

Addendum to Onsite Offset Management Plan for 215 Cooper Street, New Epping, Victoria

Date: 25 June 2024

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Ref: 14592

1 Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Riverlee Caruso Epping Pty Ltd to provide a summary of updates to the existing Onsite Offset Management Plan (OMP) prepared by Ecology Australia for the proposed development at 215, 315W and 325C Cooper Street, New Epping.

Updates to the OMP are presented in this addendum in the below tables.

2 Background

The property at 215 Cooper Street, New Epping is approximately 45.5 ha where the majority of the land was historically used to quarry basalt. This activity has left large pits. The majority were backfilled following completion of quarrying, however some remained open resulting in a collection of permanent and ephemeral waterbodies.

This site now supports a regionally significant population of Growling Grass Frog *Litoria raniformis major* and that have been detected throughout the property. Growling Grass Frog is listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Flora and Fauna Guarantee Act 1988* (FFG Act). An extant population of Golden Sun Moth also occurs on the property at 315W and 325C Cooper Street, New Epping. Golden Sun Moth area listed as vulnerable under the EPBC Act and FFG Act. Offsets for Golden Sun Moth will be secured in the Western Grassland Reserve and are covered in less detail in the management plan.

3 Updates to the Management Plan

The Onsite OMP was prepared for the study area to address the impacts of the development on site and set out management objective for managing the existing population of Growling Grass Frog. The management plan was prepared in 2019 by Ecology Australia Pty Ltd however, due to changes across the site including construction timing and the extent of the habitat corridor updates to this document are required and is the subject of this addendum.

This OMP has been updated in accordance with Condition 22 and 23 of the EPBC Approval (EPBC 2016/7755) as we have assessed that the changes do not result in a new or increased impact. The changes made to the OMP are predominately administrative and relate to updates to project timing (i.e. program updates) and changes as a results of minor adjustment to the habitat corridor boundary in accordance with the approved Development Plan boundaries. A summary of the changes made to the OMP are provided in Section 4 below.

The following addendum schedule sets out our proposed amendments to the 'current' OMP (Ecology Australia dated 09/09/2019 as submitted on the 9/9/2019 & 16/05/2023). The schedule lists reference points and nominated text that is proposed to be amended within the 'current' OMP, and states the alternative text under 'Updated text'. This addendum should be read in conjunction with OMP dated 09/09/2019 (Appendix 1).

4 Addendum to Onsite Offset Management Plan

Update #	Section	Page	Paragraph	Current text	Updated text
1	Entire report	-	-	Department of Environment, Land, Water and Planning (DELWP)	Department of Department of Energy, Environment and Climate Action (DEECA)
2	Entire report	-	-	Department of the Environment and Energy (DoEE)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)
3	Summary	2	4	Riverlee proposes to construct a 11.44 ha Growling Grass Frog habitat corridor along Edgars Creek.	Riverlee proposes to construct a 12.82 ha Growling Grass Frog habitat corridor along Edgars Creek.
4	Summary	3	1	This OMP will come in to force following the completion of construction at the New Epping site (which is covered in the EMP), and will remain in force until 10 years after the new Growling Grass Frog habitat corridor is completed.	This OMP will come in to force following the completion of construction of the habitat corridor (which is covered in the EMP). The OMP which will cover the migration and adaptive management phases of the project and will remain in force for 10 years.
5	Section 1	4	1	The New Epping development will be constructed over approximately five years (2019-2023), and this period will be covered by a Environment Management Plan (EMP) for the site (Ecology Australia 2019a).	The New Epping development will be constructed over approximately ten years (2019-2028) , and this period will be covered by a Environment Management Plan (EMP) for the site (Ecology Australia 2019a).
6	Figure 1	5	-	-	Update: Figure 1 updated.
7	Figure 2	6	-	-	Update: Figure 2 updated.
8	Section 1	7	Point 1	11.44 ha of onsite offsets (68.7%), which will be met by constructing a habitat corridor along Edgars Creek that is specifically designed to provide good quality habitat for Growling Grass Frogs, covered in this OMP and the EMP (Ecology Australia 2019a).	12.82 ha of onsite offsets (65.01%) , which will be met by constructing a habitat corridor along Edgars Creek that is specifically designed to provide good quality habitat for Growling Grass Frogs, covered in this OMP and the EMP (Ecology Australia 2019a).
9	Section 1	7	Point 2	6.9 ha of offsite offsets (31.7%), at a known site of high quality Growling Grass Frog habitat at Perry Bridge, in central Gippsland approximately 200 km east of New Epping.	6.9 ha of offsets (34.98%), at a known site of high quality Growling Grass Frog habitat at Perry Bridge, in central Gippsland approximately 200 km east of New Epping.

Update #	Section	Page	Paragraph	Current text	Updated text
10	Section 1	7	3	The 11.44 ha onsite offset (the “habitat corridor”) will follow best practice Growling Grass Frog habitat design standards (DELWP 2017a; b) and will be discussed further in Section 3.3.	12.82 ha onsite offset (the “habitat corridor”) will follow best practice Growling Grass Frog habitat design standards (DELWP 2017a; b) and will be discussed further in Section 3.3.
11	Section 2	8	1	The objectives of this OMP are to document the details of the site to be impacted and the offset site to meet EPBC Act approvals requirements to offset impacts to Growling Grass Frog.	Additional text: The OMP will ensure a viable population of GGF left on site in accordance with EPBC approval.
12	Section 3.2.2	10	1	As a result of the development, 17.39 ha of potential Growling Grass Frog habitat will be cleared.	As a result of the development, 15.67 ha of potential Growling Grass Frog habitat will be cleared
13	Section 3.2.2	10	Point 3	9.13 ha of terrestrial habitat suitable for Growling Grass Frogs (Figure 3).	7.41 ha of terrestrial habitat suitable for Growling Grass Frogs (Figure 3).
14	Section 3.2.2	10	3	The majority (68.7%) of the quantum of impact will be offset...	The majority (65.01%) of the quantum of impact will be offset...
15	Figure 3	11	-	-	Update: Figure 3 updated.
16	Section 3.3	12	1	The onsite offset will consist of a habitat corridor of 11.44 ha that runs along Edgar’s Creek (Figure 4 and Figure 5).	The onsite offset will consist of a habitat corridor of 12.82 ha that runs along Edgar’s Creek (Figure 4 and Figure 5).
17	Figure 4	14	-	-	Update: Figure 4 updated.
18	Figure 5	15	-	-	Update: Figure 5 updated.
19	Section 3.3.3	16	Table 2	<u>Wetland sizes</u>	Refer to Updated Table 2 below.
20	Section 4.1	23	Table 4. Condition 3	To compensate for the loss of 17.39 ha of Growling Grass frog habitat...	To compensate for the loss of 15.67 ha of Growling Grass frog habitat...
21	Section 4.2	25	1	The offset will consist of an 11.44 ha habitat corridor designed specifically for Growling Grass Frogs.	The offset will consist of an 12.82 ha habitat corridor designed specifically for Growling Grass Frogs.
22	Section 4.4	26	Table 5	Total Area - 11.44 ha	Total Area - 12.82 ha
23	Section 4.4	26	Table 5	Terrestrial Habitat - 3.8 ha	Terrestrial Habitat - 5.52 ha
24	Section 4.4	27	Table 7	-	Refer to Updated Table 7 below.

Update #	Section	Page	Paragraph	Current text	Updated text
25	Section 4.5	28	Point 1	Legal protection for 11.44 ha of Growling Grass Frog Habitat...	Legal protection for 12.82 ha of Growling Grass Frog Habitat...
26	Section 4.5.1	29	1	Four out of seven constructed, permanent wetlands will be maintained as freshwater wetlands with salinity kept below 3,000 µS/cm. To reduce the incidence of chytrid, the remaining permanent wetlands will be more saline, but with salinity maintained below 7,000 µS/cm. The ephemeral wetlands will be filled with freshwater (<3,000 µS/cm).	Updated text: All wetlands will use a single water source from the quarry hole with a salinity of approximately 3,300 µS/cm. As salinity is expected to increase over time due to evaporation, the water delivery system will allow potable water to be added to reduce salinity in the storage tank the feeds the wetlands.
27	Section 5.1.2	33	4	Revegetation monitored twice annually, once in spring and once in autumn.	Revegetation monitored twice annually, once in spring and once in autumn by a suitably qualified ecologist.
28	Section 5.5	40	1	Ponds will be managed at two salinity levels, as frogs from waterbodies with slightly elevated salinities tend to have a lower chytrid load (Stockwell et al. 2015). Ponds 2, 4 and 7 will be managed as brackish wetlands (<7000 µS/cm) and ponds 1, 3, 5 and 6 as freshwater wetlands (<3,000 µS/cm). Ephemeral wetlands will be fed primarily with freshwater, as regular drying out will increase salinity.	Updated text: As salinity is expected to increase in ponds due to evaporation, a single water source from the quarry hole (approximate salinity 3,300 µS/cm) will be used. Salinity will be monitored and managed in wetlands through the water delivery system.
29	Section 5.6	41	Management Actions	<p>A variety of salinities will be managed in the constructed wetlands on site; these will be maintained by utilising a variety of water sources for the wetlands. Specifically wetlands will be maintained at:</p> <ul style="list-style-type: none"> - Lower salinity (<3,000 µS/cm, wetlands P1, P3, P5 and P6) using a combination of groundwater and freshwater. - Lower salinity (wetlands E1, E2, E3, <3,000 µS/cm when full). As ephemeral wetlands will increase in salinity over time due to regular drying out, groundwater use will be minimal. - Higher salinity (<7,000 µS/cm) using primarily groundwater (wetlands P2, P4 and P7). 	Updated text: All wetlands will use a single water source from the quarry hole with a salinity of approximately 3,300 µS/cm. As salinity is expected to increase over time due to evaporation, the water delivery system will allow potable water to be added to reduce salinity in the storage tank the feeds the wetlands.

Update #	Section	Page	Paragraph	Current text	Updated text
30	Section 5.6	42	Table 10	Maximum values for water quality parameters in Growling Grass Frog wetlands, taken from DELWP (2017b)	Refer to updated Table 10 below.
31	Section 5.7	43	1	When constructing and working in habitat corridor: -clean vehicles coming on site at a designated wash down area and/or ensure vehicles have been washed down immediately prior to coming on site. -clean and disinfect equipment to minimise the risk of introducing or spreading chytrid fungus. -clean and disinfect footwear when working around growling grass frog habitats including during salvage and relocation	Updated text: Appropriate wash down and disinfection procedures to be determined by contractor.
32	Section 5.12	51-52	Table 11	Low salinity wetlands (wetlands 1, 3, 5, and 6) to be maintained at <3,000 µs/cm) and high salinity wetlands (wetlands 2, 4 and 7) to be maintained at <7,000 µs/cm.	Updated text: Remove reference to low and high salinity wetlands. All water sourced from quarry hole with salinity of approximately 3,300 µS/cm.
33	Section 7.4	61	3	-	Add dot point: Cover of trees over 5 m tall should not exceed 10% across the offset site
34	Section 8.2	65	2	Riverlee is responsible for auditing the implementation and effectiveness of this EMP	Riverlee is responsible for auditing the implementation and effectiveness of this OMP
35	Section 11	73-74	Glossary	<ul style="list-style-type: none"> - DELWP – Victoria Department of Environment, Land, Water and Planning - DoEE – Commonwealth Department of Environment and Energy 	<ul style="list-style-type: none"> - DEECA – Department of Department of Energy, Environment and Climate Action - DCCEEW – Department of Climate Change, Energy, the Environment and Water

4.1 Table Updates

Updated Table 2. Characteristics of proposed Growling Grass Frog wetlands to be created at New Epping, Victoria

Wetland number (Figure 4)	Hydroperiod	Water source (relative salinity)	Minimum size (m ²)
P1	Permanent	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	3052
P2	Permanent	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	987
P3	Permanent	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	1355
P4	Permanent	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	818
P5	Permanent	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	887
P6	Permanent	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	852
P7	Permanent	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	1946
E1	Managed ephemeral	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	500
E2	Managed ephemeral	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	440
E3	Managed ephemeral	Water sourced from quarry hole (salinity approximately 3,300 µS/cm)	650
Total			11487

* Ephemeral wetlands may tend to increase in salinity over time (i.e. due to regular drying out), hence, ephemeral wetlands will largely be filled by on-groundwater sources (e.g. potable water, piped rainfall captured on-site (i.e. rooftops), or creek water filtered for exotic fish).

Updated Table 7. Security, management, monitoring and reporting requirements for the offset sites

Responsible/liable for meeting offset requirements	Riverlee (or subsequent EPBC Act approval holder)
Security	Amendment to the planning scheme so the habitat corridor is rezoned as Urban Flood Zone and Public Conservation and Resource Zones
Date of commencement for the planning amendment and rezoning	Late 2021
Start date for the 10 year management period	Mid 2026
End date for the 10 year management period	Mid 2036
Responsibility for management and monitoring of offset site for management period	Riverlee (or subsequent landholder)
Auditing	Riverlee (or subsequent EPBC Act approval holder)
Reporting and responsibility to DCCEEW	Riverlee (or subsequent EPBC Act approval holder)
OMP Review	Riverlee (or subsequent EPBC Act approval holder)
Management of the offset site following the 10 year management period	Melbourne Water and/or City of Whittlesea

Updated Table 10. Maximum values for water quality parameters in Growling Grass Frog wetlands, taken from DELWP (2017b).

Water Quality Parameter	Target Value
Total Nitrogen (mg/L)	< 1.0
Ammonia (mg/L)	< 0.01 as NH ₄ ⁺
Total phosphorous (mg/L)	< 0.1
pH	6.0-9.0 (adapted with information from Ecology Australia 2017b)
E.coli (organisms/100 ml)	Primary Contact < 150 Secondary contact < 1000
Salinity (µS/cm)	< 7000 for all wetlands
Turbidity (NTUs)	< 40

Updated Figures

Updated Figure 1



Figure 1
Project area boundaries and stages
Offset Management Plan: 215, 315W and 325C Cooper Street, Epping

- Legend**
- Property area
 - Stages**
 - Stage 1
 - Stage 2



N

0 40 80
Metres

Map Scale: 1:4,300 @ A4
 Coordinate System:
 GDA 1994 MGA Zone 55

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

Updated Figure 2

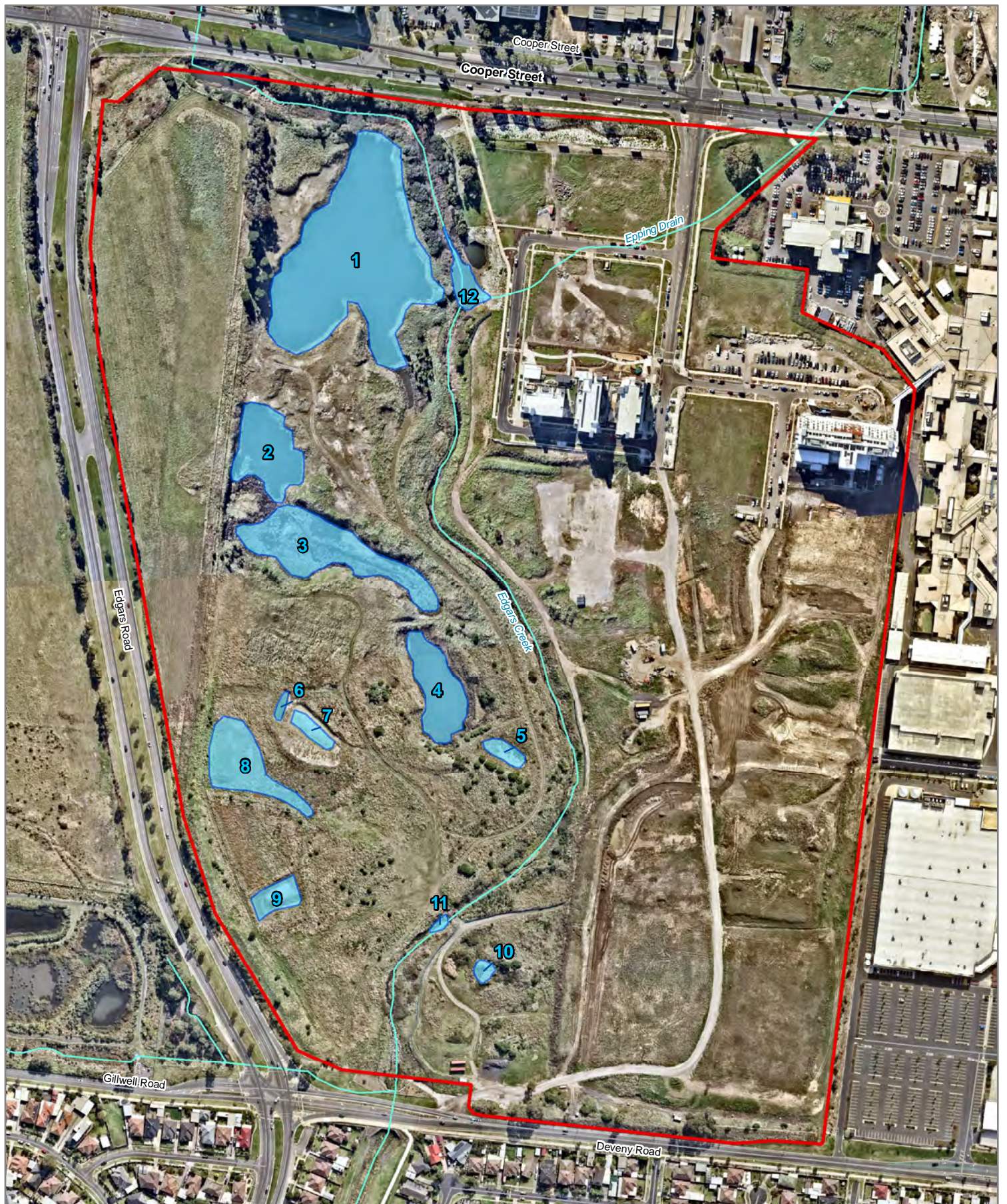
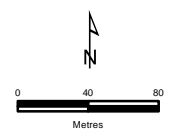


Figure 2
Existing conditions and wetland
Offset Management Plan: 215, 315W and 325C Cooper Street, Epping

Legend
 Project area
 Existing wetlands



Map Scale: 1:4,300 @ A4
 Coordinate System: GDA 1994 MGA Zone 55

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Updated Figure 3

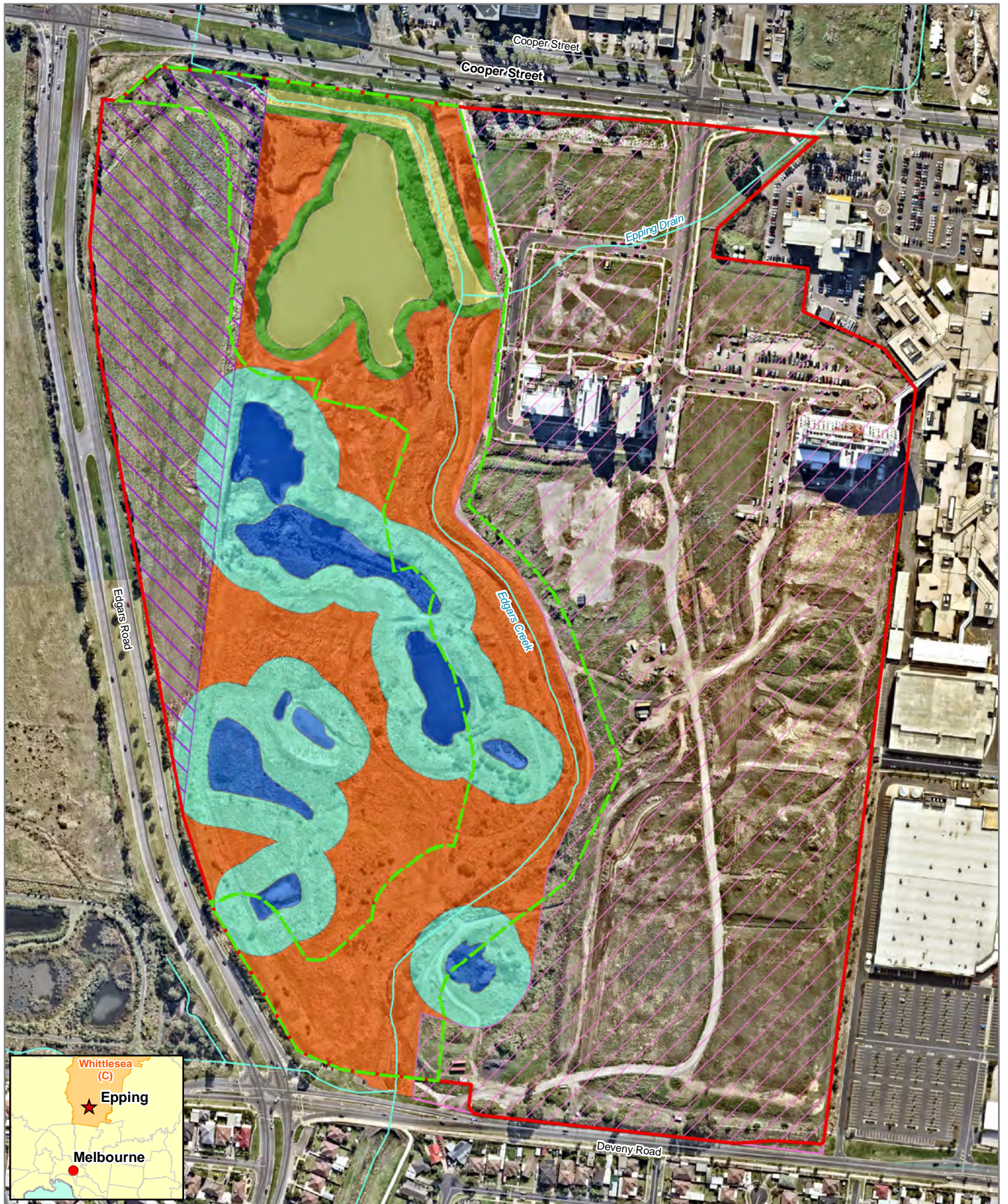


Figure 3
Habitat status for
Growing Grass Frog
and Golden Sun Moth
Offset Management
Plan: 215, 315W and
325C Cooper Street,
Epping

