

Technical Memorandum

Project title	Pettavel Basin Augmentation Project - Targeted surveys for Growling Grass Frog and Latham's Snipe		
Prepared for	CMP Consulting Group Pty Ltd	Date of Issue	20 March 2024
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Reviewed by	Dan Weller	Approved by	Andrew Taylor

1. Introduction

SMEC Australia Pty Ltd (SMEC) was commissioned by CMP Consulting Group Pty Ltd (CMP) to undertake targeted surveys for Growling Grass Frog (*Litoria raniformis*) and Latham's Snipe (*Gallinago hardwickii*) for the Pettavel Basin Augmentation Project, Victoria (the Project). The species is listed as Vulnerable under the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Project aims to increase the water storage capacity of the existing Pettavel water storage facility, that has been used as a water storage facility by Barwon Water for over 70 years. The construction of a new 100 ML basin is required to meet future demand of the growing populations of Armstrong Creek, Leopold the Bellarine and Surf Coast. The proposed works are situated on a 25 ha parcel of land on the corner of Draytons Road and Reservoir Road, Waurin Ponds, Victoria (Figure 1).

A Detailed Flora and Fauna Assessment completed for the Project (SMEC 2024) identified potential habitat for Growling Grass Frog and Latham's Snipe within the borrow pit wetland and recommended targeted surveys for both species to confirm their presence or absence. This report details the outcome of those surveys.

2. Growling Grass Frog

2.1 Species description

Conservation Status

EPBC Act: Vulnerable

FFG Act: Vulnerable

Description

Growling Grass Frog is also commonly known as the Southern Bell Frog, Green and Golden Frog and Warty Swamp Frog. The species is a large diurnal frog that can be distinguished by its bright to olive-green colour, warty back (with brown blotches in the adult), dorso-lateral fold, and distinct tympanum (ear) (DCCEEW 2024).



Image 1: Growling Grass Frog (Source: Dan Weller, SMEC, 2021).

Growling Grass Frog generally breed between November to March, following local flooding and a rise in water levels. This rise in water levels triggers breeding males to begin calling for females (DCCEEW 2024). Eggs are laid within days of breeding and tadpoles hatch between 2–4 days later (DCCEEW 2024). The metamorphosis stage of the tadpoles generally takes approximately three months, however, may take up to 12 months in exceptional circumstances (DCCEEW 2024). In Victoria, most tadpoles have emerged as frogs by the end of May (SWIFFT 2024).

Growling Grass Frog can be highly mobile species, capable of moving up to 1 km over a 24-hour period (DCCEEW 2024). When restricted to small, permanent waterbodies, dispersal is low where they tend to move shorter distances indicating high site fidelity. Conversely, when occupying ephemeral waterbodies, Growling Grass Frog are likely to disperse more and travel further distances to reach other suitable wetland habitat(s) (SWIFT 2023).

Growling Grass Frog are carnivorous where their diet ranges from invertebrates, small fish, small reptiles and other amphibians, even Growling Grass Frog young in rare circumstances (DCCEEW 2024).

Distribution

Growling Grass Frog is distributed across south-eastern Australia, being found in New South Wales (Riverina area), Victoria, Tasmania, and south-eastern South Australia. In Victoria, the species has isolated populations in the greater Melbourne area and across areas in south-western Victoria (SWIFFT 2024). Growling Grass Frog has experienced a significant range reduction in recent decades where this species is now considered locally extinct in most areas of Victoria (DCCEEW 2024).

Habitat

Growling Grass Frog occur in still or slow-moving waterbodies with emergent and fringing vegetation and mats of floating or submerged plants (SWIFFT 2024). They can inhabit artificial waterbodies, such as farm dams, irrigation channels and disused quarries. High quality habitat includes abundant aquatic vegetation and minimal tree canopy cover, with open areas for basking (SWIFFT 2024). Grass and shrub cover on the banks are also important for the emerging froglets to gain protection from predators and to acquire insect prey as a food source (SWIFFT 2024).

