.0			
Saturated soil	0.0			
Water	100.0			
Unknown	0.0			
Wetland phase (non peatbed wetlands)				
Wetland phase (non peatbed wetlands)	Full			
Number of years dry				
If currently dry, how many years has the wetland been dry?	0			
Is this a peatland system?	No			
Wetland catchment	**score:**		**6.00**	**Poor**
measure	value		category	score
Wetland buffer assessment				**2**
Average buffer width (m)	> 50		> 50	
% of wetland perimeter within a buffer	5 - 25		5 - 25	
Percentage of land in different land use intensity classes adjacent to the wetland				**4**
Land use intensity class	**136 - 200**		**136 - 200**	**4**
Very High	0.0			
High	60.0			
Medium	15.0			
Low	0.0			
Very Low	25.0			
Physical Form	**score:**		**19.75**	**Excellent**
measure	value		category	score
Reduction in wetland area				**10**
Change in wetland area (non peatland sites)	**0 - 5**		**0 - 5**	**10**
Does the shape of the wetland boundary differ from Wetland 1994 layer or more recent mapping?	No			
Percentage of wetland where activities have resulted in a change in bathymetry				**9.75**

Activity that changes the wetland bathymetry			
Excavation of the wetland bed (e.g. channels, dams, dredging)	No		
Landforming (e.g. raised-bed cropping, laser-levelling, building mounds)	No		
Severity of wetland bathymetry change			**9.75**
High	2.5		
Medium	0.0		
Low	0.0		
None	97.5		
Hydrology	**score:**	**15.00**	**Good**
measure	value	category	score
Severity of effect of activities that change the water regime			**25**
Water source	River or stream		
Activity that changes the wetland water regime			
Activity that changes the flow regime of the water source	Yes		
Obstruction or regulation of natural water inlets	No		
Obstruction or regulation of natural water outlets	Yes		
Drainage of water from the wetland	No		
Disposal of water into wetland	No		
Extraction of water directly from the wetland	No		
Activities that permanently raise the water level when full	No		
Activities that lead to an increase in groundwater height	No		
Activities that lead to a decrease in groundwater height	No		
Severity of change on water regime components			**25**
Seasonality	Low - very low		10
Frequency	Low - very low		10
Duration	Medium		5
Water Properties	**score:**	**11.67**	**Moderate**
measure	value	category	score
Activities leading to nutrient enrichment			**5**
Discharge of nutrient-rich water to the wetland	No		
Drainage of water into the wetland from an urban area	No		
Runoff of nutrients to wetland	No		
Grazing by livestock and feral animals	Yes		
Aquaculture	Yes		
What is the likelihood of an increase in nutrients from any of the above activities?	Moderate		5
No activities leading to nutrient enrichment	No		
Evidence of a change in salinity			**6.670000076**

Is there evidence that the wetland has increased in salinity?	No			10
Is the wetland within 250 m of a salinity discharge site?	Yes			0
Is saline water delivered to the wetland or is freshwater delivered to a saline wetland?	No			10
Soils	**score:**		**19.50**	**Excellent**
measure	value		category	score
Percentage and severity of wetland soil disturbance				
Activity that causes soil distubance				
Pugging/disturbance by livestock and/or feral animals	Yes			
Cultivation	No			
Carp mumbling	No			
Human trampling	No			
Driving of vehicles in the wetland	Yes			
Soil disturbance severity				**19.5**
Severity of disturbance				**19.5**
High	2.5			
Medium	0.0			
Low	0.0			
None	97.5			
Overall Biota		**score:**	**17.40**	**Good**
		score:	**20.00**	
measure	value		category	score
Individual EVC assessment				
EVC	821 - Tall Marsh			
Unit No.	1.0			
Percentage of the wetland area covered by EVC	6.0			
Critical lifeform groups				**25**
Number of lifeforms identified in the benchmark	4.0			
Number of lifeform(s) present that are unmodified	4.0			
Number of lifeform(s) present that are modified	0.0			
Weeds				**25**
Weeds				
% cover of weeds	< 5		< 5	
% of weed cover made up of high threat weeds	0		0	
Indicators of altered processes				**25**
Indicators of altered processes	>= 50% critical lifeform groups present with no evidence of the altered process or none recoginised in the benchmark			25
Vegetation structure and health				**25**
Percent of benchmark cover	> 50		> 50	
Percentage of cover of structural dominants which is healthy	> 70		> 70	
		score:	**20.00**	
measure	value		category	score
Individual EVC assessment				