Legend

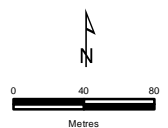
- Project area
- VCAT Corridor Creek Boundary (23/01/17)
- Existing habitat lost and offset onsite**
- GGF wetland habitat to be offset
- GGF riparian habitat to be offset
- GGF movement habitat to be offset

Existing habitat retained

- GGF wetland habitat retained
- GGF terrestrial habitat retained

Non GGF habitat

- Unsuitable GGF habitat lost and not offset
- GSM habitat lost and offset



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14592_Fig03_GGF_GSM_Hab 17/08/2023 melsley

Updated Figure 4

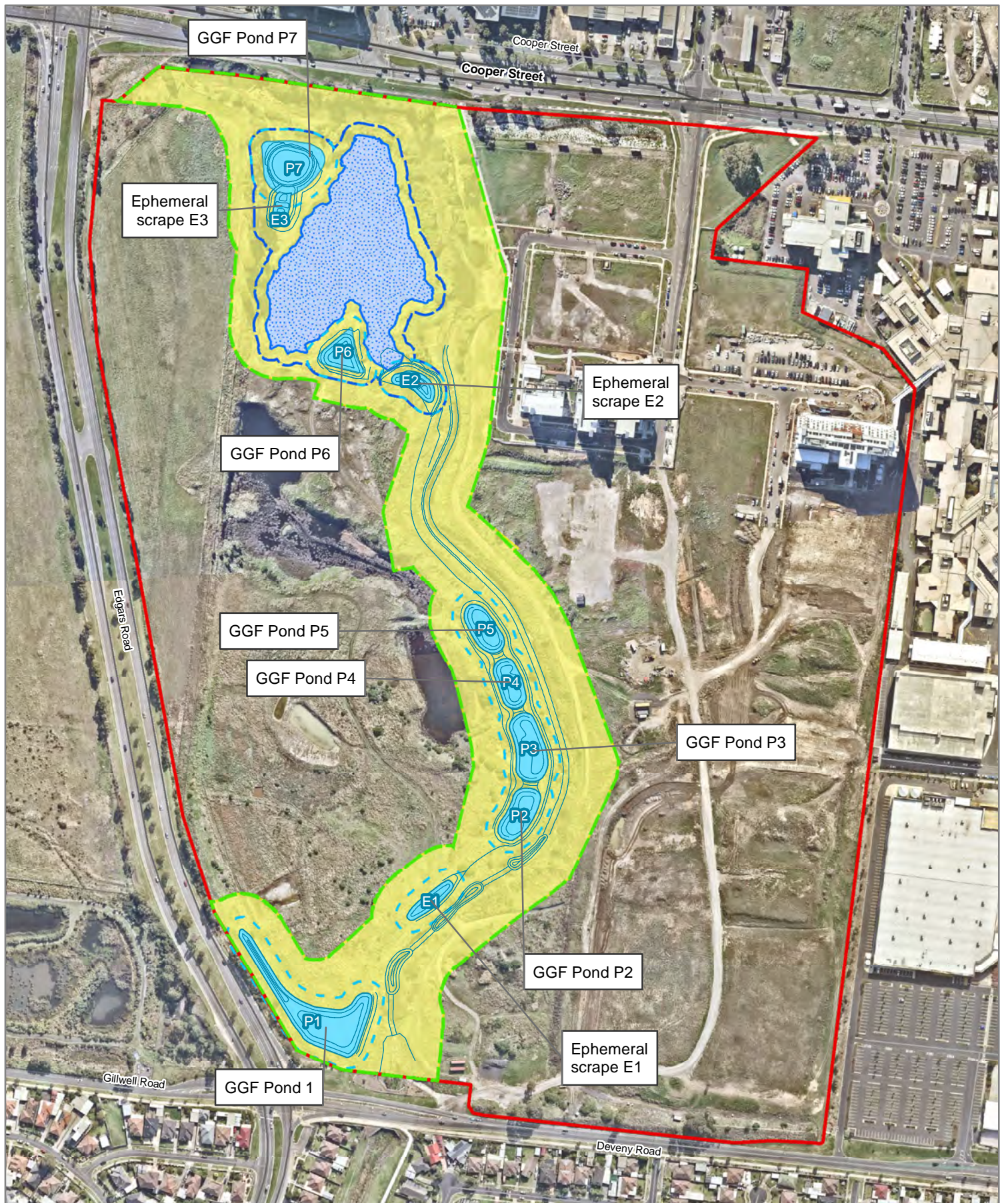
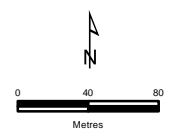


Figure 4
Proposed onsite offset layout
Offset Management Plan:
 215, 315W and 325C
 Cooper Street, Epping

- Legend**
- Project area
 - VCAT Corridor Creek Boundary (23/01/17)
 - Pond or ephemeral scrape
 - 10m buffer (GGF wetland)
 - Proposed Lake (Edgars Creek)
 - Proposed Lake buffer
 - GGF Terrestrial habitat



Map Scale: 1:4,300 @ A4
 Coordinate System:
 GDA 1994 MGA Zone 55

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14592_Fig06_PropOffset 26/10/2023 dvaladars

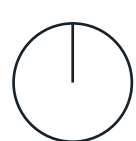
Aerial source: Nearmap 2023

Updated Figure 5



NOTE:
 The above plan is the indicative landscape masterplan of the proposed Edgars Creek Corridor, extracted from the Landscape Masterplan Report prepared by Tract dated 05.10.2023.

Drawing Title	Project Name	Drawing No.	Revision	Date	Drawn	Checked	Project Principal	Scale
Landscape Masterplan	New Epping Edgars Creek Corridor	316-0647-00-L-72-DR10	0	27.10.2023	MC	MY	JG	0 25 50 100



Appendix 1 – Offset Management Plan: 215, 315W and 325C Cooper St, Epping



ECOLOGY
AUSTRALIA

Offset Management Plan: 215, 315W and 325C Cooper St, Epping (EPBC 2016/7755)



Prepared for: Verve Projects

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Cover photo: Growling Grass Frog recorded at 215 Cooper St, Epping in 2019 (M. Le Feuvre)



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We gratefully acknowledge the assistance of:

- Jamie McMahon Ecology Australia
- Ben Rowe Riverlee
- Richard Johnston Riverlee
- Tim Stephens Verve Projects
- Cameron Delarue Verve Projects

Declaration of accuracy

Riverlee Caruso Epping Pty Ltd (ACN 605 442 500)
Staged Redevelopment of 215, 315W and 325C Cooper St
Epping, Victoria, 3076
EPBC 2016/7755

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed



Andrew McMahon
Principal Ecologist
Ecology Australia Pty Ltd

Summary

Ecology Australia Pty Ltd was commissioned by Riverlee Caruso Epping Pty Ltd (“Riverlee”) to prepare an Offset Management Plan (OMP) for an onsite offset site required for impacts to matters of national environmental significance as a result of the redevelopment of 215, 315W and 325C Cooper Street, Epping (“New Epping”) for residential and commercial uses.

The 51 ha site has a long history of intensive land use including stock grazing, quarrying and landfill activities, that has all but eliminated native vegetation, and the site is now severely degraded and overwhelmingly dominated by weed species. Despite the low quality habitat present, the site supports an important population of Growling Grass Frog (*Litoria raniformis*) that inhabits the disused quarry pits. The Growling Grass Frog is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), listed as threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act) and is classified as endangered in Victoria (DSE 2013). The largest quarry pit is fed by groundwater and as a result provides permanent, off-channel habitat for Growling Grass Frogs. Two more water bodies are near permanent, and provide good habitat for Growling Grass Frogs in most years. The remaining eight waterbodies are ephemeral, and provide habitat for Growling Grass Frogs in wet years.

Riverlee proposes to remove the majority of Growling Grass Frog habitat present on site as part of the development. Impacts to Growling Grass Frogs will be offset using a combination of offsite and onsite offsets. Management of the on-site offset following construction of New Epping make up the bulk of this OMP. Management of the onsite offset during construction activities are covered in the Environment Management Plan (EMP) (Ecology Australia 2019a).

This OMP addresses the following specific EPBC Act Approval (2016/7755) conditions:

- *To compensate for the loss of 17.39 ha of Growling Grass Frog habitat, the approval holder must implement the Growling Grass Frog Offset Strategy, and ensure that a viable population of the Growling Grass Frogs is maintained at the proposed offset area for the life of the approval.*
- *Prior to the commencement of the action, the approval holder must prepare Offset Management Plans for the onsite and offsite offset areas proposed in the Growling Grass Frog Offset Strategy. The approval holder must not commence the action until both Offset Management Plans have been prepared. Each approved Offset Management Plan must be implemented for the life of the approval.*
- *Within three (3) months following the third and fourth anniversary of the commencement of the action, the approval holder must provide a report demonstrating that a viable population of Growling Grass Frog has been maintained at the onsite offset site (as required under the Growling Grass Frog Offset Strategy). The report must be prepared by a suitable qualified expert.*
- *All management plans required under this approval should be prepared in line with the Department’s Environmental Management Plan Guidelines.*
- *The approval holder must prepare a compliance report for each 12 month period following the date of commencement of the action, or as otherwise agreed to in writing by the Minister*

- *The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance.*
- *The approval holder must ensure that independent audits of compliance with the conditions are conducted for the 12 month period from commencement of the action and for every subsequent 24 month period until this approval expires, or as requested in writing by the Minister.*
- *The approval holder may, at any time, apply to the Minister for a variation to an action management plan approved by the Minister under condition 4, or as subsequently revised in accordance with these conditions, by submitting an application in accordance with the requirements of section 143A of the EPBC Act. If the Minister approves a revised action management plan (RAMP) then, from the date specified, the approval holder must implement the RAMP in place of the previous action management plan.*

Riverlee proposes to construct a 11.44 ha Growling Grass Frog habitat corridor along Edgars Creek. The habitat corridor will be specifically designed and managed for Growling Grass Frogs, and will include:

Refer to
update #3

- The retained main quarry waterbody (1.52 ha)
- Ten constructed wetlands, designed specifically for Growling Grass Frogs. This includes seven permanent wetlands and three managed ephemeral wetlands (1.14ha)
- Riparian habitat (4.31 ha) and terrestrial habitat (3.8 ha) designed and managed specifically for Growling Grass Frogs.

This OMP outlines management actions to minimise impacts to Growling Grass Frogs as a result of this development. The actions include, but are not limited to the following:

- Maintaining water levels in the constructed wetlands.
- Maintaining water quality in the constructed wetlands.
- Maintaining vegetation in the habitat corridor in specific vegetation zones
- Eliminating any targeted weeds, new and emerging weeds and/or woody weeds to less than 1% cover.
- Controlling the spread of chytrid on site.
- Monitoring and controlling predatory fish to ensure that they do not persist in the constructed wetlands.
- Monitoring the Growling Grass Frog population and habitat on site.
- Conducting Growling Grass Frog searches and salvage and relocation prior to any works in the habitat corridor.
- Destroy any rabbit warrens or fox dens encountered in the habitat corridor.
- Maintaining fencing and signage on site.

This OMP contains a comprehensive risk assessment for the ongoing management of the site, and outlines the monitoring, reporting, auditing and OMP review requirements for the project.

~~This OMP will come in to force following the completion of construction at the New Epping site (which is covered in the EMP), and will remain in force until 10 years after the new Growling Grass Frog habitat corridor is completed.~~

Refer to
update #4

1 Introduction

Ecology Australia Pty Ltd was commissioned by Riverlee Caruso Epping Pty Ltd (“Riverlee”) to prepare an Offset Management Plan (OMP) for an onsite offset site required for impacts to matters of national environmental significance as a result of the redevelopment of 215, 315W and 325C Cooper Street, Epping (“New Epping”) for residential and commercial uses (Figure 1). This is outlined in *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Referral 2016/7755 (Ecology Australia 2018). ~~The New Epping development will be constructed over approximately five years (2019-2023), and this period will be covered by a Environment Management Plan (EMP) for the site (Ecology Australia 2019a).~~ Following construction of New Epping this OMP will come into force, replacing the EMP.

Refer to
update #5

The property at 215 Cooper Street comprises 45.5 ha of private land. The eastern portion of this property was used to quarry basalt, and subsequently as a landfill until 1998, after which it was capped and rehabilitated. The central and northern areas were also used to quarry basalt, leaving behind some large pits that are now a collection of permanent and ephemeral waterbodies (Figure 1 and Figure 2). The adjoining properties to the west comprise c. 3.5 ha of Council owned private land (road reserve, 315W Cooper Street) and c. 2.1 ha of State owned public land (325C Cooper Street). These two properties do not appear to have undergone historic earthworks and are dominated by introduced Chilean Needle-grass *Nassella neesiana* which is maintained by mowing/slashing. Edgars Creek traverses the site from north to south. A long history of stock grazing followed by quarrying and landfill activities has all but eliminated native vegetation, and the site is now severely degraded and overwhelmingly dominated by weed species (Ecology Australia 2015).

Despite the low quality habitat present, the site supports an important population of Growling Grass Frog (*Litoria raniformis*) that inhabits the disused quarry pits (Wildlife Profiles 2015; Ecology Australia 2017a). The Growling Grass Frog is listed as Vulnerable under the EPBC Act, listed as threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act) and is classified as endangered in Victoria (DSE 2013). The largest quarry pit (Waterbody 1, Figure 2) is fed by groundwater and as a result provides permanent, off-channel habitat for the Growling Grass Frogs. Two more water bodies are near permanent (Wetlands 2 and 3, Figure 2), and provide good habitat for Growling Grass Frogs in most years. The remaining seven waterbodies are ephemeral, and provide habitat for Growling Grass Frogs in wet years. In total, there is approximately 17.39 ha of potential Growling Grass Frog habitat onsite (EA 2018).

In addition, a small population of Golden Sun Moth (*Synemon plana*) is present on site, primarily in Chilean Needle-grass dominated grasslands at 315W and 325C Cooper St. The Golden Sun Moth is listed as critically endangered under the Commonwealth EPBC Act, listed as threatened under the Victorian FFG Act and classified as critically endangered by DELWP (DSE 2009). There is approximately 5.5318 ha of Golden Sun Moth habitat on site, the majority of which (5.508 ha) is at 315W and 325C Cooper St.

Riverlee proposes to remove the majority of Growling Grass Frog habitat and all Golden Sun Moth habitat present on site as part of the development. Impacts to Golden Sun Moth will be offset offsite in the Western Grassland Reserve, and will not be covered in this OMP. Impacts to Growling Grass Frogs will be offset using a combination of offsite and onsite offsets. Management of the onsite offset during construction of New Epping are outlined in the EMP (Ecology Australia 2019a). Ongoing management of the onsite offset following construction activities will be covered in this OMP.

Refer to update #6

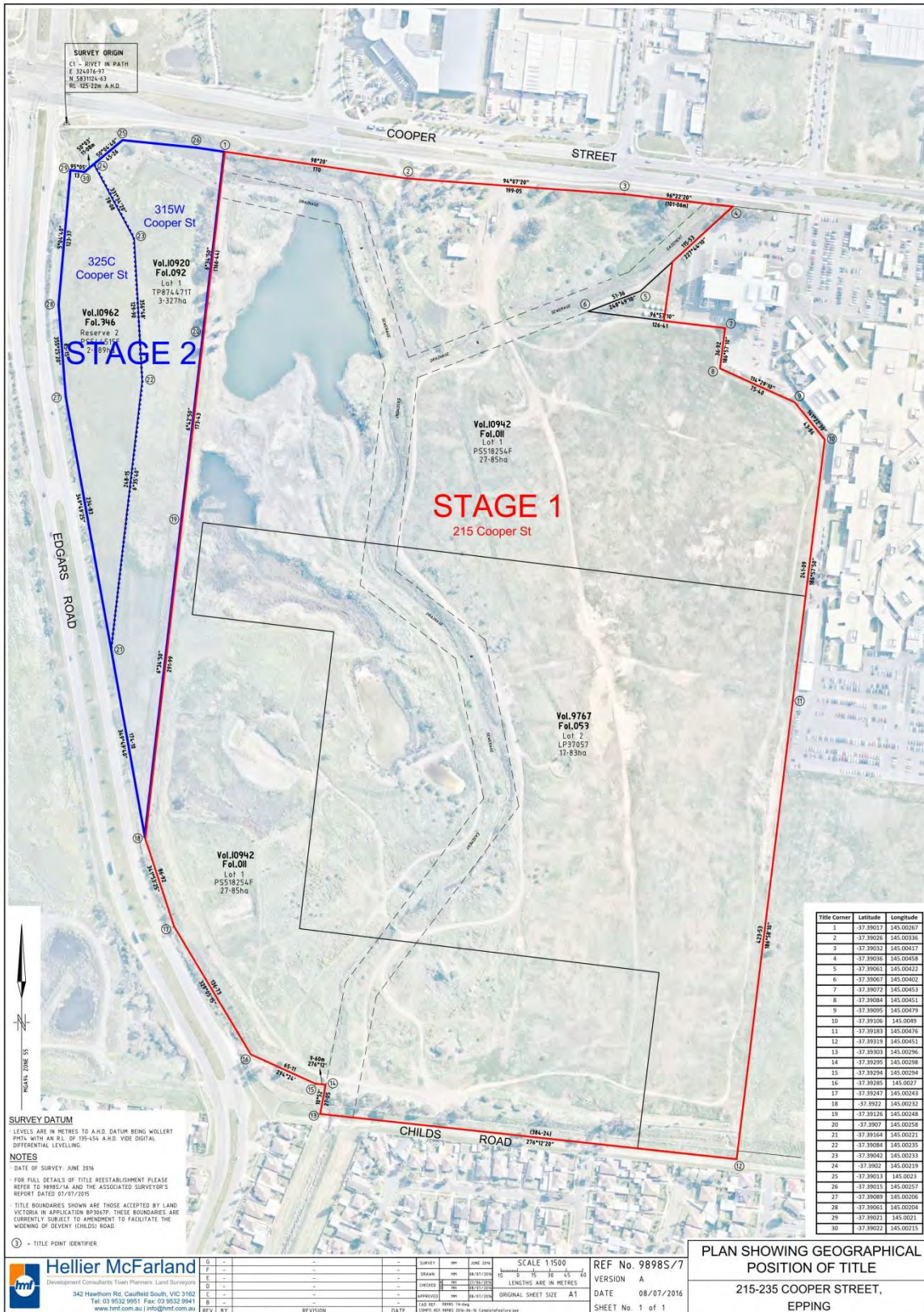


Figure 1 Project area boundaries of the New Epping site, showing Stages 1 and 2 of the proposed development



Figure 2 Epping Quarry site – existing conditions and wetlands (from Wildlife Profiles 2015)

Offsets for the proposed New Epping development are prescribed by the Department of the Environment and Energy (DoEE), based on a thorough assessment of offset requirements using the DoEE offset calculator (DSEWPaC 2012a; b). Using the offset calculator, the calculated quantum of impact is 5.97 adjusted hectares. 18.34 ha of offset, spread across two sites, will meet 100 % of the offset requirements. The two sites constitute:

- ~~11.44 ha of onsite offsets (68.7%), which will be met by constructing a habitat corridor along Edgars Creek that is specifically designed to provide good quality habitat for Growling Grass Frogs, covered in this OMP and the EMP (Ecology Australia 2019a).~~
- ~~6.9 ha of offsite offsets (31.7%), at a known site of high quality Growling Grass Frog habitat at Perry Bridge, in central Gippsland approximately 200 km east of New Epping. This site will be covered in an additional offsite OMP.~~

Refer to
update #8

Refer to
update #9

~~The 11.44 ha onsite offset (the “habitat corridor”) will follow best practice Growling Grass Frog habitat design standards (DELWP 2017a; b) and will be discussed further in Section 3.3.~~

Refer to
update #10

Management of the habitat corridor following construction will involve active ecological management of the site, ongoing monitoring and reporting.

2 Objectives

The objectives of this OMP are to document the details of the site to be impacted and the offset site to meet EPBC Act approvals requirements to offset impacts to Growling Grass Frog. Impacts will be offset by securing, maintaining, improving and monitoring the Growling Grass Frog population and habitat present in the habitat corridor.

Refer to
update #11

This OMP aims to:

- Identify the area in 215, 315W and 325C Cooper Street, Epping that comprise the Growling Grass Frog habitat corridor.
- Develop an Offset Management Plan to compensate for the permitted Growling Grass Frog habitat loss as a result of the New Epping development. This includes the following
 - Location and map of the offset site
 - The type of offset to be secured.
 - How the offset will be secured.
 - Necessary management actions to protect and improve Growling Grass Frog habitat on site.
 - Schedules of management actions and reviews.
 - Details of ongoing monitoring, and evaluation of the management plan.
- Provide an OMP to the satisfaction of the DoEE.

3 Offset suitability

This section provides details on the site to be impacted, and assesses the suitability of the proposed habitat corridor. These are both covered in greater detail in the Preliminary Documentation (Ecology Australia 2018) and the EMP (Ecology Australia 2019a). The existing conditions on site are shown in Figure 2 and the proposed habitat corridor is shown in Figure 4 and Figure 5.

3.1 Impact site details

Details of the site to be impacted are outlined in Table 1.

Table 1 Details of the site to be impacted.