Key threats

The principal threats to Growling Grass Frog include habitat loss and Chytridiomycosis disease through the following impacts (SWIFFT 2024):

- Draining, filling or barriers to movement of waterbodies;
- Reduced water quality and increased salinity, phosphate and nitrate concentrations;
- Loss of terrestrial habitat through heavy stock grazing;
- Introduced fish; and
- Climate change.

2.2 Methods

2.2.1 Permits

Fauna monitoring was undertaken in accordance with a Research Permit approved by the Victorian Department of Energy, Environment, and Climate Action (DEECA) under the *Wildlife Act 1975* (Permit 10009728) (formerly the Department of the Environment, Land, Water and Planning [DELWP]). All animal handling was in accordance with SMECs Standard Operating Procedure (SMEC 2021), and Wildlife and Small Institutions Animal Ethics Committee (WSIAEC) approval 23.20.

2.2.2 Nomenclature

Unless otherwise noted, common and scientific names for fauna species follow the VBA database (current version) (DEECA 2023).

2.2.3 Online data

Database searches for the Victorian Biodiversity Atlas (VBA) encompassed a 10 km buffer radius around the study site (DEECA 2023). Records prior to 1980 are removed from the datasets based on age and relevance.

2.2.4 Targeted survey

Nocturnal surveys

Targeted surveys were undertaken over two separate days in November and December 2023 (Table 1) in areas identified as potential habitat within the study site (Figure 2). Surveys were undertaken in accordance with the 'Significant impact guidelines for the vulnerable Growling Grass Frog' (DEWHA 2009), as follows:

- Sampling methods included nocturnal surveys, with two survey nights completed (non-consecutive nights to increase detectability over breeding season).
- Surveys were undertaken when night-time air temperatures are greater than 12°C with moderate to no wind, and during the breeding season when males are calling (October to December).

- Surveys utilised a combination of call playback and active searching. Call playback was used to elicit a response from breeding males (approx. 10 minutes), followed by a period of active listening (approx. 5 minutes) Areas of suitable habitat were then searched using a spotlight for approximately 20 minutes, including areas of dense vegetation and other possible refuges (e.g., rocks and logs).

Tadpole surveys

Breeding activity of Growling Grass Frog was investigated within the wetland using two separate survey methods, bait traps and dip netting. Ten bait traps were deployed around the margins of the wetland over one night, each trap was set with a glow stick as an attractant. The traps were set in shallow water with only the entrances at each end submerged. The top of each trap was retained above the water level. The traps were checked the following morning and species identified. Deployment and retrieval of bait traps was coupled with dip-netting along the margins and within aquatic vegetation within the wetland over approximately four hours. Dip-netting was undertaken at different depths (bottom, mid-water and surface) using a swooping movement.

2.2.5 Habitat assessment

A diurnal habitat assessment was completed on 10 November 2023. Habitat quality was assessed using components of Heard (et al. 2010) for hydroperiods and aquatic vegetation cover. The following was recorded:

- Size: Physical dimensions of the water body (approximate width and length).
- Water Quality: Temperature (°C), pH (0-14) and water turbidity (NTU).
- Hydroperiod: This is defined as the likelihood a selected wetland will remain inundated over the course of a single breeding season, on a scale from 0 to 3, where:
 - 0 = fills only in years with above average rainfall ('intermittent')
 - 1 = fills and dries out annually with average rainfall ('ephemeral')
 - 2 = dries out only during years of below average rainfall ('semi-permanent')
 - 3 = never dries out, regardless of rainfall ('permanent')
- Terrestrial vegetation and refuge: Cover of terrestrial vegetation, rocks and logs.
- Aquatic vegetation cover: Defined as the mean percentage of the water surface area covered by foliage associated with emergent, submergent and floating aquatic plants. The mean percentage of cover (%) ranges between 0-100%, and is calculated as follows:
 - Mean percentage of cover (%) = $\text{sum}(\% \text{emergent} + \% \text{submergent} + \% \text{floating}) / 3$.
 - For the purposes of this assessment, averages are rounded to the nearest unit value (i.e. 8% would be rounded to 10%).
- Connectivity: Level of connectivity is defined as follows:
 - Good connectivity - Wetlands or other suitable habitat present within 1 km, no dispersal barriers and minimal overland travel required (e.g., connectivity via a waterway within 100 m).
 - Moderate connectivity - Wetlands or other suitable habitat present within 1 km, however some dispersal barriers and/or overland travel required (e.g., connectivity via a waterway >100 m).
 - Poor connectivity - Wetlands or other suitable habitat >1 km away, dispersal barriers present and/or significant overland travel required (>1 km).
- Habitat quality: The borrow pit wetland was allocated habitat quality rating based on the attributes described above and known to support the species ecology (particularly breeding). A generalised description of habitat quality ratings is provided below, noting that a 'best-fit' rating is applied where a site supports attributes across multiple rating categories:
 - High quality habitat:
 - Contain many habitat attributes required for breeding, foraging and refuge (overwintering).
 - Habitat with low turbidity water (≤ 50 NTU).
 - Wetlands that are permanent and/or have high levels (>30-40%) of aquatic vegetation cover.

- Habitat with good connectivity.
- Medium quality habitat:
 - Contain some habitat attributes required for breeding, foraging and refuge (overwintering).
 - Habitat with moderate turbidity water (≤ 100 NTU).
 - Wetlands that are permanent or semi-permanent and/or have medium levels (>10 - 30%) of aquatic vegetation cover.
 - Habitat with moderate connectivity.
- Low quality habitat:
 - Contain few habitat attributes required for breeding, foraging and refuge (overwintering).
 - Habitat with high turbidity water (≥ 100 NTU).
 - Wetlands that are permanent, semi-permanent or ephemeral and/or have low levels of ($<10\%$) aquatic vegetation cover.
 - Habitat with poor connectivity.

2.3 Results

2.3.1 Previous records

There are four previous records for Growling Grass Frog from within 10 km of the study site, most recently from 2019 (Figure 3). These records are typically associated with the Barwon River between 2001-2010, with no apparent records within 1 km of the study site.

2.3.2 Targeted survey

Nocturnal surveys

Growling Grass Frog was detected within the borrow pit wetland on two separate occasions (Table 1). The survey outcomes and weather conditions during each nocturnal survey are summarised below, with full details provided in Appendix 1.

A total of five other, non-threatened amphibian species were detected calling in low abundances during each survey:

- 25 x Common Froglet (*Crinia signifera*);
- 3 x Southern Brown Tree Frog (*Litoria ewingii*);
- 10 x Southern Bullfrog (*Limnodynastes dumerilii*);
- 8 x Spotted Marsh Frog (*Limnodynastes tasmaniensis*); and
- 2 x Striped Marsh Frog (*Limnodynastes peronii*).

One introduced fish species, Mosquito Fish (*Gambusia holbrooki*), was also detected within the borrow pit wetland. Mosquito Fish is listed as a key threat to the species due to predation of frog eggs and tadpoles (DCCEEW 2023).

Table 1: Growling Grass Frog survey dates and weather conditions

Date	Min. temp. (°C)	Max. temp. (°C)	Survey temp (°C)	Max. cloud cover (%)	Wind (km/h)	Rain	Detected?
10/11/2023	10.9	31.8	23	50	0-5	No rain	6 x Growling Grass Frog heard calling
5/12/2023	13.6	27.6	19	15	0-5	No rain	10 x Growling Grass Frog heard calling

Tadpole surveys

Growling Grass Frog tadpoles were detected within the borrow pit wetland (Table 1). This outcome confirms that the population of Growling Grass Frog present on the site is currently breeding. A total of five Growling Grass Frog tadpoles were collected and identified to species level using dip-netting methods between 18-19 January 2024.