EVC	308 - Aquatic Sedgeland		
Unit No.	1.0		
Percentage of the wetland area covered by EVC	26.0		
Critical lifeform groups			**25**
Number of lifeforms identified in the benchmark	1.0		
Number of lifeform(s) present that are unmodified	1.0		
Number of lifeform(s) present that are modified	0.0		
Weeds			**25**
Weeds			
% cover of weeds	< 5	< 5	
% of weed cover made up of high threat weeds	0	0	
Indicators of altered processes			**25**
Indicators of altered processes	>= 50% critical lifeform groups present with no evidence of the altered process or none recoginised in the benchmark		25
Vegetation structure and health			**25**
Percent of benchmark cover	> 50	> 50	
Percentage of cover of structural dominants which is healthy	> 70	> 70	
	score:	**15.57**	

measure	value	category	score
Individual EVC assessment			
EVC	13 - Brackish Sedgeland		
Unit No.	1.0		
Percentage of the wetland area covered by EVC	26.0		
			20.82999992
Critical lifeform groups			
Number of lifeforms identified in the benchmark	3.0		
Number of lifeform(s) present that are unmodified	2.0		
Number of lifeform(s) present that are modified	1.0		
Weeds			**7**
Weeds			
% cover of weeds	25 - 50	25 - 50	
% of weed cover made up of high threat weeds	> 50	> 50	
High threat weed species observed	Cirsium vulgare, Hordeum murinum s.l., Lolium perenne, Parapholis incurva, Phalaris aquatica, Plantago coronopus, Polypogon monspeliensis, Trifolium fragiferum var. fragiferum		
Indicators of altered processes			**25**
Indicators of altered processes	>= 50% critical lifeform groups present with no evidence of the altered process or none recoginised in the benchmark		25
Vegetation structure and health			**25**
Percent of benchmark cover	> 50	> 50	
Percentage of cover of structural dominants which is healthy	> 70	> 70	
	score:	**12.73**	

measure	value	category	score

Individual EVC assessment			
EVC	13 - Brackish Sedgeland		
Unit No.	2.0		
Percentage of the wetland area covered by EVC	16.0		
			16.67000008
Critical lifeform groups			
Number of lifeforms identified in the benchmark	3.0		
Number of lifeform(s) present that are unmodified	1.0		
Number of lifeform(s) present that are modified	2.0		
Weeds			**7**
Weeds			
% cover of weeds	25 - 50	25 - 50	
% of weed cover made up of high threat weeds	> 50	> 50	
High threat weed species observed	Cirsium vulgare, Hordeum murinum s.l., Lolium perenne, Phalaris aquatica, Plantago coronopus, Rumex crispus, Trifolium fragiferum var. fragiferum		
Indicators of altered processes			**25**
Indicators of altered processes	>= 50% critical lifeform groups present with no evidence of the altered process or none recoginised in the benchmark		25
Vegetation structure and health			**15**
Percent of benchmark cover	10 - 50	10 - 50	
Percentage of cover of structural dominants which is healthy	> 70	> 70	
	score:	**18.90**	

measure	value	category	score
Individual EVC assessment			
EVC	651 - Plains Swampy Woodland		
Unit No.	1.0		
Percentage of the wetland area covered by EVC	26.0		
Critical lifeform groups			**22.5**
Number of lifeforms identified in the benchmark	5.0		
Number of lifeform(s) present that are unmodified	4.0		
Number of lifeform(s) present that are modified	1.0		
Weeds			**22**
Weeds			
% cover of weeds	< 5	< 5	
% of weed cover made up of high threat weeds	< 50	< 50	
High threat weed species observed	Cirsium vulgare, Holcus lanatus, Rumex crispus		
Indicators of altered processes			**25**
Indicators of altered processes	>= 50% critical lifeform groups present with no evidence of the altered process or none recoginised in the benchmark		25
Vegetation structure and health			**25**
Percent of benchmark cover	> 50	> 50	
Percentage of cover of structural dominants which is healthy	> 70	> 70	

B5 FROG HABITAT ASSESSMENT SHEETS

Frog Habitat Assessment

Cluster/region:	**Site:** 1	**Personnel:** NM	**Photos taken?**
Date: 23/10/19	**Time:** 3:47 pm	**GPS:**	**Wpt:**

Weather conditions: Sunny

Waterbody type: Wetland (sediment pond, treatment wetland, lake, lagoon pond, quarry)