Landowner of site to be impacted	Riverlee Caruso Epping Pty Ltd
Location and address of site to be impacted	215, 315W and 325C Cooper Street, Epping
Local Government Area	City of Whittlesea
Catchment Management Authority	Port Phillip and Western Port
Permit Applicant	Riverlee Caruso Epping Pty Ltd

3.2 Habitat to be removed.

The Growling Grass Frog habitat on site will be removed to enable the development of the site for residential and commercial purposes and facilitate the remediation of a former landfill and quarry. The land is currently being rezoned from Industrial 3 Zone to a combination of Mixed Use and Special Use Zones under amendment to the City of Whittlesea Planning Scheme C213.

3.2.1 Condition of habitat to be removed

The 51 ha New Epping site is located in Epping, roughly 19 km north of the Melbourne CBD in the City of Whittlesea. The project area occurs within the Victorian Volcanic Plain Bioregion. A long history of intensive land use has all but eliminated native vegetation, and the site is now severely degraded and overwhelmingly dominated by weed species.

The property at 215 Cooper Street comprises 45.5 ha of private land. The eastern portion of this property was used to quarry basalt and subsequently as a landfill until 1998, after which it was capped and rehabilitated. The western portion was largely used to quarry basalt, leaving behind some large pits that now form a collection of permanent and ephemeral waterbodies.

The adjoining properties to the west comprise c. 3.5 ha of Council owned private land (road reserve, 315W Cooper Street) and c. 2.1 ha of State owned public land (325D Cooper Street). These two properties do not appear to have undergone historic earthworks and are dominated by introduced Chilean Needle-grass (*Nassella neesiana*) which is maintained by mowing/slashing.

An on-site assessment in February 2015 found that the majority (approximately 49 ha) of the site comprised exotic grasslands, planted exotic trees and waterbodies. The assessment identified 2 ha of native vegetation, based on the Victorian *Native Vegetation Permitted Clearing Regulations*, including remnant patches of native vegetation and scattered trees. Creekline Grassy Woodland EVC is found

along the northern part of Edgars Creek, which has undergone extensive rehabilitation by Melbourne Water 2009/2010 (Ecology Australia 2015). Areas of Aquatic Herbland EVC occur downstream of the Creekline Grassy Woodland along Edgars Creek, while Tall Marsh EVC was observed along the channels of Edgars Creek and Epping Drain. There were also some areas of Plains Grassy Woodland EVC, Heavier-Soils Plains Grassland EVC and Stony Knoll Shrubland (EVC 649) on the plains, and Plains Sedgy Wetland (EVC 647) in some artificial depressions created as part of the quarry and rehabilitation works for the landfill. Fifteen scattered trees were identified onsite and would have once formed part of the Plains Grassy Woodland.

The project area is within the Edgar's Creek catchment, a sub-catchment of Merri Creek. Edgar's Creek is an ephemeral stream with an upstream catchment area of approximately 1,400 hectares; the length of creek within the site is approximately 1.2 km. Water quality monitoring shows no change upstream to downstream of the project area.

The project area also contains ten mostly man made off stream wetlands, including the former quarry pits (Figure 2). These wetlands vary in size from 230 m² to 15,200 m². One waterbody is permanent, two are near permanent and the remainder are ephemeral. There are two small in channel wetlands along Edgar's Creek.

The subject landform includes gentle slopes on the capped landfill, steep slopes on former quarry holes, spoil dumps and generally a gentle gradient along Edgars Creek. The history of quarrying and landfill on site has resulted in gross changes to soil profiles and intact soil profiles of clays or clayey loams over basalt now form a minor part of the site.

3.2.2 Area of habitat to be removed

As a result of the development, ~~17.39 ha of potential Growling Grass Frog habitat will be cleared. This includes:~~

Refer to update #12

- 1.98 ha of off-channel wetlands
- 6.28 ha of riparian habitat (30 m buffer around wetlands)
- ~~9.13 ha of terrestrial habitat suitable for Growling Grass Frogs (Figure 3).~~

Refer to update #13

A further 30.6 ha of terrestrial habitat unsuitable for Growling Grass Frogs, including the capped landfill and areas away from water bodies, will also be cleared (Figure 3). Using the DoEE offset calculator (DSEWPac 2012b), the quantum of impact is 5.97 adjusted hectares. See Ecology Australia (2018, 2019a) for further information.

~~The majority (68.7%) of the quantum of impact will be offset with a Growling Grass Frog habitat corridor to be constructed on site, which includes a network of off-channel and in-stream wetlands and terrestrial habitat, all of which will be designed and managed specifically for Growling Grass Frog. The habitat corridor will be constructed before any core Growling Grass Frog habitat (i.e. off channel wetlands with a riparian buffer zone) is removed. The remainder of the impact (31.7%) will be offset offsite at a site in Perry Bridge approximately 200 km east of the project site. This property is known to support a healthy population of Growling Grass Frogs, even in dry years in part due to the presence of spring-fed off channel wetlands. The ongoing management of the offsite offset will be covered in a separate OMP which is currently in preparation.~~

Refer to update #14

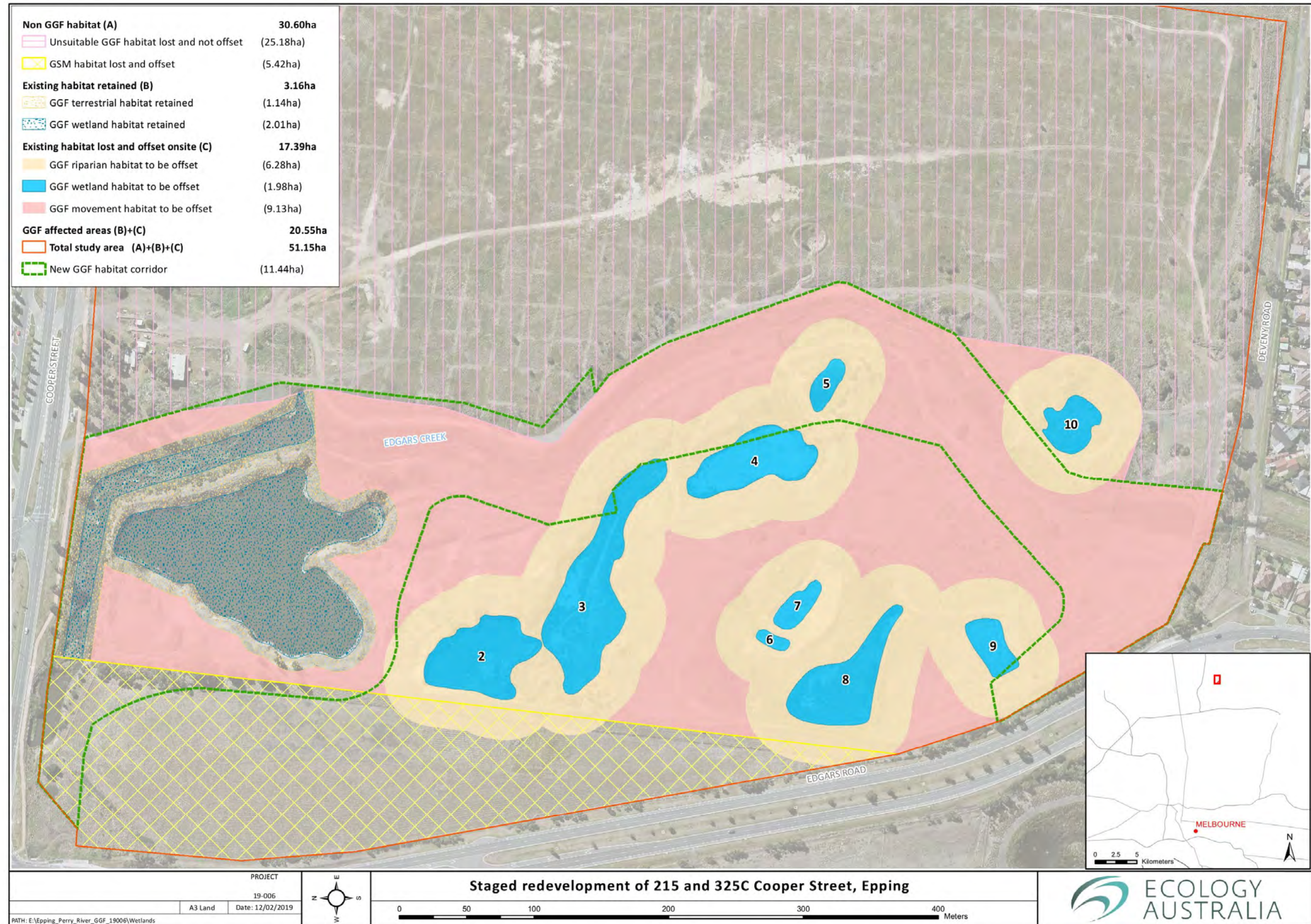


Figure 3 Habitat status for Growing Grass Frog and Golden Sun Moth – New Epping Development

3.3 Description of the onsite offset

The onsite offset will consist of a habitat corridor of 11.44 ha that runs along Edgar's Creek (Figure 4 and Figure 5). The offset will consist of mostly off channel wetlands, wetland riparian zones and other terrestrial habitat that will be specifically designed and managed for Growling Grass Frogs. Modelling has been completed which indicates that the proposed habitat corridor design has the potential to maintain the long-term persistence of Growling Grass Frogs onsite (Ecology Australia 2016a).

Refer to update #16

3.3.1 Wetland habitat offsets

To compensate for the proposed removal of nine existing wetlands (covering approximately 1.98 ha), ten dedicated Growling Grass Frog wetlands are proposed to be created. These wetlands are between 0.05 and 0.3 ha each, for a total area of approximately 1.15 ha (Table 2). In addition, the permanent, large (1.52 ha) quarry waterbody on site will be retained. This results in a deficit of approximately 0.83 ha of wetland area. However, several of the existing wetlands are not considered to support suitable Growling Grass Frog habitat, at least under the prevailing conditions, and successful breeding appeared to occur in only wetlands 1, 2 and 3 during each of the previous survey seasons (Wildlife Profiles 2015; Ecology Australia 2017a).

The number and arrangement of wetlands within the corridor essentially meets the definition of a Growling Grass Frog wetland 'node' under the MSA guidelines (DELWP 2017a), with a network of 11 wetlands proposed versus the minimum node size of 10 wetlands. We note, however, that many of the proposed wetlands are smaller than the recommended minimum size of 0.1 ha under the guidelines (Table 3). As wetland size is largely related to ensuring permanence, the small wetland size will be offset by constructing a water delivery system that will actively manage and maintain water levels in the constructed wetlands, even in dry years.

Constructed wetlands will be located off-stream to reduce the likelihood of colonisation by predatory fish. Created wetlands will contain areas of deep water and a dense cover of submergent and floating vegetation. Deep areas will help control the dominance of tall emergent species. There will be areas of shallow water, with some emergent vegetation and a structurally variable littoral zone. The wetlands will have rock beaching on approximately 30–40% of the perimeter for structural integrity, and to improve habitat quality and thermal niches. Seventy percent of constructed waterbodies will have a 'permanent' hydroperiod, drying out only under exceptional circumstances, or through management to mitigate risks associated with the presence of exotic fish. The remaining constructed wetlands will have a 'managed ephemeral' hydroperiod, designed to hold water during October to March, and then be drawn down and dried out at other times.

The large quarry waterbody in the north of the site will be retained. This wetland is deep and permanent due to groundwater inflows. As a result it is an important, permanent refuge for Growling Grass Frogs on site, especially during dry years when all other existing wetlands on site may dry out. Habitat at the main quarry site will be improved by the addition of two permanent off-stream wetlands, to the west and south of the quarry lake (Figure 4 and Figure 5). Two additional ephemeral wetlands will also be created in this area, to the west and south of the quarry lake. South of the proposed road bridge across the habitat corridor (Figure 4 and Figure 5), four permanent off-stream wetlands will be created west of Edgars Creek. A final, larger pond will be created along the southern boundary of the site, providing habitat with deeper water, and proximity to existing fauna culverts under Edgars Road that connect to

neighbouring wetlands also utilised by Growling Grass Frogs. Between the southernmost pond and the four off-stream wetlands, a third managed off-stream ephemeral wetland will also be created.

Wetland locations and arrangement have been designed to reduce gaps that may pose a potential barrier to regular dispersal; most wetlands are within 20 - 50 m of another wetland, except for a gap of c. 150 m between the northern and central sections of the habitat corridor (Figure 4 and Figure 5). This gap between wetlands also contains a road bridge, which could potentially reduce movements between the northern and central sections of the habitat corridor. However, the bridge crossing will meet Growling Grass Frog crossing design standards (DELWP 2017b) and is proposed to be largely an open span across the corridor, with two to three mid-span footings/columns, which will be constructed during the remediation of the creekline and the construction of the habitat corridor in this area. Hence, the form of the bridge is unlikely to present a barrier to frog passage in this area.

Modelling has been undertaken of the long-term occupancy of the proposed habitat corridor design (Ecology Australia 2016a), using models developed by Heard *et al.* (2013, 2015). This modelling indicated that the creation of the seven permanent wetlands within the proposed habitat corridor buffer resulted in a similar occupancy of ponds over 40 years compared with the existing conditions. Since running the model, three managed, off-channel ephemeral wetlands have been added to the habitat corridor.

3.3.2 Hydroperiod

Seven created wetlands will have a permanent hydroperiod, while the remaining three will have a 'managed ephemeral' hydroperiod (Table 2). 'Managed ephemeral' wetlands refer to wetlands that are designed to dry out over winter in most years, but are artificially filled between October and March (i.e. the key Growling Grass Frog breeding and larval period); hence they essentially have a hydroperiod that is the reverse of most natural ephemeral wetlands, which fill in winter and dry out in summer/autumn. Longitudinal monitoring of Growling Grass Frog populations at the Western Treatment Plant (Werribee, Victoria) has shown that such 'managed ephemeral' wetlands perform very well in terms of Growling Grass Frog occupancy, abundance and breeding success (Ecology Australia 2016b; Hamer *et al.* 2016).

In addition to wetland connectivity, three of the key, and inter-related factors driving the viability of Growling Grass Frogs over time are wetland hydroperiod (i.e. availability of standing water over the breeding season), chytrid fungus dynamics and predation by fish (Heard *et al.* 2010, 2015; Ecology Australia 2017b). The inclusion of three 'managed ephemeral' wetlands within the habitat corridor targets these factors; water is provided (artificially where 'natural' water sources are insufficient) over the breeding season, exotic fish are excluded/regularly removed through drying of the waterbody, and the impacts of chytrid fungus may also be ameliorated to some extent by the approximately annual drying out of each waterbody. We consider that a managed ephemeral hydroperiod helps explain the high abundance and breeding success of Growling Grass Frogs at the Western Treatment Plant.

Refer to update #17

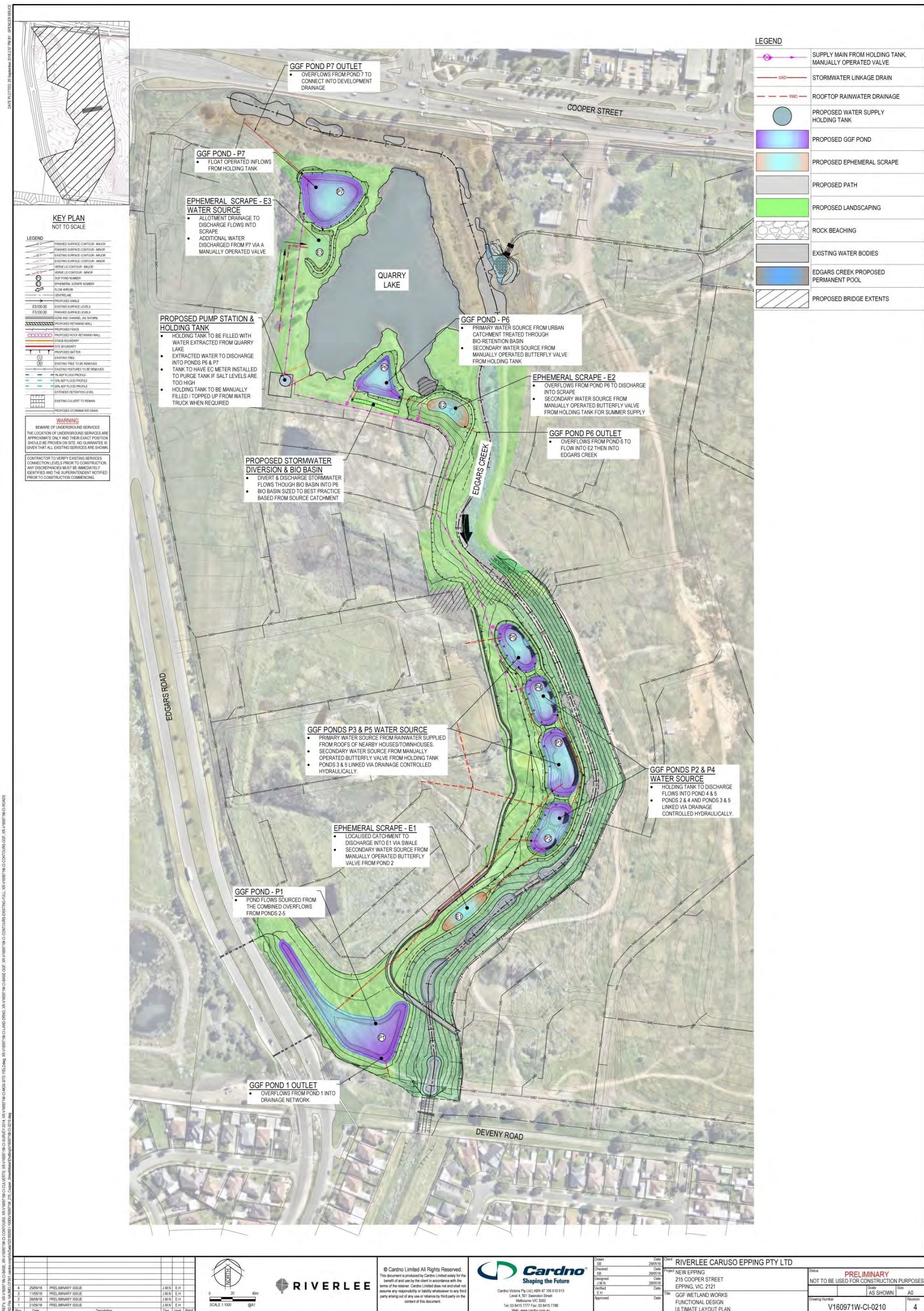


Figure 4 Approximate layout for proposed onsite offset showing retained wetlands, off-channel and in-stream wetlands to be constructed and terrestrial habitat (Cardno).

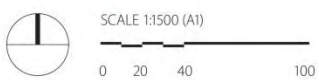
Refer to update #18



Legend

- | | | | | | |
|--|---|--|---|--|--|
| | FROG POND | | EXTENDED BUFFER TREE PLANTING
<i>Maximum 10% canopy cover</i> | | GRAVEL TRAIL AND MAINTENANCE ACCESS
2.5m width |
| | TERRESTRIAL BUFFER
10m wide buffer surrounding frog ponds | | NODES | | CONCRETE SHARED PATH
2.5m width |
| | EXTENDED BUFFER AND BATTER PLANTING | | EXISTING REVEGETATION | | |

NOTE
For further information regarding the frog ponds, associated buffer zones and creek planting, refer to R02-3 Notes.



Landscape Concept
Epping Quarry Redevelopment

PROJECT_DRG NO Q316-0647-00 R02-1 REV 01 DRWN EZ CHKD JG APPROV MS DATE 10.09.2018 **Tract**

Figure 5 Landscape plan of the proposed habitat corridor at the New Epping site, Victoria (Tract Consultants)

3.3.3 Water source

Wetlands will be filled using a water distribution network. The water distribution network will use a variety of water sources including groundwater from the main quarry pit, which is mildly saline (most current wetlands have a salinity of 4 to 7 mS/cm) (Ecology Australia 2016c, 2017a), or from a less saline water source, such as harvested rainwater, recycled water, potable water or water from Edgars Creek (filtered for exotic fish) (Table 2).

Wetlands will be initially filled (i.e. post-creation) with groundwater from the site, which appears favourable to successful breeding (Ecology Australia 2017a). During the 2 year frog migration period, managed ephemeral wetlands will be filled over the breeding season (i.e. by October) with primarily fresh water (e.g. potable water from off-site) rather than groundwater. Groundwater may be used to fill managed ephemeral wetlands where monitoring shows that salinity levels are relatively low (i.e. <5 mS/cm). Pipes and other infrastructure to fill and drain wetlands will be designed to exclude exotic fish from entering wetlands.

Refer to
update #19

Table 2 – Characteristics of proposed Growling Grass-Frog wetlands to be created at New Epping, Victoria

Wetland number (Figure 4)	Hydroperiod	Water source (relative salinity)	Minimum size (m ²)
P1	Permanent	Groundwater + piped rainfall/filtered creek water (lower salinity)	3,050
P2	Permanent	Primarily groundwater (higher salinity)	1,000
P3	Permanent	Groundwater + piped rainfall/filtered creek water (lower salinity)	1,360
P4	Permanent	Primarily groundwater (higher salinity)	820
P5	Permanent	Groundwater + piped rainfall/filtered creek water (lower salinity)	880
P6	Permanent	Groundwater + piped rainfall/filtered creek water (lower salinity)	820
P7	Permanent	Primarily groundwater (higher salinity)	2,000
E1	Managed ephemeral	Piped rainfall/filtered creek water +/- groundwater (lower salinity)*	500
E2	Managed ephemeral	Piped rainfall/filtered creek water +/- groundwater (lower salinity)*	440
E3	Managed ephemeral	Piped rainfall/filtered creek water +/- groundwater (lower salinity)*	650
Total			11,520

* Ephemeral wetlands may tend to increase in salinity over time (i.e. due to regular drying out), hence, ephemeral wetlands will largely be filled by non-groundwater sources (e.g. piped rainfall captured on-site (i.e. rooftops), or creek water filtered for exotic fish).