2.3.3 Habitat assessment

The following describes the habitat recorded at the site and its suitability for Growling Grass Frog:

- Size: Artificial wetland (160 x 30 m) and 1.2 m depth (containing a soft mud layer of approximately 60 cm).
- Water Quality:
 - Temperature: 20.7°C
 - PH: 8.5 (alkaline)
 - NTU: 50.7 (low to moderate)
- Hydroperiod (0-3): The borrow pit wetland is a permanent wetland (score of 3), with expansion and reduction of shallow marsh areas during extended rainfall and/or extended high temperatures during summer.
- Terrestrial vegetation and refuge: Low levels of refuge/overwintering by means of rockery, logs, cracking soils. Tussock grasses (native or non-native) are predominantly absent surrounding the margins of the wetland. There is partial shading by acacia along edge of the wetland. However, areas to the north within the planted pine trees provide some of the habitat characteristics suitable for overwintering habitat (tussock grasses and wood piles), which were typically supporting European Rabbit (*Oryctolagus cuniculus*) warrens during the assessment. Open areas supporting modified grassland are routinely slashed and these provide foraging opportunities for the species.
- Aquatic vegetation cover: High cover of emergent vegetation but low levels of submerged and floating vegetation present, with a medium overall average cover of aquatic vegetation. The borrow pit wetland was estimated to provide a total mean aquatic vegetation of 36% cover, comprising 51% emergent, 50% submergent and 7% floating vegetation.
- Flora species composition: Vegetation within the borrow pit wetland can be broadly described as a mosaic of Tall Marsh and Plains Sedgy Wetland Ecological Vegetation Classes (EVCs), with patches of Tall Marsh characterised by tall (> 1 m high) emergent graminoids including Narrow-leaf Cumbungi (*Typha domingensis*), Tall Spike-rush (*Eleocharis sphacelata*) and River Club-sedge (*Schoenoplectus tabernaemontani*) often forming dense monoculture patches at the transitional zone between shallow and deeper water. In shallow regions, small aquatic graminoids and aquatic herbs were dominant with the dominant species being Small Spike-sedge (*Eleocharis acuta*). A significant portion of the wetland (40%) comprises open water contained submerged vegetation in high cover (90%) supporting Blunt Pond Weed (*Potamogeton ochreatus*). Aquatic herbs such as Water-milfoil (*Myriophyllum crispatum*), Water Ribbons (*Cyanogetum procerum*), Creeping Brookweed (*Samolus repens*), Poison Lobelia (*Lobelia pratioides*) and Lesser Joyweed (*Alternanthera denticulata*) were also common, and extending to the margins. Weed cover was low with no aquatic weed species recorded. Despite the margins of the wetland often being comprised of bare ground only scattered annual weed species such as Hillmans Panic (*Panicum hillmanii*) and Rough Sow-thistle (*Sonchus asper*) were present.
- Connectivity: The borrow pit wetland has poor connectivity to other wetlands or suitable habitat. Based on available information, the nearest cluster of waterbodies is located approximately 220 m north-west of the study site (Figure 1), comprising a series of small to medium waterbodies used for irrigation of Mount Duneed Estate. With no evident habitat stepping stones or wildlife corridors to provide connectivity, dispersal is likely to be limited to overland movement during suitable conditions. Research into Growling Grass Frog dispersal capabilities suggests that populations separated by more than about 1 km have relatively little interaction with each other (Heard 2012).

Opportunities to disperse within the local area are further limited by the presence of the following:

- Agriculture: Areas to the north and west of the study site are subject to farming practices which include cropping and/or slashing on private property, which is likely to limit species dispersal due to noise and/or direct mortality from machinery. However, the level of risk for mortality is subject to the timing of farming practices and dispersal by the species.
- Roads: The site is surrounded by public roads, including Daytons Road, Reservoir Road and Pettavel Road which may limit the success of dispersal from the study site. The Princess Highway is located approximately 1 km north of the study site, this is a four-lane road which is considered to be a barrier to dispersal. There are no underpass structures or culverts present within or adjoining the study site which can reduce potential road strikes if or when dispersing.