Hydroperiod: Seasonal (Estimate (TBC) - permanent, semi-permanent, ephemeral, intermittent)

Water level: 20cm deep (depth (cm) if known AND % of wetland area (i.e. within margin) under water)

Year of construction: | **Year of desilting (if applicable):**

Aquatic vegetation *Mapped by zone (Z1 - drawdown zone; Z2 - emergent zone; Z3 - open water/subm. zone)*

Areas (GIS) - Zone 1: Zone 2: Zone 3:

Zone 1 dom. taxa	Cover		Zone 2 dom. taxa	Cover		Zone 3 dom. taxa	Cover	
			Eragrostis infecunda	20%	Z2			
			Mentha diemenica	20%	Z2			
			Callitriche brutia	1%	Z2			
			Eleocharis acuta	5%	Z2			
			Amphibromus fluitans	1%	Z2			
			Stellaria angustifolia subsp. Angustifolia	1%	Z2			

Estimate of flora sp. richness - across Z1, Z2 and Z3

Fringing vegetation (description) % Tree cover within 10m of water's edge:

Aquatic Herbland

Major fringing habitat type (w'in 10m): (mown, grazed, rank growth, bare, rocks, landscaped, shrubby)

Terrestrial refuge (estimate of % cover of rocks and logs (>5 cm diameter) within 10 m of water's edge)

Rocks: No Logs: No

Water quality Instrument(s):

Water temp: pH: Turb:

Salinity (uS/cm) Other:

Frogs recorded (calling / dip-netting)		**Dip-netting conducted?** Y/**N** (5-10)	
Crinia signifera	✓	Limnodynastes dumerilii	
Geocrinia victoriana		Limnodynastes peronii	✓
Litoria ewingii		L. tasmaniensis	
Litoria leseuri		Neobatrachus sudelli	
Litoria peronii		Pseudophryne bibronii	
Litoria raniformis	✓ 10-50	P. semimarmorata	
Litoria verreauxi		Crinia parinsignifera	✓

Gambusia observed? Approx. # captured (dip-netting) -

[Yes/**No** & estimate: none, few (c. <10), moderate (c. 10-50), many (>50)]

Other records or potential interest:

(e.g. yabbies, eels)

Notes:

Frog Habitat Assessment

Cluster/region:	**Site:** 2	**Personnel:** NM	**Photos taken?**
Date: 23/10/19	**Time:** 4:58 pm	**GPS:**	**Wpt:**

Weather conditions: Sunny, no wind. Approx 20°C

Waterbody type: Wetland (sediment pond, treatment wetland, lake, lagoon pond, quarry)

Hydroperiod: (Estimate (TBC) - permanent, semi-permanent, ephemeral, intermittent)

Water level: 50cm (depth (cm) if known AND % of wetland area (i.e. within margin) under water)

Year of construction: **Year of desilting (if applicable):**

Aquatic vegetation *Mapped by zone (Z1 - drawdown zone; Z2 - emergent zone; Z3 - open water/subm. zone)*

Areas (GIS) - Zone 1: Zone 2: Zone 3:

Zone 1 dom. taxa	Cover		Zone 2 dom. taxa	Cover		Zone 3 dom. taxa	Cover	
						Eragrostis infecunda	20%	Z3
						Callitriche brutia	2%	Z3
						Amphibromus fluitans	5%	Z3
						Eleocharis acuta	10%	Z3

Estimate of flora sp. richness - across Z1, Z2 and Z3

Fringing vegetation (description) % Tree cover within 10m of water's edge:

Cane grass wetland, Aquatic Grassy Wetland

Major fringing habitat type (w'in 10m): (mown, grazed, rank growth, bare, rocks, landscaped, shrubby)

Terrestrial refuge (estimate of % cover of rocks and logs (>5 cm diameter) within 10 m of water's edge)

Rocks: No Logs: No

Water quality Instrument(s):

Water temp: pH: Turb:

Salinity (uS/cm) Other:

Frogs recorded (calling / dip-netting)		**Dip-netting conducted?** Y/**N** (5-10)	
Crinia signifera	✓ 50+	Limnodynastes dumerilii	✓ 2
Geocrinia victoriana		Limnodynastes peronii	
Litoria ewingii		L. tasmaniensis	✓ 20
Litoria leseuri		Neobatrachus sudelli	
Litoria peronii		Pseudophryne bibronii	
Litoria raniformis	✓ 30-50	P. semimarmorata	
Litoria verreauxi		Other:	