Table 3 Alignment of the proposed Epping habitat corridor with the Growling Grass Frog Masterplan habitat standards (DELWP 2017a; b)

Masterplan habitat standards	Epping habitat corridor	Comments
Wetland clusters (nodes)		
Clusters contain at least 10 off-stream wetlands (including existing wetlands)	Yes	
Wetlands less than 200-300 m apart	Yes	
75% of wetlands should have a permanent hydroperiod (particularly Sept to Feb)	Yes	
Variety of wetland types within a cluster	Yes	
50% of wetlands to be 'anti-chytrid' (high rock cover, warm shallows, moderate salinity)	Likely	The aim is to achieve this standard, however will be a function of ongoing management.
All wetlands offline (i.e. except during 'exceptional' floods)	Yes	
Wetland size and morphology		
Surface area of most created wetlands must be at least 0.3 ha; where space is limited, wetlands to be at least 0.15 ha (in all cases submergent zone must be at least 0.1 ha)	No	Only one retained and one created wetland will be >0.3 ha; Remaining created permanent wetlands will range from 0.08 to 0.2 ha. Managed ephemeral wetlands will be approximately 0.05 ha. However, as wetland size is predominantly about maintaining permanence, this issue will be overcome by actively managing water levels to ensure the wetlands are permanently full.
At least one wetland should be large (>0.7 ha)	Yes	Retained quarry waterbody
All wetlands must have a deep water zone (maintained at greater than 1.5 m deep) of at least 50% of surface area	No	Permanent wetlands will reach 1.5m depth, but this depth will be between 33% and 51% of surface areas.
Emergent vegetation zone of 30-40%, and should include a littoral zone with fluctuating water levels	Yes	
Incorporate a variety of slopes in banks	Yes	

Masterplan habitat standards	Epping habitat corridor	Comments
Wetlands lined (e.g. clay liner) to prevent leakage, with soil over the liner	Yes	
Hydroperiod		
75% of wetlands in a cluster to have a permanent hydroperiod; all wetlands should hold water between Sept. to Feb.	Yes	'Managed ephemeral' wetlands will be filled between September and February.
Created wetlands designed to be able to be dried out (drained)	Yes	
Thermal properties		
Wetlands to incorporate an extensive shallow, permanently inundated zone	Yes	
Wetlands incorporate rock piles around at least 20% of margin, extending into water	Yes	
'Anti-chytrid' wetlands to have c. 50% rock cover	Yes	
Aquatic vegetation		
Planting density to establish c. 50% submergent/floating cover within 2-3 years	Likely	Intention is meet this standard but depends on performance over period.
Diverse vegetation established, in line with Growling Grass Frog planting species list	Yes	
Water quality		
pH between 6.0 and 8.5	Likely	Intention is meet this standard but depends on performance over period.
Salinity up to c. 5.0 mS/cm	(some wetlands may be slightly higher)	Successful breeding recorded in existing wetlands on-site with salinities of 6-7 mS/cm
Turbidity <40	Likely	
Terrestrial habitat		
A minimum 50 m buffer of wetlands from development (i.e. roads/buildings)	No	Buffers around wetlands of between c. 20 to 40 m.

Masterplan habitat standards	Epping habitat corridor	Comments
Shared use paths and minor infrastructure (e.g. passive recreation) must not be constructed closer than 30 m from wetland	No	Shared paths will be located within c. 15 to 30 m of some wetlands.
c. 50% of area within 10 m of wetlands to be low grassy vegetation to 10 cm height; ≤20% cover of tussock-forming graminoids	Yes	
Rock piles established around wetlands	Yes	
No mulch within 50 m of a wetland	Yes	
No trees or shrubs within 10 m; < 10% cover of trees/shrubs within 100 m of wetlands	Yes	Shading from buildings to align with this requirement.
The area between 10 m and 100 m should primarily have an open structure (e.g. short mown grass) with scattered denser plantings of tussock-forming vegetation	Yes (although the buffer <100m wide)	
Crossings		
30% of the section of road 50 m each side of the waterway (i.e. total 100 m section) must be open for passage if the whole opening is provided by a bridge	Uncertain (and section will be less than 100 m)	The bridge will span the majority of the corridor; hence, most of the corridor will be open for passage.
A minimum setback from top of bank of 5 m for the bridge abutments	Yes	
Conditions under bridges/within culverts should resemble those outside (i.e. natural surface, temperature, light levels)	Likely	
Other		
Inclusion of a fish exclusion filter between Growling Grass Frog wetlands and water source(s)	Yes	
Groundwater is generally the preferred water source	Yes	

3.3.4 Wetland, riparian and terrestrial habitat characteristics

Growling Grass Frogs are dependent on aquatic vegetation, especially floating and submergent species occurring in deep water. High planting densities should ensure that dense (approximately 30-50%) cover of submergent and floating vegetation is established by the second Growling Grass Frog breeding season (September to March). Patches of emergent vegetation will also be planted out, at c. 4–6 plants per square meter.

Created wetlands will be lined (i.e. clay liner) to prevent leakage, with suitable soil placed over the liner to facilitate aquatic vegetation growth.

Rock beaching will be included around 30–40% of constructed wetland margins, extending from the banks into the water, to create warmer areas for basking as well as habitat for perching and shelter. Embankments may also be constructed where appropriate.

A 10 m revegetation buffer will surround each wetland, comprising up to 45% low structural complexity habitat (i.e. mown grass, bare ground and rock); these areas are utilised by the frog for foraging and basking, as well as facilitating movement. A further 45% of this revegetation zone will comprise relatively dense plantings of tussock-forming grasses, sedges and rushes. The remaining 10% cover will consist of large rocks and logs to provide overwintering habitat. Shrubs >2 m tall and trees will not be planted within 10 m of the wetlands.

Beyond 10 m, c. 50–80% of the habitat corridor will consist of mown grass, with the remainder (20-50%) comprising denser patches of tussock-forming grasses and sedges. The cover of woody plants >2 m in height will not exceed 10% within the habitat corridor.

Infrastructure adjacent to and within the habitat corridor (such as paths, bridges, lighting and storm water infrastructure) will be designed and constructed in a way that is sensitive to the requirements of Growling Grass Frogs.

3.3.5 Offset Site Suitability.

The on-site offset site fulfils the requirements outlined in the EPBC Act approval for the New Epping development. Specifically, the site meets the requirements outlined in Condition 3 per the approval dated 24/5/19:

*3. To compensate for the loss of 17.39 ha of **Growling Grass Frog habitat**, the approval holder must implement the **Growling Grass Frog Offset Strategy**, and ensure that a **viable population** of the **Growling Grass Frogs** is maintained at the proposed offset areas for 10 years.*

The Offset Strategy (Ecology Australia 2019b) identifies the proposed habitat corridor 215, 315W and 325C Cooper St, Epping as a suitable on-site offset site.

The habitat corridor is located onsite, therefore the local Growling Grass Frog population will be protected, rather than protecting a different population.

The habitat corridor follows Growling Grass Frog habitat design standards (DELWP 2017a; b), and as a result will provide good quality Growling Grass Frog habitat. The following important habitats will be created and managed specifically for Growling Grass Frogs to protect the local Growling Grass Frog population:

- The permanent, groundwater fed large quarry waterbody, which provides a permanent refuge for Growling Grass Frogs on site, will be retained and riparian vegetation improved.
- Seven permanent off channel Growling Grass Frog wetlands will be constructed. These will be maintained at a range of salinities. Water will be supplied to these wetlands via a water distribution network to ensure permanence.
- Three managed ephemeral Growling Grass Frog wetlands that will be filled over summer, and allowed to dry out over winter.
- A remediated and revegetated Edgar's Creek, including retaining an existing in channel wetland, and creating an additional four in channel wetlands.
- A riparian zone with areas of dense vegetation, open areas and areas with logs and large rocks for overwintering.
- Open terrestrial habitat.

The habitat corridor will maintain and potentially improve connectivity to neighbouring populations by improving habitats along Edgars Creek and building a wetland (wetland 1, Figure 4) immediately adjacent to the existing culverts under Edgars Road. These existing culverts potentially link New Epping to neighbouring wetlands on the Melbourne Wholesale Markets site that are known to support Growling Grass Frogs roughly 100 m west of the proposed wetland.

Currently, the site is not managed for Growling Grass Frogs, and the population receives no protection.

3.3.6 Current permitted land uses

The property is currently zoned as Industrial Zone 3 (IN3Z) within the City of Whittlesea Planning Scheme. Industrial Zone 3 provides for lower intensity industries and associated uses that will not impact more sensitive adjacent land uses. 325C Cooper St is subject to a Priority Development Zone – Schedule 1 (PDZ1). This Priority Development Zone relates to the ongoing development of the neighbouring Melbourne Wholesale Market site, and recognises the importance of the site for Victoria.

The site is subject Urban Floodway Zone (UFZ) and a Land Subject to Inundation Overlay (LSIO), which equate to the 1 in 100 Annual Recurrence Interval. These ensure any development maintains the free passage and temporary storage of floodwaters, and minimises flood damage. There are no overlays on the project area relating to biodiversity.

Currently the land is a large dormant landfill site, with a current and valid landfill licence to accept further putrescible waste. Activity at the site is currently limited to ongoing remediation, monitoring and investigation activities in accordance with licence conditions whilst development of the site for more sensitive uses progresses. However, the proponent holds landfill licence 11684 with EPA Victoria to accept prescribed industrial waste and operate a landfill. While it is the proponent's intention to undertake a mixed-use property development, it could opt to continue these operations under the existing licence which would most likely affect the small Growling Grass Frog population on site.

While the removal of vegetation is controlled under clause 52.17 of the Victorian Planning Provisions, some vegetation can be removed without a permit to the minimum extent possible for certain activities. The activities that allow for the removal of vegetation without a permit include the removal of dead vegetation, construction of boundary fences, mowing of understory grasses, removal of pest animal burrows and fire protection. See DELWP (2017c) for further information

Without additional protection, the Growling Grass Frog population on site may be at risk of decline due to current permitted land uses.

3.3.7 Existing offset arrangements

The proposed habitat corridor is not a current designated offset site under either Victorian policy or EPBC Act Offset Policy.

4 Offset Implementation

This section outlines the management actions necessary to implement this OMP and conserve Growling Grass Frog habitat in the habitat corridor. This OMP details management activities from the completion of construction at New Epping to ten years following the completion of the Growling Grass Frog habitat corridor. This OMP aims to protect and improve Growling Grass Frog habitat through on ground actions, and must meet the targets outlined in this OMP.

4.1 EPBC Act approval conditions

This OMP has been specifically developed to comply with the approval conditions outlined in the approval for the New Epping Development (EPBC 2016/7755). The relevant approval conditions are outlined in Table 4.

Table 4 EPBC approval conditions for the New Epping development.

Condition	Condition details	OMP Actions	OMP section
3	To compensate for the loss of 17.39 ha of Growling Grass frog habitat , the approval holder must implement the Growling Grass Frog Offset Strategy , and ensure that a viable population of the Growling Grass Frogs is maintained at the proposed offset areas for 10 years.	Offsets secured in perpetuity	3.3, 4
4	Prior to the commencement of the action , the approval holder must prepare Offset Management Plans for the onsite and offsite offset areas proposed in the Growling Grass Frog Offset Strategy . The approval holder must not commence the action until both Offset Management Plans have been prepared. The Offset Management Plans must be provided to the Department within 14 days the Offset Management Plans being prepared. Each approved Offset Management Plan must be implemented for the life of the approval. Each Offset Management Plan must:	This report	NA
4a	Be prepared by a suitably qualified expert	Report written by suitably qualified and experienced ecologists.	NA
4b	Be prepared in accordance with the principles of the EPBC Act Environmental Offsets Policy , and be consistent with the Growling Grass Frog Offset Strategy	Yes	NA
4c	Include timelines and mechanisms for legally securing the offset area(s)	By 2019	4.4
4d	Provide a written description and a map that clearly defines the location and boundaries of the offset area(s). This must be accompanied by the offset attributes and shapefiles(s)	Description of site and map provided. Attributes and shapefiles to be attached separately	3.3
4e	Include a description, based on adequate surveys, of the current Growling Grass Frog population within each offset area, and the condition (prior to any management activities)	Site description including current Growling Grass Frog population and	3.3

Refer to update #20

Condition	Condition details	OMP Actions	OMP section
	of each offset area, including existing habitat (the baseline conditions)	habitat included.	
4f	Detail timeframes, management actions, and strategies for: <ul style="list-style-type: none"> i) maintaining a viable population of Growling Grass Frogs within the onsite offset; and ii) for the creation, regeneration and/or revegetation of Growling Grass Frog habitat within the proposed onsite and offsite offset areas. 	Management actions outlined to preserve and improve the Growling Grass Frog population and habitat on site	5
4g	Management actions and strategies must include: <ul style="list-style-type: none"> i) performance and completion criteria for evaluating the management of the offset area, and criteria for triggering remedial action and contingency responses ii) a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria iii) a description of potential risks to the successful implementation of the plan, a description of the measures that will be implemented to mitigate against these risks and a description of the contingency measures that will be implemented if defined triggers arise iv) specify the timing and frequency of management actions, reporting and implementation of contingency responses and corrective actions, and the person/s responsible 	<p>Management actions with performance criteria outlined to preserve and improve the Growling Grass Frog population and habitat on site.</p> <p>Monitoring and reporting program included.</p> <p>Risk assessment completed.</p> <p>Management responsibilities outlined</p> <p>Potential corrective actions outlined</p>	4, 5, 6, 7, 8, 9
6	Within three (3) months following the third and fourth anniversary of the commencement of the action , the approval holder must provide a report demonstrating that a viable population of Growling Grass Frog has been maintained at the onsite offset site (as required under the Growling Grass Frog Offset Strategy). The report must be prepared by a suitably qualified expert .	Annual Growling Grass Frog monitoring report	8
7	If the Minister is not satisfied that a viable population of Growling Grass Frog has been maintained, as required in condition 6, the Minister may (in writing) require the approval holder to submit a new plan or program for the Minister's approval to reduce, mitigate, remediate or compensate impacts to Growling Grass Frogs . If the Minister approves the plan or program, then the approved plan or program must be implemented. <i>Note: To avoid doubt, any proposed compensation measures must be additional to that required by the Growling Grass Frog Offset Strategy.</i>	Potential corrective actions included in management actions OMP review as required.	5, 8.3
10	All management plans required under this approval should be prepared in line with the Department's Environmental Management Plan Guidelines .	OMP follows guidelines.	NA
11	The approval holder must maintain accurate and complete compliance records .	Reporting schedule included	8
15	The approval holder must prepare a compliance report for	Reporting schedule	8

Condition	Condition details	OMP Actions	OMP section
	each 12 month period following the date of commencement of the action , or as otherwise agreed to in writing by the Minister .	included	
16	The approval holder must notify the Department in writing of any: incident ; non-compliance with the conditions; or non-compliance with the commitments made in plans . The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify: <ul style="list-style-type: none"> a. the condition which is or may be in breach; and b. a short description of the incident and/or non-compliance. 	Incident reporting section provided, with relevant emergency contacts.	9
17	The approval holder must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying: <ul style="list-style-type: none"> a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; b. the potential impacts of the incident or non-compliance; and c. the method and timing of any remedial action that will be undertaken by the approval holder. 	Incident reporting section provided, with relevant emergency contacts.	9
18	The approval holder must ensure that independent audits of compliance with the conditions are conducted for the 12 month period from commencement of the action and for every subsequent 24 month period until this approval expires, or as requested in writing by the Minister .	Audit reporting schedule reflects condition	8.2
21	The approval holder may, at any time, apply to the Minister for a variation to an action management plan approved by the Minister under condition 4, or as subsequently revised in accordance with these conditions, by submitting an application in accordance with the requirements of section 143A of the EPBC Act . If the Minister approves a revised action management plan (RAMP) then, from the date specified, the approval holder must implement the RAMP in place of the previous action management plan.	OMP review process outlined.	8.3

Note that a **viable population** means a self-supporting population of **Growling Grass Frog** with documented breeding and ongoing recruitment into the population, and sufficient numbers and genetic variety in a particular area, determined from baseline data.

4.2 Offset site details

The offset will consist of an 11.44 ha habitat corridor designed specifically for Growling Grass Frogs. Some details of the proposed offset are provided in Table 5. The majority of this offset will be contained on 215 Cooper St, Epping with a small portion extending to 315W Cooper St Epping. The details of these

Refer to
update #21

land parcels, including the details of the landowner, location, allotment and location government area are shown in Table 6.

4.3 Offset strategy

The offset will be secured and managed for Growling Grass Frog conservation in perpetuity. The habitat corridor constitutes a portion of the properties at 215 and 315W Cooper St. There are no exiting offset sites within the proposed habitat corridor nor across the entire New Epping Development, either under the EPBC Act offset policy or Victorian offset policy.

4.4 Offset security, management responsibilities and reporting requirements

The proposed offset area (the habitat corridor) is located within larger properties at 215, 315W and 325C Cooper St, Epping. The property is owned by Riverlee, who will manage the property for the duration of the EMP and this OMP (Table 7). Once the OMP period is completed (i.e. 10 years following completion of the Growling Grass Frog habitat corridor), the ownership and management of the offset will pass to Melbourne Water and/or the City of Whittlesea.

Further to the approach outlined in the Preliminary Documentation (section 4.3.5), it is proposed that offsets provided on-site will be secured through the zoning being applied Amendment C213 to the City of Whittlesea Planning Scheme through a combination of Urban Flood Zone, and Public Conservation and Resource Zones. Both zonings restrict development to minor works. Once the works are completed the ownership of the creek corridor containing the direct offsets will be transferred to the public land manager (Melbourne Water and/or the City of Whittlesea) as is usual practice.

Table 5 Area and number (where applicable) of each habitat type in the habitat corridor.

Habitat type	Sub-category	Area/number
Total Area		11.44 ha
Wetlands	Retained wetland	1
		1.52 ha
	Constructed permanent wetlands	7
		0.99 ha
	Constructed ephemeral wetlands	3
		0.16 ha
In-stream wetlands	5 (1 retained)	
	0.32 ha	
Riparian zone (within 20 m of wetlands)	Retained	1.14 ha retained
	Constructed	3.17 ha
Terrestrial habitat	Constructed	3.8 ha

Refer to update #22

Refer to update #23

Table 6 Offset site details

Landowner	Riverlee Caruso Epping Pty Ltd*	
Type of Offset	First party	
Address of Offset	215 Cooper St, Epping, Vic	315W Cooper St, Epping, Vic
Allotment	Lots 1 and 2 of PS734561	Lot 1 TP874471
Volume/Folio	Volume 10942 Folio 011 Volume 09767 Folio 053	Volume 10920 Folio 092
Local Government Area	Whittlesea	
Council Property Number	963389	572750
Bioregion	Victorian Volcanic Plains	

* Note, at the time of writing, 315W Cooper Street was owned by City of Whittlesea, but is under contract to Riverlee Caruso Epping Pty Ltd and is due to settle by July 2019.

Table 7 Security, management, monitoring and reporting requirements for the offset sites

Refer to
update #24

Responsible/liable for meeting offset requirements	Riverlee (or subsequent EPBC Act approval holder)
Security	Amendment to the planning scheme so the habitat corridor is rezoned as Urban Flood Zone and Public Conservation and Resource Zones
Date of commencement for the planning amendment and rezoning	2019 (exact date to be confirmed)
Start date for 10 year management period	Mid 2020 – once habitat corridor construction completed (exact date to be confirmed)
End date for 10 year management period	Mid 2030 (exact date to be confirmed)
Responsibility for management and monitoring of offset site for management period	Riverlee (or subsequent landholder)
Auditing	Riverlee (or subsequent EPBC Act approval holder)
Reporting responsibility to DoEE	Riverlee (or subsequent EPBC Act approval holder)
OMP review	Riverlee (or subsequent EPBC Act approval holder)
Management of the offset site following the 10 year management period	Melbourne Water and/or City of Whittlesea

4.5 Environmental outcomes to be achieved

The key environmental outcomes to be achieved as a result of establishing the habitat corridor are:

- ~~Legal protection of 11.44 ha of Growling Grass Frog habitat in perpetuity.~~
- Improving habitat around the main quarry water body, which represents the permanent refuge on site for Growling Grass Frogs.
- Establishing and managing new habitat specifically designed for Growling Grass Frog following best practice guidelines.
- Improve the Growling Grass Frog habitat quality on site, as measured by population size and habitat and water quality monitoring programs. Corrective management action will be implemented if the Growling Grass Frog population or habitat quality declines rapidly.

Refer to
update #25

4.5.1 Future condition goals

Future habitat condition goals will be assessed using the habitat features preferred by Growling Grass Frog, including areas of deeper open water that support submergent and floating vegetation, a relatively open riparian zone with emergent vegetation, tussock grasses and inter-tussock spaces, rocks and logs for overwintering and no predatory fish.

Growling Grass Frog Population size

The Growling Grass Frog population on site should remain the same or increase compared to the existing population on site. Three years of surveys (2015/16, 2016/17, 2018/19) have been conducted on site in both wet and dry years to establish a baseline for the local Growling Grass Frog population. Surveys have recorded between 8 and 91 individuals in a single survey, with evidence of breeding recorded each year of surveys (Wildlife Profiles 2015, Ecology Australia 2017a, Ecology Australia (in prep). Growling Grass Frog populations on site and elsewhere tend to fluctuate dependent on prevailing conditions (Heard, Scroggie, and Malone 2012) which makes monitoring population health difficult. As a result, a number of population trigger values have been set to initiate corrective management actions. See Section 5.11 for further information.