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- Railways: The Geelong-Warrnambool Railway is located approximately 650 m south of the study site and is considered to be a barrier to dispersal.
 - Active quarries: There is an active quarry operated by Boral approximately 250m east of the study site, this comprises a series of large waterbodies with varying levels of aquatic vegetation. The embankments are typically steep and consist of open bare ground which is likely to limit dispersal opportunities when coupled with the noise of machinery during operation of the quarry.

However, new habitat will be constructed within the study site to maintain this extant population, with details outlined within a Growling Grass Frog Management Plan (SMEC 2024).

- Habitat quality: Overall, the borrow pit wetland is deemed to have high quality habitat as it is a permanent waterbody with a high level of aquatic vegetation (36%) and low to moderate water quality, however it has poor connectivity.

3. Latham's Snipe

3.1 Species description

Conservation status

EPBC Act: Vulnerable (in effect from 5 January 2024), Migratory/Marine

FFG Act: N/A

Description

Latham's Snipe (*Gallinago hardwickii*) is a medium-sized migratory shorebird and the largest snipe species in Australia (ABG 2017; SPRAT 2020a). Latham's Snipe migrate to Australia during the species non-breeding season. They arrive in Australia between late July to November and return to their breeding grounds in Japan and far eastern Russia typically from March to May (Higgins and Davies 1996). In Australia, Latham's Snipe inhabit both permanent and ephemeral wetlands ranging up to 2000 m above sea-level (Chapman 1969; Naarding 1982). These wetlands range from open freshwater wetlands with low, dense vegetation to saline or brackish water in modified or artificial habitats including those occurring near human activity (Naarding 1983; Frith et al. 1977).

3.2 Methods

3.2.1 Permits

Fauna monitoring was undertaken in accordance with a Research Permit approved by the Victorian Department of Energy, Environment, and Climate Action (DEECA) under the *Wildlife Act 1975* (Permit 10009728) (formerly the Department of the Environment, Land, Water and Planning [DELWP]). All animal handling was in accordance with SMECs Standard Operating Procedure (SMEC 2021), and Wildlife and Small Institutions Animal Ethics Committee (WSIAEC) approval 23.20.

3.2.2 Nomenclature

Unless otherwise noted, common and scientific names for fauna species follow the VBA database (current version) (DEECA 2023).

3.2.3 Online data

Database searches for the Victorian Biodiversity Atlas (VBA) encompassed a 10 km buffer radius around the study site (DEECA 2023). Records prior to 1960 are removed from the datasets based on age and relevance.

3.2.4 Targeted survey

Targeted surveys were undertaken over four separate days in spring and summer 2023-2024 (Table 2) in areas identified as potential habitat within the study site (Figure 2). Surveys were undertaken in accordance with the 'EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species' (DoEE 2017). Multiple survey techniques were employed to maximise detection of Latham's Snipe potentially utilising habitat within and immediately adjacent to the study site, and to assess the relative importance of habitat for the species within the study site. The survey techniques included:

- Flushing transects – This involves several observers walking parallel at 3-5 meter (m) spacing, across an area of suitable habitat. This technique is employed to target Latham's snipe as the species typically utilises fringing or dense marsh vegetation for cover and can be difficult to detect by point count surveys;
- Identify, assess and map any suitable Latham's Snipe habitat within and immediately adjacent the study site;
- Count the number of any Latham's Snipe observed and map areas of use at time of observation; and
- Data was collected using the ArcGIS Collector mobile application with data captured to ± 5 metres.

3.2.5 Habitat assessment

Habitat assessments were undertaken to characterise the habitat values for migratory birds within the study site at all areas that are surveyed. Habitat attributes recorded during the habitat assessments included:

- A description of wetland features (i.e. wetted width, shape, depth, vegetation);
- Survey climate conditions;
- Presence of habitat features necessary for shorebirds e.g. muddy margins, fringing vegetation, riparian vegetation;
- Habitat suitability for Latham's snipe;
- Presence of all waterbirds and shorebirds; and
- Any other significant habitat features or values present.