Gambusia observed? Approx. # captured (dip-netting) -

[Yes/No & estimate: none, few (c. <10), moderate (c. 10-50), many (>50)]

Other records or potential interest:

(e.g. yabbies, eels)

Notes:

Recording 30

Frog Habitat Assessment

Cluster/region:	**Site:** 3	**Personnel:**	**Photos taken?**
Date: 24/10/19	**Time:** 8:08 am	**GPS:**	**Wpt:**

Weather conditions: Sunny, no wind. Approx 20°C

Waterbody type: Wetland (sediment pond, treatment wetland, lake, lagoon pond, quarry)

Hydroperiod: (Estimate (TBC) - permanent, semi-permanent, ephemeral, intermittent)

Water level: (depth (cm) if known AND % of wetland area (i.e. within margin) under water)

Year of construction: **Year of desilting (if applicable):**

Aquatic vegetation *Mapped by zone (Z1 - drawdown zone; Z2 - emergent zone; Z3 - open water/subm. zone)*

Areas (GIS) - Zone 1: Zone 2: Zone 3:

Zone 1 dom. taxa	Cover		Zone 2 dom. taxa	Cover		Zone 3 dom. taxa	Cover	
			Triglochin procera	10%	Z2			
			Amphibromus fluitans	5%	Z2			
			Potamogeton cheesemanii	5%	Z2			
			Callitriche brutia	1%	Z2			
			Eleocharis acuta	5%	Z2			

Estimate of flora sp. richness - across Z1, Z2 and Z3

Fringing vegetation (description) % Tree cover within 10m of water's edge:

Aquatic Herbland

Major fringing habitat type (w'in 10m): (mown, grazed, rank growth, bare, rocks, landscaped, shrubby)

Terrestrial refuge (estimate of % cover of rocks and logs (>5 cm diameter) within 10 m of water's edge)

Rocks: Logs:

Water quality Instrument(s):

Water temp: pH: Turb:

Salinity (uS/cm) Other:

Frogs recorded (calling / dip-netting)		**Dip-netting conducted?** Y/N (5-10)
Crinia signifera	✓ 30-50	Limnodynastes dumerilii ✓
Geocrinia victoriana		Limnodynastes peronii
Litoria ewingii		L. tasmaniensis
Litoria leseuri		Neobatrachus sudelli
Litoria peronii		Pseudophryne bibronii
Litoria raniformis	✓ many (50+) 100-200m east	P. semimarmorata
Litoria verreauxi		Other:

Gambusia observed? Approx. # captured (dip-netting) -

[Yes/No & estimate: none, few (c. <10), moderate (c. 10-50), many (>50)]

Other records or potential interest:

(e.g. yabbies, eels)

Notes:

APPENDIX C

PROTECTED MATTERS SEARCH TOOL (PMST) REPORT

Australian Government
Department of the Environment and Energy

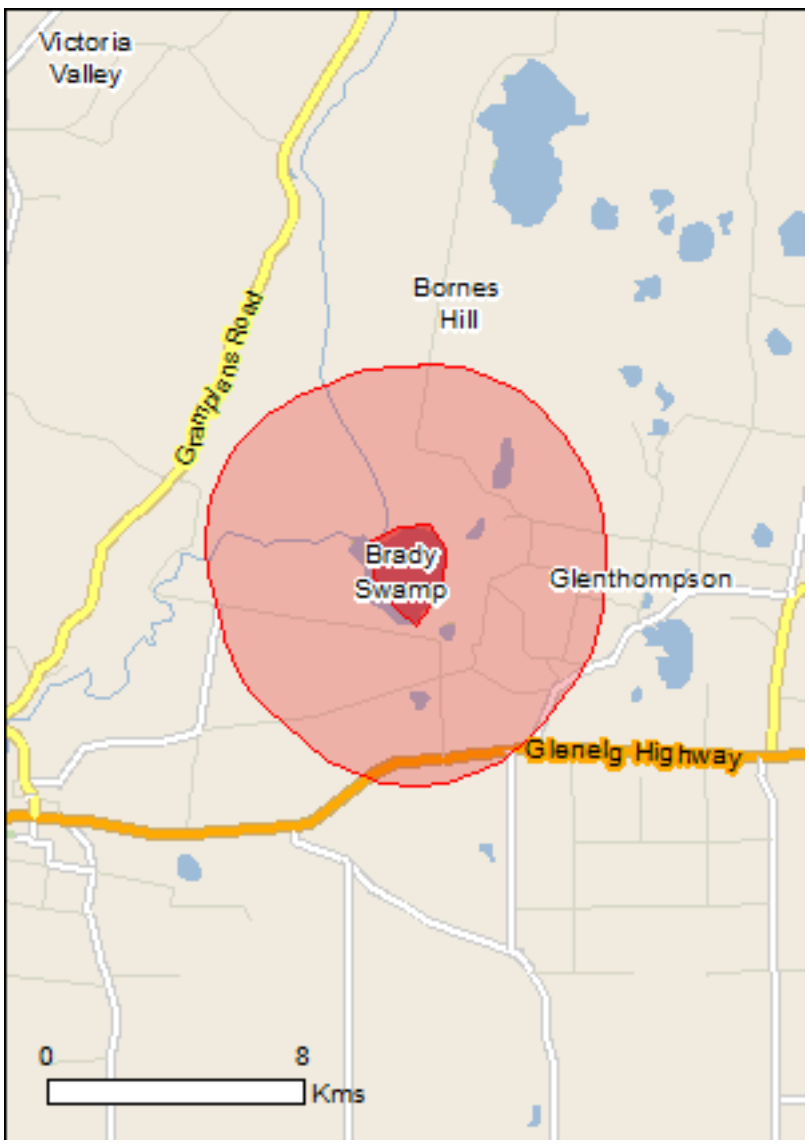
EPBC Act Protected Matters Report

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.

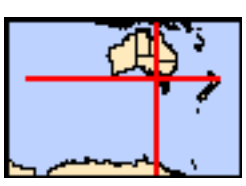
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 16/12/19 16:19:21



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 5.0Km



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:	1
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	38
Listed Migratory Species:	12

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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	19
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	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:	2
Regional Forest Agreements:	1
Invasive Species:	30
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
Grampians National Park (Gariwerd)	VIC	Listed place

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Glenelg estuary and discovery bay wetlands	100 - 150km upstream

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 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		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely 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
Hirundapus caudacutus White-throated Needletail [682]	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
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 likely to occur within area

Name	Status	Type of Presence
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Crustaceans		
Euastacus bispinosus		
Glenelg Spiny Freshwater Crayfish, Pricklyback [81552]	Endangered	Species or species habitat likely to occur within area
Fish		
Galaxiella pusilla		
Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat known 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 likely to occur within area
Insects		
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 likely to occur within area
Isoodon obesulus obesulus		
Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Miniopterus orianae bassanii		
Southern Bent-wing Bat [87645]	Critically Endangered	Species or species habitat likely to occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys fumeus		
Smoky Mouse, Konoom [88]	Endangered	Species or species habitat may occur within area
Pseudomys shortridgei		
Heath Mouse, Dayang, Heath Rat [77]	Endangered	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Amphibromus fluitans		
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area
Asterolasia phebalioides		
Downy Star-bush [3599]	Vulnerable	Species or species habitat likely to occur within area
Caladenia ornata		
Ornate Pink Fingers [76213]	Vulnerable	Species or species habitat likely to occur within area
Dodonaea procumbens		
Trailing Hop-bush [12149]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely 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 known to occur within area
Leucochrysum albicans var. tricolor Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat likely to occur within area
Pimelea spinescens subsp. spinescens Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat likely to occur within area
Poa sallacustris Salt-lake Tussock-grass [24424]	Vulnerable	Species or species habitat likely to occur within area
Prasophyllum diversiflorum Gorae Leek-orchid [13210]	Endangered	Species or species habitat likely to occur within area
Prasophyllum suaveolens Fragrant Leek-orchid [64956]	Endangered	Species or species habitat likely to occur within area
Rutidosis leptorrhynchoides Button Wrinklewort [7384]	Endangered	Species or species habitat likely to occur within area
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
Sphaerolobium acanthos Grampians Globe-pea [65835]	Critically Endangered	Species or species habitat may occur within area
Thelymitra epipactoides Metallic Sun-orchid [11896]	Endangered	Species or species habitat may occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat known 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]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to 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 likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	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
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Brady Swamp W.R	VIC
Grampians	VIC

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
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
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
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
Mammals		
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
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
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
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to 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
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to 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
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		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
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

-37.589017 142.436993,-37.587793 142.440941,-37.585752 142.446606,-37.585208 142.455189,-37.590105 142.459481,-37.599626 142.458794,-37.607378 142.451069,-37.600578 142.44077,-37.589017 142.436993

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-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
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-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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