Vegetation and landscaping

The offset site will support a variety of vegetation types preferred by Growling Grass Frogs as follows:

- Deep areas (>1.5 m deep) of wetlands supporting dense submergent and floating vegetation, covering at least 35% of each wetland.
- Shallow areas supporting emergent vegetation covering at least 30% of each wetland.
- Rock beaching should be present along 30-40% of the perimeter of each wetland. The rock beaching should extend down into the water so it remains inundated as water levels fluctuate.
- Riparian areas (within 10 m of wetlands) should support approximately 45% cover of high complexity habitat such as tussock grasses, sedges and rushes and 45% cover of low complexity habitat such as mown grass, bare ground or rocks. The final 10% should consist of boulders and logs to provide areas for perching, calling and, most importantly, over wintering. No trees or shrubs over 2 m in height should be planted in this area.

- The remaining terrestrial habitat (i.e. >10m from wetlands) should consist of roughly 50-80% cover mown grass and 20-50% cover of tussock grasses and sedges. The cover of trees and woody plants >2 m tall will not exceed more than 10% to reduce shade.
- Weeds currently make up the majority of the vegetation across the project area, and will likely continue to be very abundant in the project area. As a result only specific weeds species will be actively targeted, as outlined in Section 5.3, or when there are new or emergent weed species. Weeds may also be targeted where they are impacting revegetation efforts.

Species indigenous to the area will be planted (see section 5.1), and tubestock used as much as possible for revegetation.

Water management.

A water delivery system will be constructed to allow water levels in the constructed wetlands to be actively managed to maintain permanent water. Permanent wetlands will be regularly refilled to their maximum (~1.5 m deep), and will not be allowed to drop below 0.5 m in depth. Managed ephemeral wetlands will be kept full over the Growling Grass Frog breeding season (October-March) and then drawn down and allowed to dry out over winter. The water delivery system will be supplied primarily by water from the groundwater-fed existing quarry pit, however as this water is moderately saline, additional freshwater sources will be required.

Water Quality

Water quality will be monitored, and kept within the range preferred by Growling Grass Frogs. Salinity in particular will be actively monitored and managed. ~~Four out of seven constructed, permanent wetlands will be maintained as freshwater wetlands with salinity kept below 3,000 μ S/cm. To reduce the incidence of chytrid, the remaining permanent wetlands will be more saline, but with salinity maintained below 7,000 μ S/cm. The ephemeral wetlands will be filled with freshwater (<3,000 μ S/cm).~~ Wetlands will be designed so they can be drained if salinity becomes a recurring issue, as salinity is expected to slowly increase in the wetlands due to evaporation.

Refer to
update #26

Wetlands will be fed by a combination of slightly saline groundwater from the main quarry pit, and freshwater potentially including harvested rainwater, treated stormwater and potable water.

Predatory fish

Predatory fish are known to consume Growling Grass Frog eggs, tadpoles and adults. All constructed wetlands will be built above the 1 in 10 year ARI to reduce the likelihood of colonisation of constructed wetlands by predatory fish. Wetlands will be regularly inspected for predatory fish, and if fish are recorded, they will be drained outside the Growling Grass Frog breeding season and refilled.

4.5.2 Performance and completion criteria

Key performance and completion criteria are:

- Establishment of legal protection in perpetuity (i.e. Planning Scheme Amendment C213 being adopted to apply the proposed protecting zoning to the habitat corridor).
- Maintain a healthy population of Growling Grass Frog on site similar to or larger than that currently occupying the site (Sections 4.5.1 and 5.11).

- Maintenance of vegetation zones in the habitat corridor (i.e. deep water with submergent and floating vegetation, shallow water with emergent vegetation, riparian vegetation and terrestrial habitat) (Sections 4.5.1 and 5.1).
- Maintain water levels and water quality in constructed wetlands (Sections 4.5.1, 5.5 and 5.6).
- Control targeted weeds on site (Sections 4.5.1 and 5.3).
- Monitor and control pest species, particularly predatory fish, on site (Sections 4.5.1 and 5.9).
- If works are conducted in the habitat corridor, appropriate Growling Grass Frog searches, salvage and relocation are conducted (Section 5.10)
- Complete scheduled management actions, monitoring, reports and audits (Sections 7, 8, 8.2 and 8.3).

4.6 Limitations

The constructed habitat corridor has been designed to follow the Growling Grass Frog habitat and crossing design standards as much as possible (DELWP 2017a; b). These standards are based on the best available science and expert opinion. As such the design and management of the habitat corridor should provide high quality habitat for Growling Grass Frogs in the long term.

5 Management actions

This section presents the management actions required to satisfy the requirements of the EPBC Act approval conditions. Management actions described below are to be implemented for a period of 10 years in accordance with the EPBC Act approval conditions. Following the 10-year management period, the site will be handed over to the City of Whittlesea and/or Melbourne Water, who will manage the site in perpetuity.

The offset site will be managed to preserve the local Growling Grass Frog population and maintaining high quality Growling Grass Frog habitat constructed on site. The site will be managed in accordance with EPBC Act approval conditions.

From the commencement of this agreement, the land owner/manager will undertake the following management actions within the habitat corridor in perpetuity:

- Maintain water levels in the constructed wetlands.
- Maintain water quality in the constructed wetlands.
- Maintain vegetation in the habitat corridor in accordance with this OMP.
- Eliminate any targeted weeds, new and emerging weeds and woody weeds to less than 1% cover.
- Monitor and control predatory fish to ensure that they are not present in the constructed wetlands.
- Destroy any rabbit warrens or fox dens encountered in the habitat corridor.
- Maintain frog and pedestrian and vehicle exclusion fences on site, as well as signage.
- Follow hygiene protocols to minimise the spread of chytrid.
- Conduct Growling Grass Frog searches, salvage and relocation prior to works in the habitat corridor.

Management actions are expanded below and a summary and schedule is shown in Table 11.

Management of the site is underpinned by adaptive management. The nature and timing of actions should be adaptable, changing as prevailing conditions vary, new management techniques are developed, knowledge of the habitat corridor improves and additional information becomes available about the ecology of Growling Grass Frogs. This will allow management to improve and respond to changing conditions and new information.

5.1 Revegetation management

The habitat corridor will be revegetated prior to the implementation of this OMP. However the vegetation in the habitat corridor will require ongoing maintenance to replace dead plants, increase planting density and potentially reduce the density of some revegetation.

5.1.1 Additional revegetation

Additional revegetation may be required in areas where revegetation has died or planting density needs to be increased. Monitoring every autumn and spring will determine if and where additional planting is

required. Additional planting will need to follow the revegetation zones as outlined in the EMP and below:

- Terrestrial habitat corridor (Zone 1) will be dominated by a mixture of open mown grassy areas and denser patches of tussock grasses similar to those outlined in Zone 2. Terrestrial habitat will be split into two sub-zones.
 - Riparian areas within 10 m of wetlands - where habitat will be more complex, and include approximately 45% cover of high complexity habitat such as tussock grasses, sedges and rushes, 45% cover of low complexity habitat including mown grass and bare ground and 10% cover of rocks and logs. No trees or shrubs >2 m tall will be planted in this zone.
 - Remaining terrestrial habitat more than 10 m from wetlands - mown grass will make up the majority (50% - 80%) of habitat with the remainder comprising tussock grasses and sedges. Cover of trees and shrubs will be <10% in this area.
- Fringing vegetation (Zone 2) will be densely planted with tussock-forming or rhizomatous perennials. The inter-tussock spaces will be vegetated with a sward of rhizomatous, stoloniferous or tufted perennials. Some species will also be dominants or co-dominants of the vegetation in Zone 3, thus are likely to form continuous swards straddling both zones. The primary objective in Zone 2 is to achieve a closed cover of vegetation as quickly as possible after planting to stabilise banks (thus preventing erosion, particularly by wave action) and to exclude weeds.
- Shallow areas (Zone 3) may be vegetatively structurally diverse but the aim is to produce a dense cover to stabilise the substrate and prevent colonisation by weeds, particularly during the summer drawdown of the water. All species selected are emergent aquatic plants or amphibious species able to cope with exposure during draw-down. Several species are winter-deciduous because of low temperatures (e.g. *Bolboschoenus caldwellii*), or may be summer-dormant (e.g. *Eleocharis acuta*) when receding water levels impose drought stress. In each case the aerial parts die back to storage organs (rhizomes, tubers etc.). Dormant plants resume growth in spring and summer respectively.
- Deep water (Zone 4) will be dominated by submerged aquatic species of permanent water. These are rhizomatous or stoloniferous perennials which are intended to densely cover the substrate.

Species to be planted in each zone will be indigenous to the area, and are outlined in Table 8.

Planting of tubestock is the only viable option for revegetation works, due to the intense competition by weeds. Revegetation should occur in autumn to spring for terrestrial species and spring for wetland species, allowing for optimal growing conditions (moisture availability and increasing soil temperature). Planted vegetation should be watered at the time of planting.

Management Actions

- Contract revegetation specialists to implement ongoing revegetation. The contractor must be suitably qualified to undertake revegetation/rehabilitation works as outlined in this document.

- Undertake revegetation monitoring twice annually, once in spring and autumn.
- Undertake revegetation works as outlined above and in Table 8 and Table 11
- Ensure all revegetation activities are undertaken with reference to Growling Grass Frog requirements outlined above (e.g. maintain a mosaic of vegetation structure so as not to overshadow sections of creek/wetlands, to provide ample floating and submergent vegetation and to provide shelter and refuge habitat).

Performance criteria

- ~~Revegetation monitored twice annually, once in spring and autumn.~~
- Habitat corridor adequately revegetated with species outlined in Table 8.
- Habitat created matches habitat requirements of Growling Grass Frog as shown in Table 3 (based on DELWP 2017a).

Refer to
update #27

Potential corrective action

- Increase vegetation monitoring to replace dead plants.

5.1.2 Vegetation removal

Wetlands can become “choked” with overly dense stands of vegetation and vegetation inappropriate to the zone can become established (e.g. Cumbungi, Common Reed and/or trees or large shrubs in riparian areas, which then cast shade on wetlands). As a result some areas may require vegetation to be removed. Vegetation should be removed by hand to reduce the chance of Growling Grass Frog mortality from machinery. If vegetation cannot be removed by hand, pre-clearance searches will be required to locate and remove any Growling Grass Frogs.

Management Actions

- Undertake revegetation monitoring twice annually, once in spring and autumn
- Clear inappropriate vegetation if it becomes established. Remove vegetation by hand where possible to reduce impacts to Growling Grass Frogs. If vegetation cannot be removed by hand, pre-clearance searches for Growling Grass Frog and if necessary salvage and relocation will be required.

Performance criteria

- Revegetation monitored twice annually, once in spring and autumn.
- Wetlands not choked with vegetation.
- Habitat created matches habitat requirements of Growling Grass Frog as shown in Table 3 (based on DELWP 2017a).

Potential corrective action

- Increase vegetation monitoring to identify vegetation of management concern.

Table 8 Plant species suitable for use in habitat corridor revegetation

Vegetation Zones

- Zone 1** Terrestrial habitat in the habitat corridor. No trees and shrubs should be planted within 10 m of wetlands and cover of trees and shrubs elsewhere should not exceed 10%
- Zone 2** Permanently moist or seasonally wet margins; shallow seasonal inundation in lower part of zone.
- Zone 3** Shallow inundation; upper minimum depth of inundation c. 10 cm; amphibious and emergent aquatic herbs, some straddling Zones 2 and 3.
- Zone 4** Permanent water; submergent and emergent aquatic-herbs, some straddling Zones 3 and 4.

Highlighting for each species in each zone is indicative of their dominance in that zone. Species highlighted with **dark grey** should be the dominant species in that zone, those highlighted in **light grey** should be common, and those not highlighted should be scattered.

Species	Common Name	Vegetation zone				Notes
		Zone 1	Zone 2	Zone 3	Zone 4	
Trees						
<i>Acacia implexa</i>	Lightwood	✓				
<i>Acacia mearnsii</i>	Late Black Wattle	✓				
<i>Acacia pycnantha</i>	Golden Wattle	✓				
<i>Allocasuarina verticillata</i>	Drooping Sheoak	✓				
<i>Eucalyptus camaldulensis</i>	River Red-gum	✓				
Large and Medium shrubs						
<i>Acacia acinacea</i>	Gold Dust Wattle	✓				
<i>Acacia paradoxa</i>	Hedge Wattle	✓				
<i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Sweet Bursaria	✓				
<i>Correa glabra</i> var. <i>glabra</i>	Rock Correa	✓				
<i>Dodonaea viscosa</i> ssp. <i>spatulata</i>	Sticky Hop-bush	✓				
<i>Eremophila deserti</i>	Turkey Bush	✓				
<i>Goodenia ovata</i>	Hop Goodenia	✓				
<i>Grevillea rosmarinifolia</i> ssp. <i>rosmarinifolia</i>	Rosemary Grevillea	✓				
<i>Leptospermum lanigerum</i>	Woolly Tea-tree	✓	✓			
<i>Melicytus dentatus</i>	Tree Violet	✓				
<i>Myoporum petiolatum</i>	Sticky Boobialla	✓				
<i>Muehlenbeckia florulenta</i>	Tangled Lignum	✓	✓			
<i>Olearia ramulosa</i> var. <i>ramulosa</i>	Twiggy Daisy-bush	✓				
Perennial herbs						
<i>Alisma plantago-aquatica</i>	Hairy Willow-herb			✓		
<i>Alternanthera denticulata</i>	Lesser Joyweed		✓			
<i>Calystegia sepium</i> subsp. <i>roseata</i>	Large Bindweed		✓			
<i>Centella cordifolia</i>	Centella		✓			
<i>Crassula helmsii</i>	Swamp Crassula		✓			
<i>Cycnogeton procerum</i> s.l. (broad erect leaves)	Water-ribbons		✓	✓		
<i>Epilobium billardierianum</i> subsp. <i>billardierianum</i>	Smooth Willow-herb		✓			
<i>Epilobium hirtigerum</i>	Hairy Willow-herb		✓			
<i>Hydrocotyle sibthorpioides</i>	Shining Pennywort		✓			
<i>Lilaeopsis polyantha</i>	Australian Lilaeopsis		✓	✓		
<i>Lobelia pratioides</i>	Poison Lobelia		✓			
<i>Lythrum salicaria</i>	Purple Loosestrife		✓			
<i>Marsilea drummondii</i>	Common Nardoo		✓	✓		If submerged plant only in shallow water (<30 cm deep)
<i>Myriophyllum crispatum</i>	Upright Water-milfoil				✓	
<i>Myriophyllum verrucosum</i>	Red Water-milfoil				✓	
<i>Ottelia ovalifolia</i> subsp. <i>ovalifolia</i>	Swamp Lily				✓	
<i>Persicaria decipiens</i>	Slender Knotweed		✓	✓		
<i>Persicaria prostrata</i>	Creeping Knotweed		✓			
<i>Potamogeton cheesemanii</i>	Red Pondweed			✓		
<i>Potamogeton ochreatus</i>	Blunt Pondweed			✓	✓	
<i>Ranunculus inundatus</i>	River Buttercup		✓	✓		

Species	Common Name	Vegetation zone				Notes
		Zone 1	Zone 2	Zone 3	Zone 4	
<i>Selliera radicans</i>	Shiny Swamp-mat		✓			
<i>Stuckenia pectinata</i>	Fennel Pondweed				✓	
<i>Triglochin striatum</i> (robust form)	Streaked Arrow-grass		✓			
<i>Vallisneria australis</i>	Eel Grass				✓	
<i>Ornduffia reniformis</i>	Running Marsh-flower		✓	✓		
Grasses and graminoids						
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass			✓		
<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass	✓	✓			
<i>Austrostipa bigeniculata</i>	Kneed spear-grass	✓				
<i>Baumea articulata</i>	Jointed Twig-sedge			✓		
<i>Baumea juncea</i>	Bare Twig-sedge	✓				
<i>Bolboschoenus caldwellii</i>	Salt Club-sedge		✓	✓		
<i>Bolboschoenus medianus</i>	River Club-sedge		✓	✓		
<i>Carex bichenoviana</i>	Plains Sedge	✓	✓			
<i>Carex tereticaulis</i>	Poong'ort	✓	✓			
<i>Eleocharis acuta</i>	Common Spike-rush		✓	✓		
<i>Eleocharis sphacelata</i>	Tall Spike-sedge		✓	✓		
<i>Glyceria australis</i>	Australian Sweet-grass		✓			
<i>Juncus amabilis</i>	Hollow Rush		✓			
<i>Juncus flavidus</i>	Gold Rush		✓			
<i>Juncus semisolidus</i>	Plains Rush		✓			
<i>Juncus usitatus</i>	Common Rush	✓				
<i>Lachnagrostis filiformis</i> var. 1	Common Blown-grass		✓			
<i>Poa labillardierei</i> var. <i>labillardierei</i>	Common Tussock-grass	✓	✓			
<i>Schoenoplectus pungens</i>	Sharp Club-sedge			✓		
<i>Schoenoplectus tabernaemontani</i>	River Club-sedge			✓		
<i>Themeda triandra</i>	Kangaroo Grass	✓				

5.2 Mowing

Open grassy areas in the terrestrial portion of the habitat corridor will need to be regularly mown to ensure that open habitats do not become clogged and inhibit foraging and movement.

Management actions

- Mow open grassy areas as required. However, mowing should be limited in frequency within 10 m of wetlands to reduce the chance of Growling Grass Frog mortality.

Performance Criteria

- Habitat corridor is regularly mown to maintain open, inter tussock areas. The rate of mowing will be condition dependent, but grass should be maintained below approximately 20 cm tall.

Potential corrective action

- Increase/decrease regularity of mowing.

5.3 Weed management

Weed species listed for control or elimination in Table 9 have been identified based on their likelihood of occurrence in the habitat corridor. These are a small proportion of the weed flora, but are species/populations that must be managed because of their seriousness as invaders, are required to be managed under the Catchment and Land Protection Act 1994 (CaLP Act) for the Port Phillip and Westernport CMA region and/or are a Weed of National Significance (WONS). Other species will require management in certain circumstances (e.g. to allow for revegetation), but full-scale management would be untenable due to the very high cover of weeds.

Weed flora is not static, and new weed species are likely to appear within the study area over the duration of this management plan, introduced by a wide range of natural agents (e.g. wind and animals). The weeds listed for control in Table 9 is not exhaustive. Annual weed monitoring will allow for the identification of new weed species and their incorporation into the management program as appropriate.

Weed management contractors must be suitably qualified and certified, and possess the requisite weed and indigenous plant identification skills. Additionally, all aspects of the control program need to be appropriately documented (to an agreed standard) to enable the tracking and evaluation of control methods/activities, and to allow for refinement of procedures, as well as to inform future weed management activities. Finally, damage to indigenous vegetation (by herbicide or machinery and to soils) must be avoided at all times, and all health and safety, and environmental regulations, must be observed.

Use of herbicides should be kept to a minimum and where possible weeds should be removed using physical treatments (e.g. physically removed, cutting or ringbarking). All herbicide usage within the study area will be in accordance with the following:

- The use of herbicides in and adjacent to water-bodies (including riparian zones and wetlands) will be avoided where practicable. If unavoidable, herbicides only legally certified for use in such situations (as specified on the product label) will be used. Application methods resulting

in low levels of off-target damage (e.g. 'wick wiping', cut/paint, and drill/fill) will be favoured over spray application.

- Where possible, undertake herbicide application during periods of low water.
- All use of herbicides (and associated additives) will be in accordance with the product label. Off-label use of herbicides may be permitted where approval has been granted from a state government department (e.g. DELWP or Department of Economic Development, Jobs, Transport and Resources).
- Site-specific herbicide planning (application methods, chemicals used, weather conditions, plant phenology, etc.) will be employed to reduce off-target herbicide damage. Off-target herbicide damage is the detrimental application of herbicide to plant species that have not been targeted for control. While this generally applies to plants in and around the point of herbicide application, it may also refer to organisms (flora and fauna) some distance away.
- Seasonal restriction: If Growling Grass Frogs are likely to be present in areas requiring control, herbicide spraying must not be undertaken within the wetlands during the Growling Grass Frog breeding season (October – March); however 'wick-wiping' (the direct application of herbicide to foliage via a wick/sponge) may be undertaken during this period.

Management Actions

- Contract weed management specialists to implement weed control as outlined above. The contractor must be suitably qualified to undertake weed management works as outlined in this document.
- Implement twice annual (once each in spring and summer) monitoring program to ensure weed control works are successful, and to identify ongoing works.

Performance criteria

- Targeted weeds are controlled when encountered and do not establish infestations in the habitat corridor.
- Targeted weed list reviewed annually at a minimum to address new weeds.
- Minimise herbicide application as much as possible around wetland. Physical treatments should be used if possible. When herbicides are used, wick-wiping is the preferred method.
- Herbicide concentrations are not elevated in wetlands during water quality monitoring.

Potential corrective action

- Increase rate of weed inspections and control
- Update targeted species list to include new threats as they emerge.

Table 9 Weed species requiring control or eliminationLife form (mostly after Carr *et al.* 1992)

A	annual	Gt	tuberous geophyte	Pt	perennial herb (tussock forming)	T	tree
B	biennial	Ls	large shrub	S	small to medium shrub		

Noxious weed / WONSWONS – Weed of National Significance (www.weeds.org.au)C – listed as a Controlled weed species under the *Catchment and Land Protection Act 1994* for the Port Phillip and Westernport Catchment Management Authority regionR – listed as a Regionally Controlled weed species under the *Catchment and Land Protection Act 1994* for the Port Phillip and Westernport Catchment Management Authority region**Control method(s) (relevant to population size and distribution of species within the study area)****A Herbicide treatments**

- 1 Herbicide applied to foliage with spray, wick applicator, etc.; annuals must be sprayed well before seed ripening.
- 2 Cut down and concentrated herbicide immediately applied to stump or stems, or bark “frilled” and herbicide applied.
- 3 Stem drilled and injected with concentrated herbicide.