3.3 Results

3.3.1 Targeted survey

Latham's Snipe was not detected during targeted surveys undertaken within the study site. Waterbirds identified utilising the wetland included: White-faced Heron (*Egretta novaehollandiae*), White-necked Heron (*Ardea pacifica*), Dusky Moorhen (*Gallinula tenebrosa*), Pacific Black Duck (*Anas superciliosa*), Hoary-headed Grebe (*Poliocephalus poliocephalus*), Straw-necked Ibis (*Threskiornis spinicollis*) and Yellow-billed Spoonbill (*Platalea flavipes*). No shorebirds were recorded within the borrow pit wetland. A summary of survey outcomes is provided in Table 2.

Table 2: Latham's Snipe survey dates and weather conditions.

Date	Min. temp. (°C)	Max. temp. (°C)	Survey temp (°C)	Max. cloud cover (%)	Wind (km/h)	Rain	Detected?
26/10/2023	6.4	15.8	10.3	35	15	6.6 mm	Not detected
10/11/2023	10.9	31.8	23	50	0-5	No rain	Not detected
05/12/2023	13.6	27.6	19	15	0-5	No rain	Not detected
19/01/2024	13.9	19.9	17	20	13	0.6 mm	Not detected

3.3.2 Habitat assessment

A detailed habitat description is provided in Sections 2.3.3 and Appendix 2. Habitat suitable for Latham's Snipe included shallow margins of the borrow pit wetland supporting adequate cover and refuge habitat in the form of emergent vegetation. Available habitat included shallow regions supporting small aquatic graminoids and aquatic herbs dominated by Small Spike-sedge. Suitable buffering habitat in the form of regenerating acacias provides a barrier to surrounding open areas of modified grassland maintained by Barwon Water.

4. Legislation

4.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the Australian Government's primary piece of environmental legislation to protect and manage nationally and internationally important species, communities and heritage places, known as Matters of National Environmental Significance (MNES). If a MNES could be impacted by a proposed action, an assessment of the potential impacts against the relevant EPBC Act significant impact criteria must be completed. If there is potential for a significant impact to occur the proposed action must be referred to the federal Environment Minister for assessment under the EPBC Act.

Recommendations

- **Growling Grass Frog:** A breeding population of Growling Grass Frog was detected within the borrow pit wetland, which will be removed as part of the Project. A significant impact assessment was completed (Appendix 1) and a significant impact to Growling Grass Frog is considered to be Possible. As such, a referral under the EPBC Act is recommended.

As part of the Project, a new wetland will be constructed prior to excavation of the borrow pit wetland in accordance with a Growling Grass Frog Management Plan (SMEC 2024). The new wetland will support the species habitat requirements for breeding, refuge and foraging habitat in accordance with industry standards for the species. Growling Grass Frog will be captured prior to and during excavation of the borrow pit wetland and relocated to the new wetland. The management plan includes measures to:

- Create a new wetland that specifically accommodates the habitat requirements of Growling Grass Frog.
- Relocate Growling Grass Frogs from the borrow pit wetland to the new wetland.
- Control the spread of Chytrid fungus.

- **Latham's Snipe:** Latham's Snipe was not detected within the site. A significant impact to this species is unlikely.

4.2 Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act 1988* (FFG Act) and *Flora and Fauna Guarantee Amendment Act 2019* is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. In performing any of their functions that may reasonably be expected to impact on biodiversity in Victoria, a Minister and public authority must give proper consideration to the objectives of the FFG Act.

A permit is required for impacts to listed fish on both private and Crown land.

Recommendations

A permit is not required under the FFG Act for impacts to terrestrial fauna, including Growling Grass Frog and Latham's Snipe.

4.3 Wildlife Act 1975 and Wildlife Regulations 2013

The *Wildlife Act 1975* and *Wildlife Regulations 2013* are both Victorian legislation that prevent harm to wildlife. Authorisation is required under the *Wildlife Act 1975* to carry out field investigations for the purpose of conserving, monitoring, improvement or maintaining wildlife habitat within Victoria.

A permit is required under the *Wildlife Act 1975* to carry out field investigations for the purpose of conserving, monitoring, improving or maintaining wildlife habitat within Victoria. This includes specific authorisation from DEECA for the capture, handling and relocation of wildlife.

Recommendations

A permit is required for the capture and relocation of Growling Grass Frog (and any other fauna species) during vegetation removal and construction. Any works requiring the removal of wildlife must be undertaken by suitably qualified and licenced personnel.

5. Summary

The following summarises the results of the assessment and further requirements:

- **Growling Grass Frog:** A breeding population of Growling Grass Frog was detected within the borrow pit wetland, which will be removed as part of the Project. As part of the Project, a new wetland will be constructed prior to excavation of the borrow pit wetland in accordance with a Growling Grass Frog Management Plan (SMEC 2024). The new wetland will support the species habitat requirements for breeding, refuge and foraging habitat in accordance with industry standards for the species. Growling Grass Frog will be captured prior to and during excavation of the borrow pit wetland and relocated to the new wetland. The management plan includes measures to:
 - Create a new wetland that specifically accommodates the habitat requirements of Growling Grass Frog.
 - Relocate Growling Grass Frogs from the borrow pit wetland to the new wetland.
 - Control the spread of Chytrid fungus.
- **Latham's Snipe:** Latham's Snipe was not detected within the site and no further action is required.
- **EPBC Act:** A significant impact assessment was completed (Appendix 1), and a significant impact to Growling Grass Frog is considered to be Possible. As such, a referral under the EPBC Act is recommended.
- **FFG Act:** A permit is not required under the FFG Act for impacts to terrestrial fauna, including Growling Grass Frog.
- **Wildlife Act:** A permit is required for the salvage and translocation of Growling Grass Frog (and any other fauna species) during vegetation removal and construction. Any works requiring the removal of wildlife must be undertaken by suitably qualified and licenced personnel.

References

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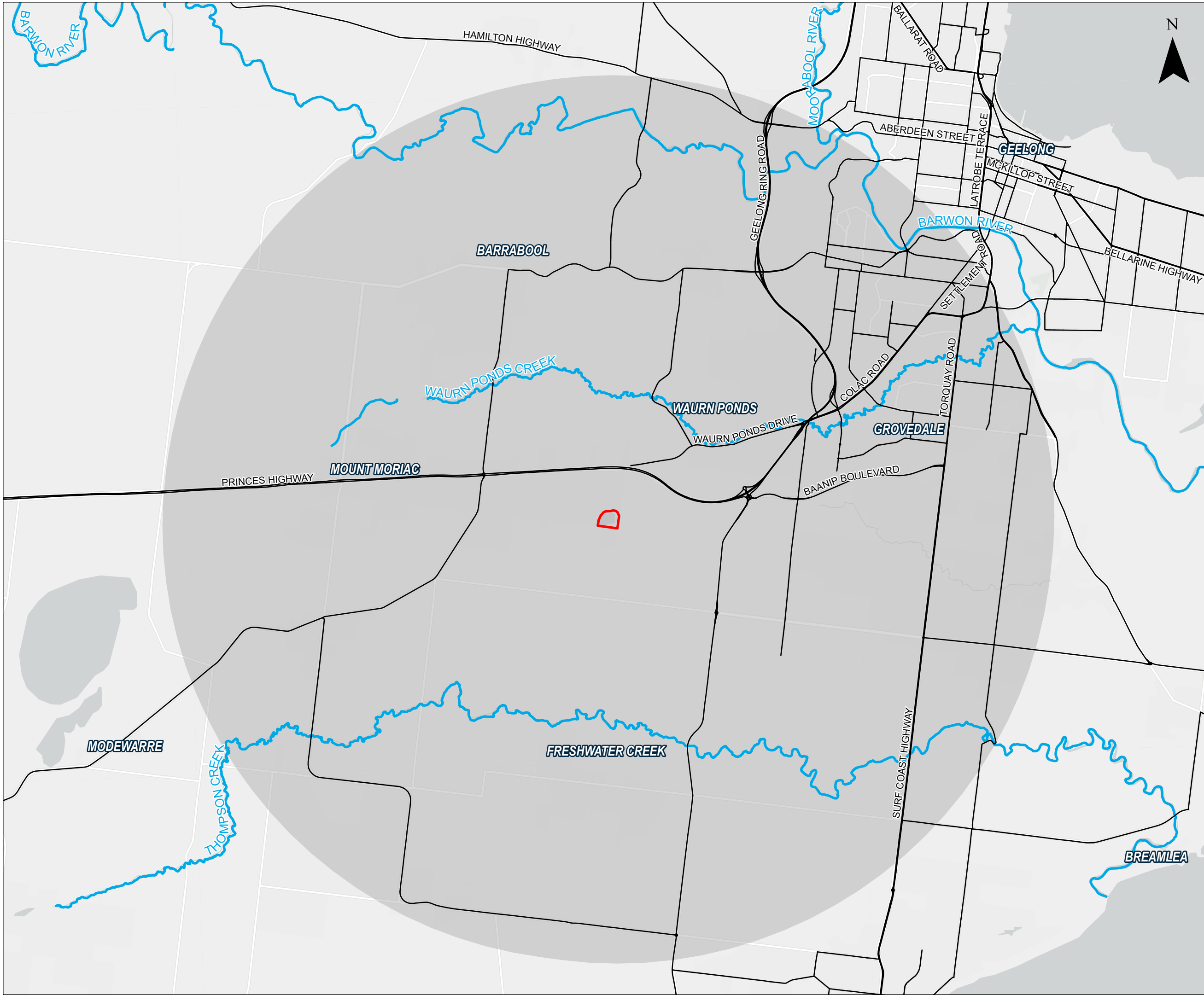
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Figures