B Physical treatments

- 4 Physical removal – most plants can be physically removed by hand-weeding or with tools when small and/or isolated but soil disturbance is kept to a minimum.
- 5 Cut off at ground level (species that will not resprout from basal buds).
- 6 Physical removal – ‘scraping’ or ‘scalping’ plants using machinery (e.g. backhoe or bulldozer) ensuring any plant material capable of regeneration is removed.

Control or eliminate

- E eliminate all plants/populations within the property
C control weed populations (elimination from property considered unfeasible)

Species	Common Name	Family	Life form	Listed Species		Control/Eliminate	Control methods
				WONS	CALP		
<i>Acacia floribunda</i>	White Sallow-wattle	Mimosaceae	Ls/T			E	2 (young), 5 (old)
<i>Asparagus asparagoides</i>	Bridal Creeper	Asparagaceae	Gt	✓	R	E	1
<i>Carduus pycnocephalus</i>	Slender Thistle	Asteraceae	A		C	C	1
<i>Carthamus lanatus</i>	Saffron Thistle	Asteraceae	A		C	C	1
<i>Chamaecytisus palmensis</i>	Tree Lucerne	Fabaceae	Ls			E	1,2
<i>Chrysanthemoides monilifera ssp. monilifera</i>	Boneseed	Asteraceae	Ls	✓	C	E	2,4
<i>Cirsium vulgare</i>	Spear Thistle	Asteraceae	B		C	C	1,4
<i>Cotoneaster pannosus</i>	Velvet Cotoneaster	Rosaceae	Ls			E	2
<i>Crataegus monogyna</i>	Hawthorn	Rosaceae	Ls/T		C	E	1,2,3
<i>Cynara cardunculus</i>	Spanish Artichoke	Asteraceae	Pt		C	C	1
<i>Dipsacus fullonum subsp. fullonum</i>	Wild Teasel	Dipsacaceae	B		C	C	1
<i>Echium plantagineum</i>	Paterson’s Curse	Boraginaceae	A		C	C	1
<i>Foeniculum vulgare</i>	Fennel	Apiaceae	Pt		R	C	1,2
<i>Fraxinus angustifolia ssp. angustifolia</i>	Desert Ash	Oleaceae	T			E	2
<i>Genista monspessulana</i>	Montpellier Broom	Fabaceae	Ls		C	C	1,2,4
<i>Juncus acutus ssp. acutus</i>	Sharp Rush	Juncaceae	Pt		C	E	1,6
<i>Lycium ferocissimum</i>	African Box-thorn	Solanaceae	Ls		C	E	1,2
<i>Malus pumila</i>	Apple	Rosaceae	T			E	2
<i>Melaleuca styphelioides var. styphelioides</i>	Prickly Paperbark	Myrtaceae	Ls/T			E	2
<i>Nassella charruana</i>	Lobed Needle-grass	Poaceae	Pt		S	E	1
<i>Nassella neesiana</i>	Chilean Needle-grass	Poaceae	Pt	✓	R	C	1
<i>Nassella trichotoma</i>	Serrated Tussock	Poaceae	Pt	✓	C	C	1
<i>Olea europaea ssp. europaea</i>	Olive	Oleaceae	T			E	2
<i>Paraserianthes lophantha subsp. lophantha</i>	Cape Wattle	Mimosaceae	Ls/T			E	2
<i>Phalaris aquatica</i>	Phalaris	Poaceae	Pt			C	1
<i>Prunus cerasifera</i>	Cherry Plum	Rosaceae	T			E	2
<i>Rosa rubiginosa</i>	Sweet Briar	Rosaceae	Ls		C	C	1,2
<i>Rubus anglocandicans</i>	Blackberry	Rosaceae	Ls	✓	C	E	1,2
<i>Salix X sepulcralis var. sepulcralis</i>	Willow	Salicaceae	T	✓	R	E	2,3
<i>Schinus molle</i>	Pepper Tree	Anacardiaceae	T			E	2,3
<i>Silybum marianum</i>	Variiegated Thistle	Asteraceae	A		C	C	1
<i>Solanum linnaeanum</i>	Apple of Sodom	Solanaceae	S		C	E	2
<i>Ulex europaeus</i>	Gorse	Fabaceae	Ls	✓	C	C	1,2
<i>Xanthium spinosum</i>	Bathurst Burr	Asteraceae	A		C	C	1

5.4 Fence Inspections and Maintenance

The habitat corridor will be surrounded by three types of fence. Frog fencing will be constructed along the western edge of the habitat corridor to prevent frogs entering residential areas. A pedestrian exclusion fence will surround the northern main quarry water body, quarry associated constructed wetlands and the northern portion of Edgars Creek. This fence is to protect the core Growling Grass Frog habitat and for safety. A vehicle exclusion fence will surround the entire habitat corridor. Fence designs are outlined in the EMP (Ecology Australia 2019a), and where fence types overlap, they can be combined into a single fence as long as all design criteria are met.

Fences will need to be regularly inspected to make sure they have not been damaged ensuring that there is no vegetation (excluding mown grass) within 1 m of the frog fence.

Management actions

- Fences inspected annually to make sure they are in good condition and there is no vegetation (excluding mown grass) within a meter of frog fencing
- Any damage should be repaired as soon as possible
- Vegetation within 1 m of frog fencing should be removed as soon as possible.

Performance criteria

- Fences inspected annually
- Damage repaired as soon as possible.
- Vegetation within 1 m of frog fencing removed as soon as possible.

Potential corrective action

- Increase rate of fence inspections.
- Improve fence design to improve durability if required.

5.5 Wetland water management

Permanent water over the Growling Grass Frog breeding season (October-March) reduces the probability of extinction of a Growling Grass Frog population (Heard *et al.* 2010). Accordingly, Growling Grass Frog habitat design standards (DELWP 2017a) require 75% of wetlands in a cluster to be permanent, or as close to permanent as practicable. Eight of eleven off channel wetlands in the habitat corridor will be permanent. Three wetlands will be managed ephemeral wetlands.

In order to maintain permanent wetlands, a water delivery system will be constructed to maintain water levels in the wetlands. The system will use a combination of water sources (quarry water, stormwater, rooftop rainwater and if necessary potable/trucked water) to manage salinity in the constructed wetlands. The primary water source for the wetland system will be the slightly saline water from the quarry pit. The specifics of the water delivery system are to be finalised, however the system will allow each wetland to be:

- Filled with the slightly saline water from the main quarry water body.

- Filled with freshwater (e.g. treated stormwater, rooftop rainwater, recycled water, potable water) to reduce salinity.
- Fully drained if predatory fish are recorded in the wetlands, or salinity becomes an ongoing issue.

~~Ponds will be managed at two salinity levels, as frogs from waterbodies with slightly elevated salinities tend to have a lower chytrid load (Stockwell *et al.* 2015). Ponds 2, 4 and 7 will be managed as brackish wetlands (<7000 $\mu\text{S}/\text{cm}$) and ponds 1, 3, 5 and 6 as freshwater wetlands (<3,000 $\mu\text{S}/\text{cm}$). Ephemeral wetlands will be fed primarily with freshwater, as regular drying out will increase salinity. Water levels will be actively maintained, and initially water levels will be checked monthly. Depth gauges should be put in all ponds to ensure that water levels can be easily determined. After two years of water level monitoring, the rate of monitoring can be reassessed. This should occur during the life of the EMP; once this OMP comes into force the required rate of water level monitoring will be established.~~

Refer to
update #28

Management actions

- Ensure constructed wetlands are kept permanent by constructing a water distribution network.
- Monitor and manage water levels monthly.

Performance criteria

- Wetlands are permanent, and water depths are not allowed to drop below 50 cm at any time.

Potential corrective actions

- Ensure water delivery system is functioning properly.
- More regular wetland water level inspection and management, particularly over summer and dry periods.

5.6 Wetland water quality

Water quality tolerances and preferences for Growling Grass Frogs are poorly known (DELWP 2017a), however, recent studies have revealed that, whilst frogs are likely to tolerate a range of water conditions (Ashworth 1998; Pyke 2002; Hamer *et al.* 2002), frogs generally prefer water bodies possessing low levels of nutrients and salinity levels for successful breeding and recruitment to occur (Ashworth 1998; Organ 2002, 2003, 2005; Hamer and Organ 2006). As such, the water quality of Edgars Creek and its associated wetlands will need to be maintained within the ranges known at sites occupied by the Growling Grass Frog. However, moderate levels of salinity (up to 7000 $\mu\text{S}/\text{cm}$) were recorded in existing breeding wetlands on site due to relatively saline groundwater in the region. Moderate salinity may be beneficial to Growling Grass Frogs due to suppression of Chytrid. As a result, a variety of salinities will be maintained on site (see below).

As salinity is expected to increase in wetlands due to evaporation, salinity will initially need to be tested monthly in each wetland. If salinity exceeds 3,000 $\mu\text{S}/\text{cm}$ or 7,000 $\mu\text{S}/\text{cm}$, freshwater will need to be pumped into the wetlands to reduce salinity, and potentially the wetland drained and refilled if very saline. Wetlands will be designed to drain to a single deep point where all water can be extracted from. The rate of water quality monitoring will be reviewed after 2 years to determine the required rate of

monitoring. This should occur during the life of the EMP; once this OMP comes into force the required rate of water level monitoring will be established.

Additional water quality monitoring will be conducted twice annually to determine concentrations of metals, fertilisers, herbicides, hydrocarbons and *E. coli* bacteria.

- A range of salinities are maintained at wetlands across the site, and the salinity of wetlands is not allowed to exceed 3,000 $\mu\text{S}/\text{cm}$ or 7,000 μS depending on wetland type.
- More regular monitoring of salinity in wetlands.
- Reduce the salinity of wetland water sources by exploring additional freshwater sources (e.g. increase amount of storm water and/or roof runoff sources).

Management actions

- ~~A variety of salinities will be managed in the constructed wetlands on site; these will be maintained by utilising a variety of water sources for the wetlands. Specifically wetlands will be maintained at:~~
 - ~~– Lower salinity (<3,000 $\mu\text{S}/\text{cm}$, wetlands P1, P3, P5 and P6) using a combination of groundwater and freshwater.~~
 - ~~– Lower salinity (wetlands E1, E2, E3, <3,000 $\mu\text{S}/\text{cm}$ when full). As ephemeral wetlands will increase in salinity over time due to regular drying out, groundwater use will be minimal.~~
 - ~~– Higher salinity (<7,000 $\mu\text{S}/\text{cm}$) using primarily groundwater (wetlands P2, P4 and P7).~~
- Monitor salinity to ensure that salinity is not above 3,000 $\mu\text{S}/\text{cm}$ or 7,000 μS in any of the wetlands. If salinity exceeds 3,000 $\mu\text{S}/\text{cm}$ or 7,000 μS , reduce salinity by pumping in freshwater or draining and refilling the wetland(s). Basic water quality (i.e. salinity, conductivity, temperature, dissolved oxygen, turbidity, and pH) will be monitored monthly for two years, and then reassessed. This should occur during the life of the EMP; once this OMP comes into force the required rate of water quality monitoring will be established.
- Additional water quality monitoring will be conducted twice annually (spring and autumn) to determine concentrations of metals, fertilisers, herbicides, hydrocarbons and *E. coli* bacteria.
- The source of water for the constructed wetlands will be from rain, groundwater, surface runoff, stormwater runoff and roof runoff from future development. Therefore, water quality monitoring will be crucial in ensuring conditions are suitable for the Growling Grass Frog. Once the wetlands are established, water quality monitoring should be conducted in early spring and autumn, and during Growling Grass Frog surveys.
- Sampling programs will follow Environment Protection Agency guidelines. If monitoring detects harmful levels of particular water quality attributes, remedial action will be undertaken in consultation with EPA, DELWP and Council.
- The use of herbicides and fertilisers will be avoided where practicable in areas adjacent to Edgars Creek and the wetland reserves and to reduce the potential for non-target impacts, the source of nutrient enrichment and the likelihood of algal blooms.

Refer to
update #29

- Any weeds or flora species considered to be undesirable for the Growling Grass Frog will be removed. While mechanical (hand) removal of weeds is preferred, many of the weed species requiring control will require herbicide application. Herbicides which are commonly applied around aquatic environments will be used (e.g. Roundup Bi-active) and sponging or wicking directly onto weeds rather than spraying is preferred.

Performance criteria

- Basic water quality should be monitored monthly in each wetland, and then reassessed after two years. In depth water quality monitoring should be conducted twice annually (spring and autumn).
- Known water quality parameters do not exceed those outlined in Table 10.
- Concentrations of other parameters (e.g. dissolved oxygen, chlorine, hydrocarbons, herbicides) should be low (95% species protection under Commonwealth of Australia (2018) guidelines).
- Wetlands managed at varying salinities.
- Stormwater treated with a treatment pond prior to entering Growling Grass Frog wetlands.

Potential corrective actions

- Drain wetland(s) if water becomes too saline or other water quality parameters become too poor. Consider removing and replacing contaminated sediments if wetlands if contamination is an ongoing issue.
- Explore additional water sources for wetlands if water quality is an ongoing issue (e.g. more rooftop and/or stormwater runoff)

Table 10 ~~Maximum values for water quality parameters in Growling Grass Frog wetlands, taken from DELWP (2017b).~~

Refer to update #30

Water Quality Parameter	Target Value
Total Nitrogen (mg/L)	< 1.0
Ammonia (mg/L)	< 0.01 as NH4+
Total phosphorous (mg/L)	< 0.1
pH	6.0-9.0 (adapted with information from Ecology Australia 2017b)
<i>E.coli</i> (organisms/100 ml)	Primary Contact < 150 Secondary contact < 1000
Salinity (µS/cm)	<3000 for low salinity or <7000 for high salinity wetlands – Growling Grass Frog recorded breeding in salinities this high on site
Turbidity (NTUs)	< 40

5.7 Chytrid control

While chytrid fungus is already widespread in the surrounding catchments and most likely the project area, the further spread of chytrid as a result of the New Epping development will be minimised through adherence to best-practice hygiene protocols (e.g. Murray *et al.* 2010).

Management actions

- ~~When working in the habitat corridor:~~
 - ~~Clean vehicles coming on site and/or ensure vehicles have been washed down immediately prior to coming on site.~~
 - ~~Clean and disinfect equipment to minimise the risk of introducing or spreading chytrid fungus.~~
 - ~~Clean and disinfect footwear when working around Growling Grass Frog habitats, including during salvage and relocation.~~
- Appropriate handling of Growling Grass Frog during salvage and relocation
- Wetlands maintained at varying salinities to suppress chytrid infection (Stockwell *et al.* 2015)
- Remove any shrubs or trees > 2m tall within 10 m of wetlands, to ensure that wetlands are not shaded.

Refer to
update #31

Performance criteria

- Wash down and disinfect vehicles, equipment and footwear before working in and around wetlands
- No major Growling Grass Frog population declines outside of expectations based on annual conditions.

Potential corrective action

- If chytrid is suspected to be causing major population declines in specific wetlands, test the chytrid loads on resident Growling Grass Frogs. If mean zoospore loads are above 10,000 per swab, a level thought to be lethal in a variety of amphibians (Kinney *et al.* 2011; Heard, Scroggie, and Clemann 2012), drain the wetlands outside the Growling Grass Frog breeding season and allow the wetland to dry out.
- If chytrid infection is widespread, consider increasing the salinity of the wetlands or the areas of shallow rock around the wetland to increase water temperatures.

5.8 User related issues

Pedestrians, cyclists and pets have the capacity to impact Growling Grass Frogs. The following management actions should be implemented to reduce the potential impacts people and pets on Growling Grass Frogs.

Management actions

- Enforce strict dogs on leash policy within 50m of Growling Grass Frog wetlands.

- Prohibit the removal of fallen timber and other plant material.
- Prohibit the introduction of exotic fish into the creek or wetlands. This will be particularly important to maintain potential breeding habitat for Growling Grass Frog in the wetland reserves. Signage will be posted prohibiting the release of fish in wetlands.
- Enforce a strict 'no dumping policy' for rubbish or litter (e.g. signs with litter fine amounts). Signage at public facilities (e.g. BBQs and picnic areas) should discourage people from leaving food waste and rubbish as they may encourage pest animals such as foxes and rodents.
- Support community education programs (e.g. Melbourne Water's Water watch and Frog Census) and encouraging participation and support for local community groups (e.g. Friends of Edgars/Merri Creek groups).
- Create an exclusion zone around quarry water body and associated wetlands to protect the core Growling Grass Frog population and habitat. Appropriate permanent fencing will be installed to prevent public access and preserve Growling Grass Frog habitat.
- Providing interpretive signage for Growling Grass Frog in areas of interest. Signage is important in order to educate the public on values that occur within the Precinct.

Performance criteria

- Informative signage installed and maintained along pathways and at "nodes" outlining the ecology and conservation status of Growling Grass Frogs.
- Fencing regularly inspected and maintained.
- Adequate signage installed and maintained indicating that the following is prohibited:
 - Walking dogs off leash within 50 m of Growling Grass Frog wetlands.
 - Removing plant material and fallen timber
 - Releasing fish into wetlands.
 - Dumping of rubbish or littering.

Possible corrective action

- Increased community education.
- Increased signage along the habitat corridor.

5.9 Pest animal monitoring and control

Introduced predators such as Eastern Gambusia and Red Foxes pose a threat to Growling Grass Frog within the Precinct.

5.9.1 Eastern Gambusia (*Gambusia holbrooki*) and other introduced fish

Eastern Gambusia is a potential predator of Growling Grass Frog eggs and tadpoles (Anstis 2002) and has been implicated in the decline of this species (Robertson *et al.* 2002). Eastern Gambusia and other introduced fish may become an issue in the created wetlands if not properly managed.

Management Actions

- All stocking of exotic fish or non-indigenous fish within the wetland reserves is prohibited.
 - Signage stating that the release of fish into the wetlands is prohibited will be installed on site.
- Conduct regular surveys of the wetlands to ensure no exotic fish have entered the system. Wetlands will be inspected for predatory fish during water quality/depth monitoring program.
- If exotic or non-indigenous fish are detected, the created wetland will be drained. Wetlands should only be drained between April and September (i.e. outside the Growling Grass Frog breeding season) so there is no mortality of Growling Grass Frog tadpoles or eggs.

Performance criteria

- Wetlands will be inspected for predatory fish during water quality/depth monitoring program.
- If created wetlands are found to contain exotic fish, drain wetlands outside the breeding season.
- Install signage stating that release of fish into wetlands is prohibited.

Potential corrective action

- If exotic fish are regularly found in the created wetlands, consider further works to reduce potential access points, e.g. increasing the height of the barrier between Edgars Creek and the wetlands, if it is regularly overtopped.
- Install additional signage regarding the release of fish.

5.9.2 Red Foxes (*Vulpes vulpes*) and other terrestrial pests

Fox predation is outlined as a Threatening Process in the Action Statement produced under the FFG Act (Mansergh and Marks 1993), and is also a threatening process under the EPBC Act. As foxes are highly mobile and would occur in surrounding areas, any control action on foxes would be potentially futile unless surrounding land managers and owners also took similar action in a co-coordinated community-based scheme over a large area (Saunders *et al.* 1995). However, any den sites located within the study area will be destroyed when found.

Likewise, any rabbit warrens found on site will be destroyed.

Management Actions

- Destroy dens and warrens found on-site.
- If possible, coordinate a community wide effort to control foxes with DELWP, City of Whittlesea, Parks Victoria, Melbourne Water and local residents.
- Remove all food waste and utilise interpretive signage to notify visitors that leaving food waste and rubbish in open space areas may encourage foxes and other pest animals, such as rodents.

Performance criteria

- Destroy fox dens and rabbit warrens found on site
- Empty public rubbish bins regularly, especially at picnic or barbeque area.

Potential corrective action

If foxes become a major issue on site, the following corrective actions could be implemented.

- Perform regular inspections of the habitat corridor.
- Empty rubbish bins more regularly and/or provide larger and/or more secure rubbish bins.

5.10 Relocation protocols for Growling Grass Frog

Relocation of Growling Grass Frog may be required prior to any works occurring in the habitat corridor. Such works may include removing vegetation from wetlands that have become overgrown with emergent vegetation and installing, upgrading and/or maintaining infrastructure (e.g. stormwater infrastructure).

It is important to note that relocation of Growling Grass Frogs is an experimental approach that has not yet been demonstrated as a viable mitigation technique for this species (Heard *et al.* 2010). The relocation protocols outlined here are considered experimental until adequate data can be collected concerning their effectiveness.

Management actions:

- Relocation protocols must be implemented prior to and as close as possible (i.e. within 3 days) to any disturbance involving any earth works or vegetation removal within 10 m of wetlands.
 - A long period between the relocation of frogs and construction works may result in frogs recolonising the area.
- A permit to relocate animals will be required from DELWP under the Victorian *Wildlife Act 1975*. Only people listed on the Victorian *Wildlife Act 1975* Management Authorisation will be permitted to handle native fauna.
- A qualified Zoologist with the requisite experience and permits will be engaged to undertake relocation of Growling Grass Frogs.
- Relocation will follow best-practice hygiene protocols (Murray *et al.* 2011), to reduce the risk of transmission of chytrid fungus into new areas or to individual frogs. Hygiene measures will include
 - Footwear and equipment will be washed in disinfectant at the commencement and end of surveys for each individual wetland.
 - Vinyl gloves will be used when handling frogs, and a new set of gloves will be used for each individual frog.
 - Captured frogs will be placed in individual plastic bags for transport.
- Searches to locate Growling Grass Frogs will be different depending on whether they are undertaken during the active and inactive season.

- Searches for the Growling Grass Frog during the active period (October to March) will adhere to the following protocols:
 - Searches will be undertaken within three days of the commencement of construction activities at a given wetland.
 - At least two night-time spotlighting surveys will be undertaken at each wetland and each survey will involve two people searching for at least one hour. Night-time surveys (where possible) will be undertaken on nights of optimal weather for detecting the species (i.e. little or no wind, temperatures greater than 15°C, and relatively high humidity).
 - Night time call recognition and call playback surveys will also be used to locate males. Growling Grass Frog calls will be played for roughly one minute and the survey personnel will listen for responses.
 - A standard diurnal search will be undertaken in the habitat where construction activities will be taking place. Daytime searches will include investigation of potential shelter and basking sites and searching within dense vegetation, at the base of grass tussocks, on reed beds, under rocks and other surface debris.
- Searches for the Growling Grass Frog during the inactive period (April to October) will adhere to the following protocols:
 - Searches will be undertaken within three days of the commencement of construction activities at a given wetland.
 - A diurnal search will be undertaken along areas to be disturbed within the no go area and within 20m of existing wetland habitats.
 - Searches will occur during daylight and will include investigation of potential shelter sites and searching within dense vegetation, at the base of grass tussocks, within reed beds, under rocks and other surface debris.
- Frogs will be captured by hand.
- Captured frogs will be released as soon as possible (<12 hours) at constructed wetlands in dense vegetation or under rocks or woody debris at the edge of the water body.
- Sick/injured/visibly distressed frogs will be taken to the Amphibian Research Centre at Werribee for assessment.

Performance criteria

- Relocation occurs within 3 days of works in existing wetlands following guidelines outlined above.

Potential corrective actions

- If Growling Grass Frogs are recorded in wetlands or area to be impacted following relocation operations, conduct another round of salvage and relocation.
- Consider draining wetlands following relocation so habitat is of lower quality.

- Consider alternative management actions for relocated frogs, such as netting constructed wetlands to prevent Growling Grass Frogs leaving and/or reducing predation

5.11 Growling Grass Frog population and habitat monitoring

The Growling Grass Frog population at the New Epping site will be monitored for at least 10 following the removal of the original Growling Grass Frog habitat. Monitoring will be used to determine the success of the relocation, the persistence of the local population, the extent of breeding on site, the habitat quality and if management practices need to change.

Growling Grass Frog populations can fluctuate dramatically from season to season based on prevailing conditions. For example at the Epping Quarry site 27 individuals were recorded 2014-15 when conditions were poor (i.e. dry) compared to 91 individuals in 2018-19. As a result, assessing the performance of constructed wetlands is complex.

Monitoring will adhere to the following protocols:

- Two nocturnal surveys of each water body (including in stream wetlands) during the main activity period (October-March), preferably with one survey in November/December and another in January/February.
- Each water body will be surveyed by two suitably qualified personnel for approximately 30 minutes, with total survey time determined by the size of the water body and habitat complexity.
- Three 50 m transects will be surveyed along the creek line.
- Survey will proceed in the following order:
 - Call recognition to see if any male frogs are calling. This will include call playback, where Growling Grass Frog calls will be played for at least 1 minute and any responses listened for.
 - Undertake a visual inspection of the waterbody and vegetation with a spotlight and with the aid of binoculars.
 - Search the perimeter of the waterbody or edge of the creek for frogs, scanning vegetation on the banks and within the water body.
- Records will include:
 - The location (with a GPS), time and activity of each frog encountered/heard.
 - The microhabitat (e.g. sitting on floating pond weed in middle of wetland).
 - Where possible, identify the age class of individuals (e.g. snout to groin length = < 30 mm – metamorph; 30-50 mm sub-adult; and >50 mm adult).
- Growling Grass Frog Habitat quality will also be assessed, based on the habitat parameters preferred by Growling Grass Frog, including
 - A high cover of floating and submergent vegetation,
 - A good cover of emergent vegetation surrounding the wetland.
 - Tussock grasses with inter tussock areas in terrestrial habitat around wetlands.

- Remaining terrestrial habitat dominated by mown grassy areas.
- Adequate rocks and logs for calling, perching, basking and overwintering.
- Water quality and availability
- Footwear and equipment will be washed with disinfectant between water bodies to prevent the spread of chytrid.
- A report, including survey methods, results and discussion, as well as recommendations for changes in management regimes if required, will be written annually. It will include long term data sets so population size can be tracked through time.
- Surveys will continue for at least 10 years following construction of the habitat corridor and removal of existing Growling Grass Frog habitat, and will only cease following discussions with DELWP and management of the wetlands is handed over to Melbourne Water.

Management actions

- Growling Grass Frog surveys as outlined above conducted twice per active season for ten years following the completion of the habitat corridor.

Performance criteria

- Growling Grass Frogs surveyed twice annually.
- Populations not declining beyond what is expected based on conditions.
- Specific triggers for further management actions are as follows:
 - A decline of $\geq 10\%$ in the number of individuals recorded during summer surveys over each of three successive years.
 - An overall decline of $>25\%$ in annual average number of individuals recorded during summer surveys over a three-year period.
 - A decline of $>50\%$ in a single year.

Potential corrective action

- Investigate potential causes of decline (e.g. low rainfall, predation, reduced habitat quality, chytrid etc.)
- Increased habitat quality, including improving the following:
 - Water delivery.
 - Water quality.
 - Revegetation, particularly submergent and floating vegetation.
 - Weed management.
 - Shelter and basking sites (e.g. rocks and logs)
 - Terrestrial habitat (i.e. maintaining open spaces for foraging and movement)
 - Areas of submergent and floating vegetation, including removing some emergent vegetation if wetlands become overgrown.

- Increase monitoring of predatory fish, and if found, drain wetland(s)
- Improve waste management so predators such as foxes are not attracted to the area.
- Improve community engagement education to encourage people not to enter wetlands, keep dogs on leads in the habitat corridor and keep cats indoors.

5.12 Ongoing management after the 10 year management period

It is expected that at the end of the 10 year management period, the habitat corridor will be handed over to an appropriate government land manager being Melbourne Water and/or the City of Whittlesea to manage in perpetuity. After the 10 year management period, the management plan may be updated with the knowledge gained over the 10 year management period by Melbourne Water and / or the City of Whittlesea, so the Growling Grass Frog population and habitat can be best preserved.

Ongoing management actions after the 10 year management period are likely to be limited to:

- Standard ongoing vegetation management practices, including
 - Regular mowing of grassy areas (Section 5.2).
 - Controlling significant weeds (Section 5.3).
 - Replacing inappropriate plants, and dead or dying plants (Section 5.1).
- Infrequent management only of wetlands where required, such as:
 - Water level management in the constructed wetlands (Section 5.5).
 - Water quality monitoring and management (Section 5.6).
 - Controlling invasive fish in constructed wetlands, most likely after major flood events (i.e. 1 in 10 year floods when banks are overtopped). (Section 5.9.1)

Table 11 Schedule of management actions.

Each management action will commence in the first year of this OMP and be ongoing.

Objective	Timing of activity	Standard to be achieved	Related section(s)
1. Monitor and manage vegetation in habitat corridor. Vegetation in the habitat corridor will need to be maintained (ongoing revegetation, removing unwanted vegetation)	Twice annually (autumn and spring)	Monitoring of vegetation across the habitat corridor to be conducted in autumn and spring. Replace dead or dying plants with plants appropriate to the vegetation zone (i.e. deep wetland, shallow wetland, fringing, riparian and terrestrial) as outlined in Table 8. Increase planting density as required. Remove inappropriate vegetation (e.g. any shrubs or trees >2 m within 10 m of wetlands, dense emergent vegetation if it is choking wetlands).	5.1
2. Mowing grassy areas Maintaining open grassy areas in terrestrial and grassy areas.	As required, based on annual conditions.	Mowing grassy areas to maintain a mixture of dense tussock grasses and areas of low, grassy vegetation and bare ground. Within 10 m of created/retained wetlands (the '10 m buffer'), mowing will be limited in frequency to reduce the risk of mortality of Growling Grass Frogs.	5.2
3. Weed monitoring and control. Weeds outlined in Table 9, woody weeds and emerging weeds will be controlled.	Monitoring biannually.	Monitoring of weeds to be conducted bi-annually (spring and autumn) across the habitat corridor.	5.3
	Ongoing weed controls as required	Use of herbicides to be avoided where possible, particularly in the riparian areas, with mechanical removal the preferred weed control option. When used in riparian areas, herbicides which are commonly applied around aquatic environments (in accordance with the product label) will be directly sponged or wicked onto weeds to minimise off target damage. Herbicides must not be used within 10 m of wetlands during the breeding season (October-March).	
4. Fence inspections Fences will be inspected and repaired as necessary	Annually	Fences to be inspected annually Fences to be repaired as soon as possible if damage is found Vegetation (excluding mown grass) within 1 m of frog fencing will be removed.	5.4
5. Manage water levels in constructed wetlands Ensure that constructed wetlands are permanent and ephemeral	Monthly following completion of habitat corridor,	Wetland water levels inspected monthly initially, with rate of inspection to be reviewed after two years. Water levels maintained to a minimum of 0.5 m, but are regularly refilled to maximum depth. Managed ephemeral wetlands to be filled over springs and summer, and drawn down over winter.	5.5

Objective	Timing of activity	Standard to be achieved	Related section(s)
wetlands are full over the breeding season.	to be reviewed after two years.		
<p>6. Manage water quality in constructed wetlands</p> <p>Ensure that poor quality water is not impacting Growling Grass Frog population.</p>	<p>Basic water quality monitored during water level monitoring.</p> <p>Full water quality monitoring twice annually, in spring and autumn.</p>	<p>Water quality will be monitored at the prior to the breeding season (September) and again in autumn. This will include basic parameters (temperature, dissolved oxygen, salinity, conductivity, turbidity, pH) and other parameters including metals, herbicides and pollutants.</p> <p>Basic water quality parameters will also be monitored during Growling Grass Frog surveys.</p> <p>Water quality parameters should be kept in line with those outlined in Table 10.</p> <p>Low salinity wetlands (wetlands 1, 3, 5, and 6) to be maintained at <3,000 µs/cm and high salinity wetlands (wetlands 2, 4 and 7) to be maintained at <7,000 µs/cm. Ephemeral wetlands will be filled with water with a conductivity of <3,000 µs/cm.</p> <p>Use of herbicides and fertilisers to be avoided where possible in the riparian areas, with mechanical removal the preferred weed control option. When used, herbicides which are commonly applied around aquatic environments will be directly sponged or wicked onto weeds.</p>	5.6
<p>7. Chytrid management.</p> <p>Chytrid fungus can cause mortality in amphibians. While likely widespread in the project area, efforts should be made to minimise transition.</p>	Ongoing	<p>Apply hygiene protocols to vehicles, and/or equipment before entering habitat corridor.</p> <p>Maintain half of the wetlands (ponds 2, 4 and 7) so they are of higher salinity.</p> <p>Shading of wetlands minimised by not planting shrubs or trees >2m within 10 m of wetlands.</p> <p>Follow handling guidelines for relocation.</p>	5.7
<p>8. User related issues</p> <p>Minimising impacts of pedestrians, cyclists and pets.</p>	Ongoing	<p>Maintain signage as follows:</p> <ul style="list-style-type: none"> • Dogs on leash within 50 m of wetlands • Prohibiting the removal of fallen timber • Prohibiting the release of exotic fish in to wetlands • No dumping of rubbish. • Interpretive signage regarding Growling Grass Frog in the habitat corridor <p>Support community engagement projects and maintain interpretative signage.</p> <p>Exclusion zone established around core Growling Grass Frog habitat associated with the main quarry waterbody.</p>	5.8

Refer to update #32

Objective	Timing of activity	Standard to be achieved	Related section(s)
9. Monitor and control pest species (particularly fish) in habitat corridor Predatory pest species will be controlled to reduce Growling Grass Frog mortality.	Monitor fish during water level monitoring.	Monitor off channel wetlands for predatory during water level monitoring. If predatory fish are found in created wetland(s), drain wetland(s) outside Growling Grass Frog breeding season.	5.9
	Opportunistic	Destroy fox dens and rabbit warrens found on site	
10. Relocation of Growling Grass Frog during works in Growling Grass Frog habitat Whenever Growling Grass Frog habitat is to be modified (e.g. wetlands clogged with emergent vegetation) or works are required in the habitat corridor, salvage and relocation must occur immediately prior to habitat removal.	Immediately prior to the removal of any Growling Grass Frog habitat	Relocation will be required immediately prior to any works are required in the habitat corridor within 10 m of constructed wetlands. Such works may include vegetation removal (i.e. if a wetland becomes overgrown with emergent vegetation) or infrastructure needs fixing. Relocation must occur within 3 days of construction. A permit will be required for relocation works. . Relocation will follow best-practice hygiene protocols. Relocation will follow protocols outlined in section 5.10. Captured frogs will be released as soon as possible at constructed wetlands in areas with suitable cover.	5.10
11. Annual Monitoring of Growling Grass Frog population and habitat Conduct monitoring of Growling Grass Frog population and breeding success over the breeding season.	Twice per breeding season	Every wetland and three 50 m long transects will be monitored twice per breeding season to determine the local population size and determine if breeding was successful. Surveys follow DoEE survey guidelines (DEWHA 2009b), and include <ul style="list-style-type: none"> • Call recognition including call playback, to see if Growling Grass Frog are calling. • Searching the waterbody and surrounding habitat for Growling Grass Frog. • Recording the location and size class of each individual. Habitat quality will also be assessed. An annual Growling Grass Frog monitoring report will be written, and include any new management actions to be implemented. Surveys to continue for 10 years following the completion of the habitat corridor.	5.11

6 Risk assessment

This OMP covers management activities following construction of the New Epping development, until ten years following the completion of the Growling Grass Frog habitat corridor. A risk assessment is presented in Table 12. The key risks identified during the risk assessment process are as follows

- Growling Grass Frog population declines due to poor habitat in the habitat corridor. Poor habitat may be due to one or more of the following issues:
 - Vegetation dying
 - Vegetation not dense enough
 - Inappropriate vegetation established.
 - Weeds reducing habitat quality
 - Insufficient boulders and logs for overwintering
 - Water management inadequate
 - Water quality too poor.
- Predation by pest species.
- Mortality due to pedestrians, vehicles or pets.
- Chytrid fungus infection.
- Mortality during works in the habitat corridor.

6.1.1 Risk assessment framework

The risk assessment follows the framework outlined in the DoEE Environmental Management Plan Guidelines (Commonwealth of Australia 2014), and is summarised below.

Risk Matrix

Likelihood	Consequence				
	Minor	Moderate	High	Major	Critical
Highly Likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

Likelihood definitions

Likelihood		Definition (based on qualitative assessment)
Rare	1	May occur in exceptional circumstances
Unlikely	2	Could occur but considered unlikely or doubtful
Possible	3	Might occur during the life of the project
Likely	4	Will probably occur during the life of the project
Highly Likely	5	Is expected to occur in most circumstances

Consequence definitions

Consequence		Definition (based on qualitative assessment)
Minor	1	Minor incident of environmental damage that can be reversed
Moderate	2	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	3	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	4	Major loss of environmental amenity and real danger of continuing
Critical	5	Severe widespread loss of environmental amenity and irrecoverable environmental damage

Table 12 Risk assessment for the New Epping development

Objectives (see Table 11)	Incident/event	Potential impact	Cause	Consequence	Likelihood	Risk Ranking	Controls	Residual Risk	Related monitoring see Table 13
All	Monitoring reveals Growling Grass Frog population decline.	Local population of Growling Grass Frog declines or goes extinct, which then impacts local metapopulation.	<ul style="list-style-type: none"> Wetland habitat quality inadequate. 	4	3	H	<ul style="list-style-type: none"> Growling Grass Frog population will be monitored two times per breeding season to assess the population and to detect declines as soon as possible. Monitoring and management of revegetation, weeds, invasive species and water quality will provide indication of environmental performance. In the event of population decline, adaptive management will be implemented with the help of qualified zoologists, DELWP and/or DoEE and will include, but will not be limited to: <ul style="list-style-type: none"> Modified revegetation. Increased vegetation management. Improving water quality and water management Controlling pest species and weeds. Increase water temperature or salinity to reduce incidence of chytrid. Increased fencing, signage and community engagement 	M	1
1,2, 3, 5	Failure to establish suitable habitat for Growling Grass Frog	Local population of Growling Grass Frog declines or goes extinct	<ul style="list-style-type: none"> Vegetation fails to establish. Inappropriate vegetation established Open areas not mown Large logs and boulders not provided for overwintering. 	4	3	H	<ul style="list-style-type: none"> Revegetate the habitat corridor using appropriate local plant species. Install rocks and logs in the terrestrial portion of the habitat to provide shelter, particularly for overwintering. Manage terrestrial vegetation so there is a combination of dense tussocks grass and more open mown areas to enable foraging and movement between wetlands. No tall, shade forming vegetation within 10 m of the wetlands, and cover of tall, shade forming vegetation does not exceed 10% in any section of the habitat corridor. Ongoing management of vegetation, including replacing dead plants, increasing planting density, removing weeds, removing inappropriate vegetation and slashing grassy areas. Ongoing management of water levels in constructed wetlands. Adaptive management to address any initial construction issues, and may include further revegetation, further vegetation management and/or altering the bathymetry of constructed wetlands. Offset site secured to protect Growling Grass Frogs if they area lost on site. 	M	2, 3, 4, 5
3	Weeds establish in habitat corridor	Reduction in Growling Grass Frog habitat quality.	<ul style="list-style-type: none"> Inadequate hygiene control and weed monitoring and controls 	2	4	M	<ul style="list-style-type: none"> Vehicles, equipment and shoes washed down and inspected prior to accessing site to stop the spread of weeds. The exclusion zone established around the main quarry water body and associated wetlands will reduce the introduction of weeds. Bi-annual monitoring of weeds in the habitat corridor in autumn and spring. Targeted and high threat weeds will be removed using mechanical means where possible, however when not possible, herbicides which are legally certified to be used around aquatic environments will be used (e.g. Roundup Bi-active). During the breeding season (October to March) herbicides must not be sprayed within 10 m of a wetland, but herbicides may be directly applied to plants using a sponge or wick. 	L	3

Objectives (see Table 11)	Incident/event	Potential impact	Cause	Consequence	Likelihood	Risk Ranking	Controls	Residual Risk	Related monitoring see Table 13
4	Frogs enter residential areas from habitat corridor and get killed by a vehicle or pet.	Reduction of Growling Grass Frog population	<ul style="list-style-type: none"> Growling Grass Frog fencing damaged or not maintained 	1	3	L	<ul style="list-style-type: none"> Frog fencing along western edge of the habitat corridor inspected annually Any damage to frog fencing repaired as soon as possible Vegetation (excluding mown grass) within 1 m of frog fencing will be removed. 	L	9
4, 8	Vegetation in habitat corridor degraded by vehicles or pedestrians.	Reduction in Growling Grass Frog habitat quality	<ul style="list-style-type: none"> Inadequate or damaged fencing around the habitat corridor Inadequate signage 	1	3	L	<ul style="list-style-type: none"> Fencing inspected annually Any damage to the fences repaired as soon as practical Support community engagement programs, such as Friends of Merri/Edgars Creek community groups. The following signage installed and maintained: <ul style="list-style-type: none"> Dogs on leash within 50 m of wetlands Prohibiting the removal of fallen timber Prohibiting the release of exotic fish in to wetlands No dumping of rubbish. Interpretive signage the ecology and conservation status of Growling Grass Frogs in the habitat corridor 	L	2, 4, 9, 10
5	Wetlands dry over summer	Constructed wetlands dry out over summer before tadpoles have developed, leading to a reduction in the Growling Grass Frog population	<ul style="list-style-type: none"> Wetlands too small to be permanent naturally. Inadequate water distribution network. 	3	4	H	<ul style="list-style-type: none"> Water delivery system constructed to ensure that wetlands do not dry out. This water delivery system will use a variety of water sources including water from the main quarry pit, rooftop rainwater, and treated rainwater. If necessary piped potable water or trucked water can also be used. Wetland water levels will be actively monitored and managed to ensure that they don't dry out. Water levels in the wetlands will be inspected monthly. Constructed Growling Grass Frog wetlands will not be allowed to drop below 50 cm in depth, but will regularly be filled. Trucked water can be pumped directly into wetlands as a last resort if water delivery system fails. Ponds clay lined to reduce leakage. 	L	7
6	Water quality is poor in wetlands.	Poor quality water in constructed wetlands inhibits Growling Grass Frog population.	<ul style="list-style-type: none"> Inadequate control of sediment and pollutants running into wetlands Inappropriate water source used to fill wetlands. 	2	3	M	<ul style="list-style-type: none"> Filter any storm waters that are used to fill constructed wetlands. Minimise use of herbicides and fertilisers in the habitat corridor as much as possible. Manage wetlands so the salinities do not exceed values outlined in design criteria, as wetlands may become increasingly saline due to evaporation and concentration of salts. If salinity is a recurring issue, increase the amount of freshwater used to top up wetlands, and explore additional freshwater sources. Monitor basic water quality parameters during water depth monitoring program. Conduct in depth water quality monitoring every spring and autumn following EPA guidelines. If monitoring detects harmful levels of particular water quality attributes (e.g. metals, hydrocarbons), wetlands should be drained. If wetlands regularly exceed levels outlined in Table 10 options for treating source water should be explored, and potential remedial action will be undertaken in consultation with EPA, DELWP and Council. 	L	8

Objectives (see Table 11)	Incident/event	Potential impact	Cause	Consequence	Likelihood	Risk Ranking	Controls	Residual Risk	Related monitoring see Table 13
7	Increase in incidence of chytrid fungus infection.	Reduction of Growling Grass Frog population	<ul style="list-style-type: none"> Chytrid introduced to constructed wetlands on vehicle, equipment and footwear. Wetlands improperly designed and increase likelihood of chytrid. Low wetland salinity increases incidence of chytrid 	3	3	M	<ul style="list-style-type: none"> All machinery and equipment washed and disinfected prior to coming on site. No shrubs >2 m tall or trees will be planted within 10 m of wetlands and any that naturally establish will be removed. Provide a range of salinities in the constructed wetlands to reduce chytrid infection and retaining the main quarry waterbody as a moderately saline refuge. Managed ephemeral wetlands will dry out every year outside of the Growling Grass Frog breeding season. If chytrid is thought to be causing major population declines, test frogs for chytrid and if zoospore levels are >10,000 per swab, drain wetland and allow to dry out. Monitoring and relocation operations follow strict hygiene practices, specifically: <ul style="list-style-type: none"> Disinfect and clean footwear and equipment between sites. When handling Growling Grass Frog, use a new pair of vinyl gloves for each individual frog Transport Growling Grass Frogs in individual plastic bags. 	L	1
9	Invasive species (e.g. Eastern Gambusia, foxes) establish in and around constructed wetlands.	Invasive species consume Growling Grass Frog eggs, tadpoles and adults, leading to population decline	<ul style="list-style-type: none"> Wetlands regularly connected to Edgars Creek. Intentional release of aquarium fish. Habitat and resources (e.g. food scraps) provision promotes local fox population. 	2	4	M	<ul style="list-style-type: none"> The Growling Grass Frog wetlands established will be off channel and above the 1 in 10 years ARI to reduce the likelihood of Eastern Gambusia and other predatory aquatic species from establishing in the constructed wetlands. Install filters on water pumps, if water is ever pumped water from Edgars Creek into the constructed wetlands. Wetlands inspected for predatory fish during water level monitoring program Install signage saying the release of fish is prohibited. All wetlands designed so they can be drained and refilled in the event that invasive aquatic species become established (i.e. they drain to a central deep section) <ul style="list-style-type: none"> To eliminate the potential risks of draining wetlands on Growling Grass Frog eggs and tadpoles, wetlands will only be drained outside the breeding period (April-September). Three managed ephemeral wetlands will be established, and these will be allowed to dry out annually outside the Growling Grass Frog breeding season. As fox control requires a widespread effort to be successful, management controls on site will be restricted to: <ul style="list-style-type: none"> Destroying any dens discovered on site. Providing adequate rubbish bins along the pathway in the habitat corridor and at any picnic areas. These bins will be regularly emptied. Installing signage notifying visitors to remove rubbish to stop attracting pests. If foxes become a major problem, a community wide effort to control foxes could potentially be coordinated with DELWP, City of Whittlesea, Parks Victoria, Melbourne Water, community groups and/or local residents. Any rabbit warrens found in the habitat corridor will be destroyed. Dogs must be kept on their leads along the habitat corridor, and will be excluded from the retained quarry and associated wetlands. 	L	6

Objectives (see Table 11)	Incident/event	Potential impact	Cause	Consequence	Likelihood	Risk Ranking	Controls	Residual Risk	Related monitoring see Table 13
10	Growling Grass Frog accidentally killed during works in habitat corridor.	Reduction of Growling Grass Frog population	<ul style="list-style-type: none"> Growling Grass Frog present in areas where works are conducted. 	2	3	M	<ul style="list-style-type: none"> If works are required in Growling Grass Frog habitat (e.g. removal of inappropriate vegetation, maintenance of infrastructure), pre clearance searches and, if required, relocation will be required. Searches, and relocation should occur as soon as possible before works commence, and no more than three days before works to prevent Growling Grass Frog recolonising the area. Impact from and footprint of the works will be kept to a minimum. Works should be completed by hand where possible. Monitoring and relocation operations follow strict hygiene practices, specifically: <ul style="list-style-type: none"> Disinfect and clean footwear and equipment between sites. When handling Growling Grass Frog, use a new pair of vinyl gloves for each individual frog. Transport Growling Grass Frogs in individual plastic bags. During the active season (between September and April) Growling Grass Frog searches in areas where construction will take place will adhere to the following: <ul style="list-style-type: none"> At least two night time spotlight surveys at each wetland, which last for at least one hour. Night time call recognition and call playback surveys will be used to locate males. A diurnal search for Growling Grass Frog, where potential shelter (under rocks and logs, at the base of grass tussocks and in reed beds) and basking sites will be investigated. During the inactive period (May to August), searches will be limited to the diurnal searches outlined above. Frogs captured by hand and released at constructed wetlands within 12 hours of capture. Site inductions will inform contractors of their obligations regarding Growling Grass Frog. 		1

7 Monitoring

A monitoring schedule is provided in Table 13 and explained in more detail below. Monitoring as outlined below will continue from the implementation of this OMP (i.e. following the completion of construction activities in New Epping) until 10 years after the completion of the Growling Grass Frog habitat corridor.

7.1 Growling Grass Frog population

Monitoring for Growling Grass Frog will be essential to determine whether the onsite offset is providing suitable habitat and offsetting impacts to this species. Monitoring of the onsite Growling Grass Frog population will begin during the first breeding season after the habitat corridor is constructed, and continue for ten years following the completion of the Growling Grass Frog habitat corridor. Monitoring will record the number of individuals and if possible their sex and age (metamorph, sub-adult, adult). Monitoring will occur twice over each active season, ideally once while breeding (November-December) and then again following breeding (January-February) to determine breeding success. As the population dynamics of Growling Grass Frog in the created wetlands is presently unknown, monitoring is required for both the adult population and signs of breeding.

Baseline surveys have been conducted in 2014-15 (Wildlife Profiles 2015), 2016-17 (Ecology Australia 2017a) and 2018-19 (Ecology Australia In Prep). Abundances of Growling Grass Frog varied considerably (maximum 27 individuals in 2014-15, 84 individuals in 2016-17 and 91 individuals in 2018-19), potentially in response to prevailing climatic conditions.

Surveys will be conducted in accordance with survey guidelines for Growling Grass Frog (DEWHA 2009). Specifically, monitoring will be conducted on warm (>12°C), calm nights and should:

- Include a combination of call playback and night visual surveys
- Cover a range of water body types.
- Be accompanied by a habitat assessment, and
- Be undertaken by appropriately experienced personnel.

Surveys will involve walking the whole perimeter of each wetland, including the pools in Edgars Creek, unless some of the perimeter of the wetlands are inaccessible. Three 50 m transects will be surveyed along Edgars Creek.

Any incidental observations of Growling Grass Frog will also be recorded.

7.2 Growling Grass Frog habitat assessment

Each spring, Growling Grass Frog habitat quality will be assessed to identify any major changes to the habitat on site, and determine which habitat variables are preferred by Growling Grass Frog at each wetland. This will involve assessing:

- The area and cover of riparian fringing, emergent and floating/submergent vegetation. Drone photography could be used to determine the area and approximate cover in each zone.
- Floristic assessments at each constructed wetland. These assessments will involve assessing the species and their cover along two transects per wetland.

- Water quality (temperature, electrical conductivity, salinity, pH, turbidity, dissolved oxygen)
- Average depth of each wetland and how full (%) each wetland is.
- Sedimentation of the ponds
- Terrestrial habitat management (mowing, maintaining tussocks with open spaces in between)

7.3 Weeds

Weed monitoring will be conducted bi-annually in autumn and spring. Monitoring will consist of inspecting the entire habitat corridor for woody weeds and targeted weeds (Table 9) on foot. Infestations of targeted weeds can then be logged using a GPS, and their location given to the weed management contractors for treatment. Infestations earmarked for treatment will be inspected during the subsequent weed monitoring program to evaluate the success of weed management. If major infestations of non-targeted weeds are identified that warrant treatment, the location of these sites should be recorded and passed on to weed contractors. If new weeds arrive on site that need to be controlled, they should be added to the targeted weeds list.

7.4 Revegetation monitoring

Monitoring of revegetation within and surrounding wetlands will be conducted in autumn and spring by appropriately qualified contractors.

Dead or dying plants should be replaced. If revegetation in certain areas consistently fails, species planted might not be appropriate for the vegetation zone (e.g. planting fringing vegetation in emergent zone) and a different suite of species should be planted that is appropriate for the vegetation zone.

Areas of inappropriate vegetation will also be recorded. Inappropriate vegetation that may require removal vegetation would include:

- Dense emergent vegetation that has choked a wetland.
- Shrubs >2 m tall or trees that have grown within 10 m of a wetland, or reach a cover of greater than 10% in other zones of terrestrial vegetation.

Refer to
update #33

7.5 Pest animal monitoring

7.5.1 Aquatic animals

Constructed off channel wetlands will be inspected for predatory fish at the same time as water quality and water level inspections. The rate of these inspection will initially be monthly, but will be reassessed over the life of the EMP (Ecology Australia 2019a) and this OMP. A mandatory inspection will be conducted in August or September, so wetlands containing pest fish species can be drained prior to the Growling Grass Frog breeding season. Inspections will involve walking the perimeter of all off channel wetlands and inspecting them for predatory fish, including Eastern Gambusia, Common Carp and Redfin Perch. If exotic fish are found to inhabit a wetland, the wetland will be drained and refilled as soon as practical. However wetlands cannot be drained during the breeding season, as any Growling Grass Frog tadpoles present would perish.

7.5.2 Terrestrial animals

Monitoring of terrestrial pest animals, including rabbits and foxes, will be limited to incidental records made during the other monitoring programs. The location of any fox dens or rabbit warrens encountered will be recorded, and passed onto a pest animal management contractor to be destroyed.

7.6 Wetland water levels

Water levels in wetlands should be assessed monthly for the first two years following construction of the habitat corridor and then the rate of inspection can be reviewed. This will occur during the life of the EMP (Ecology Australia 2019a), so an appropriate regime should be established by the beginning of this OMP. Water levels in permanent wetlands will not be allowed to fall below 0.5 m, and will regularly be filled to 1.5 m. Ephemeral wetlands will retain water over the entire breeding season, and then be drawn down over winter. Depth gauges will be installed in each wetland.

7.7 Water quality

Basic water quality parameters will be monitored at each constructed wetland when wetland water levels are assessed. As outlined above, the final rate of monitoring will be based on a two year trial where water levels will be measured monthly. Water quality will also be measured at the same time as Growling Grass Frog monitoring. The following water quality parameters will be measured:

- Water temperature
- Salinity (%)
- pH
- Conductivity ($\mu\text{S}/\text{cm}$)
- Turbidity
- Dissolved oxygen

Additional water quality monitoring will be conducted annually in spring and autumn, when concentrations of heavy metals, nutrients, herbicides and other contaminants will be assessed.

7.8 Fence condition

Surveys of exclusion fencing and frog fencing should be conducted annually. Any damage to the fence lines must be promptly repaired. Vegetation (excluding mown grass) within 1 m of the inside of the frog fence should be removed.

7.9 Signage

Signage on site should be inspected annually to ensure that it is still in place and in good condition. If signs are damaged or removed, they should be replaced.

Table 13 Monitoring schedule

	Monitoring Activity	Parameter Measured	Monitoring guidelines	Where	When
1	Growling Grass Frog population monitoring	Number of Growling Grass Frogs observed, and age class	Two nocturnal call playback and spotlighting surveys per breeding season, covering all constructed wetlands, in channel wetlands and retained quarry pit and three 50 m transects along Edgars Creek. Refer to section 7.1 for further details.	All constructed wetlands, in channel wetlands, retained quarry pit and Edgars Creek.	Twice annually (preferably once in November/December and again in January/February)
2	Growling Grass Frog habitat monitoring	Vegetation, water quality and depth, sediment and terrestrial habitat	Habitat quality (vegetation cover and area, floristics, water quality, pond depth, sedimentation and terrestrial habitat management) will be assessed annually. Refer to section 7.2 for further details.	All constructed wetlands, in channel wetlands and retained quarry pit	Annually in spring
3	Weed monitoring	Target and woody weeds	Surveys conducted throughout the entire habitat corridor to identify targeted and woody weeds on site, and map their location. Locations will then be provided to weed management contractors for control. Refer to section 7.3 for further details.	Habitat corridor	Bi-annually, in spring and autumn
4	Revegetation monitoring	Persistence of revegetation	Revegetation at wetlands will be surveyed twice annually to identify areas where revegetation has failed, and further works are required. Refer to section 7.4 for further details.	Habitat Corridor	Twice annually in spring and autumn
5	Tree and shrub monitoring	Cover of woody species > 2 m	Estimate cover of woody plants across habitat corridor to determine if management is required for woody plants Refer to section 7.4 for further details.	Habitat Corridor	Twice annually in spring and autumn
6	Pest animal monitoring	Presence of pest animals (introduced fish, foxes, rabbits)	All constructed off-channel wetlands to be inspected for introduced fish during water depth and quality monitoring, including once prior to the Growling Grass Frog breeding season. Signs of terrestrial pest animals to be recording during other monitoring programs. Refer to section 7.5 for further details.	Habitat corridor	Aquatic species – during water quality and depth monitoring. Terrestrial species – incidental during each monitoring program.

	Monitoring Activity	Parameter Measured	Monitoring guidelines	Where	When
7	Water level monitoring	Depth	Water levels should be monitored monthly for the first two years in all constructed wetlands, and filled as required. The monitoring schedule will be reviewed after 2 years. This will occur under the EMP, so when this OMP is implemented, there will be an established rate of inspection. Refer to section 7.7 for further information	Constructed wetlands	To be determined over the life of the EMP.
8	Water quality monitoring	Water quality	Basic water quality monitored at each constructed wetland during water depth monitoring program. More detailed water quality assessments annually in spring and autumn. Refer to section 7.6 for further details.	Constructed wetlands	Basic water quality monitoring during water quality and depth monitoring, with more in depth water quality annually in spring.
9	Fence condition	Condition of fences	Survey exclusion, vehicle and frog fences to ensure fences are intact. If damage is noted, fences should be fixed as soon as possible. Any vegetation within 1 m of the inside of frog fencing should be removed. Refer to section 7.8 for further details.	Habitat corridor	Annually
10	Signage	Condition of signage	Signage inspected to ensure it is in place and in good condition. Damaged/removed signs should be replaced.	Habitat corridor	Annually

8 Reporting, auditing and OMP review

8.1 Reporting

Riverlee must submit an annual report to DoEE for each year of the 10 year management period (i.e. ten years after the completion of the habitat corridor). Reports should be submitted two months before the anniversary of the initiation of this OMP to enable compliance to be assessed before the anniversary date. The annual report will provide enough written evidence that the management and monitoring commitments outlined in this document are complied with, and determine progress against these commitments.

The annual report must include:

- The details of management actions undertaken within the reporting period.
- The details of monitoring activities conducted during the reporting period, including Growling Grass Frog population and habitat monitoring.
- Site photographs, including photos of each constructed wetland.
- Details of compliance or non-compliance with schedule of management actions and performance criteria.
- Details of any incidents or new management issues, with recommendations for corrective actions, and whether the OMP should be reviewed.

A reporting schedule is provided in Table 14.

8.2 Auditing

~~Riverlee is responsible for auditing the implementation and effectiveness of this EMP.~~ Audits will be conducted by an independent ecologist as follows:

Refer to
update #34

- At the end of the first year of this OMP – this is to ensure that initial management actions are satisfactorily completed.
- At the end of the third, fifth, seventh and ninth year of this OMP – this will involve a review of annual monitoring program, the distribution of Growling Grass Frogs in existing and constructed wetlands and an independent assessment of Growling Grass Frog habitat quality in the habitat corridor.
- Following the final year of this OMP (i.e. 10 years following the completion of the habitat corridor) – this will be the final audit of the implementation and effectiveness of this OMP.

The timing of audits is outlined in Table 14. Additional audits may be triggered as a result of an OMP review, or following major environmental incidents resulting in significant changes to the site.

8.3 OMP Review

This OMP includes the potential for ongoing adaptive management, whereby management actions may be modified or triggered by major events occurring within the offset site (e.g. fire, flood) or by the results of monitoring (e.g. major population decline or reduction in habitat quality). If there is a major

environmental event which results in a significant change to the condition or character of the site or a major Growling Grass Frog population decline, Riverlee must ensure that this OMP is reviewed.

The OMP review will be conducted by Riverlee (or a suitably qualified consultant) in consultation with DoEE, and Melbourne Water, City of Whittlesea and DELWP as required. Any changes will be incorporated into this EMP and an updated version will be supplied to the DoEE.

Any part of this EMP can be changed as part of the review in order to adequately respond to the trigger or improve management outcomes under changed site conditions.

This could involve changes to

- Details of site management methodologies
- Monitoring methods
- Monitoring, reporting and auditing programs.

Table 14 Reporting schedule

Type of Report	Timing	Trigger
<p>Annual management actions report. Outlines all management actions completed on site for a given monitoring period (Spring to autumn). May be combined with annual monitoring report.</p>	<p>Report to be completed by June 30 so it can be reviewed prior to subsequent management program.</p>	<p>Not applicable</p>
<p>Annual monitoring report Present the results of offset site monitoring, excluding Growling Grass Frog population and habitat condition</p>	<p>Report to be completed by June 30 so it can be reviewed prior to subsequent monitoring program.</p>	
<p>Growling Grass Frog monitoring report Present the results of Growling Grass Frog population and habitat condition monitoring.</p>	<p>Report to be completed as soon as possible following autumn monitoring so results can be interpreted and management actions implemented as needed.</p>	<p>At completion of annual monitoring, or as requested by DoEE</p>
<p>Audit report</p>	<p>Years 1, 3, 5, 7, 9 and the final year of the 10 year management period (covering the EMP and this OMP)</p>	<p>Not applicable</p>
<p>Review of this Offset Management Plan</p>	<p>As required</p>	<p>Following a major environmental event that changes the character of the site (e.g. major flood or fire) or a significant decline in the Growling Grass Frog population</p>

9 Incidents, non-compliance and emergency contacts

9.1 Incidents and non-compliance

Any incidents and non-compliance must be addressed with corrective action as soon as possible. An incident is defined in the approval conditions as “any event which has the potential to, or does, impact on protected matter(s)”.

As outlined in approval conditions 16 and 17, the DoEE must be informed of any incidents or non-compliances within two business days, and the approval holder must provide details within 10 days. Specifically:

1. *The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify:*
 - a) *the condition which is or: may be in breach; and*
 - b) *a short description of the incident and/or non-compliance.*
2. *The approval holder must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying:*
 - c) *any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;*
 - d) *the potential impacts of the incident or non-compliance; and*
 - e) *the method and timing of any remedial action that will be undertaken by the approval holder.*

Corrective action will be dependent on the non-compliance/incident, but may include

- Improve revegetation and vegetation management.
- Improving water management and water quality, especially salinity, in constructed wetlands.
- Controlling weeds and pest animals on site.
- Increase or decreasing rate of mowing on site.
- Replacing or repairing fencing along the habitat corridor and improving user management
- Controlling the spread of chytrid on site.
- Increase monitoring of Growling Grass Frog population and/or habitat.

Major incidents or non-compliance may trigger a review of the OMP as outlined in section 8.3.

9.2 Emergency Contacts

The key emergency contacts for the New Epping development are:

- Riverlee – 03 9620 3888

- Emergency Services – 000 – for life threatening emergencies.
- Wildlife Victoria – 03 8400 7300 – for injured wildlife.
- DELWP wildlife emergencies – 136 186 – for injured wildlife.
- Ecology Australia (or another environmental consultancy) – 03 9489 4191 – for, relocation or other environmental services.
- Environmental Protection Agency – 1300 372 842 – for pollution and chemical spills.
- Department of Environment and Energy – to report incidents - 02 6274 1111

10 References

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11 Glossary

ARI	ARI (Average Recurrence Interval) is an estimate of the average time between random events based on historical data. For example, a 1 in 10 year flood event means there is a 10% chance of a flood event of that size occurring in a given year.
Bioregion	Defined geographical regions of Australia with similar climatic and geophysical characteristics, and which generally contain a suite of distinct ecosystems and species
CaLP Act	<i>Victorian Catchment and Land Protection Act 1994</i>
EMP	Conservation Management Plan
Conservation status	Categorisation of the threat risk to biological assets (plant and animal species, EVCs or plant communities) at a defined scale (e.g. national, state), as determined by specific criteria
DELWP	Victorian Department of Environment, Land, Water and Planning
DoEE	Commonwealth Department of Environment and Energy
Ecological Vegetation Class (EVC)	A vegetation classification described through a combination of its floristic composition, life form and ecological characteristics, and its association with particular environmental attributes. EVCs may include one or more floristic communities that occur across a biogeographic range, and have similar habitat and ecological processes operating
Endemic	Naturally found only in a defined geographic area
EPBC Act	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
Exotic	Plants, animals, fungi and other organisms that have been introduced (deliberately or accidentally) to Australia or a given area after European settlement
Exotic vegetation	Vegetation comprised wholly or substantially of exotic species
FFG Act	<i>Victorian Flora and Fauna Guarantee Act 1988</i>
GIS	Geographic Information System. A digital platform for creating, analysing and viewing maps and other spatially referenced data
High threat weeds	Introduced species (including non-indigenous 'natives') which, as invading species have highly deleterious impacts on indigenous vegetation and faunal habitats
Indigenous	Plant and animal species found naturally in pre-European Australia
Indigenous vegetation	Vegetation native to Australia or native to a specific geographic region
Introduced	Deliberately or accidentally brought to Australia or part of Australia, usually by human agency

Refer to
update #35

Metapopulation	A population of populations. Generally it is a network of spatially separated populations that interact through migration between populations.
Native vegetation	Species occurring naturally in Australia as part of the pre-European flora or fauna
Vegetation community	Term for interacting plant populations forming vegetation. A vegetation community in formal classifications may have characteristic plant species, composition and structure
Viable population	A self-supporting population of Growling Grass Frog with breeding pairs, and sufficient numbers and genetic variety in a particular area, determined from baseline data.
VROTS	Victorian Rare or Threatened Species
WONS	Weeds of National Significance