Member of the Surbana Jurong Group

SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

0 1000 2000 3000 4000

Meters

Scale: 1:80,000 @ A3
GDA2020 MGA Zone 55

LEGEND

- Study site
- Study area
- Major road
- River



SOURCES:

- Roads and Waterways © DELWP 2023
- Basemap © Light Gray Base: Vicmap, Esri, TomTom, Garmin, FAO, NOAA, USGS
Light Gray Base: Vicmap, Esri, TomTom, Garmin, Foursquare, METINASA, USGS

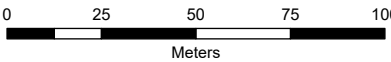
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Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources - no warranty is given that the information contained on this is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it. This map is not a design document.

PROJECT: Pettavel Augmentation Project
PROJECT NO: 30049187
FIGURE NO: 1
FIGURE TITLE: Study Site Location
CREATED BY: RS17486
DATE: 5/02/2024
VERSION: 1



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SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

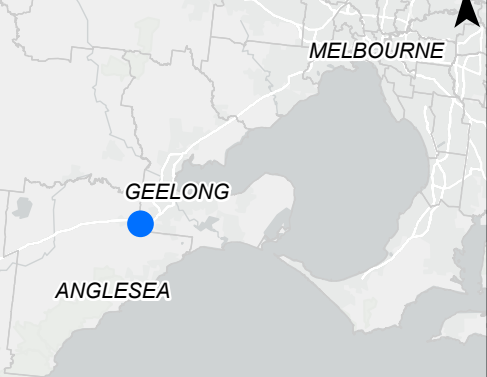


Scale: 1:2,000 @ A3
GDA2020 MGA Zone 55

LEGEND

- Study site
- Waterbodies
- Stream
- Minor road
- Growing Grass Frog Habitat**
 - Borrow pit wetland
 - Terrestrial foraging habitat
- Basin/Wetland Construction Footprint**
 - Proposed Basin No.3
 - Overflow Detention Storage Basin
 - Proposed Growing Grass Frog Wetland

KEY MAP



SOURCES:
1. Roads and Waterways © DELWP 2023
2. Basemap © Light Gray Base: Vicmap, Esri, TomTom, Garmin, FAO, NOAA, USGS

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PROJECT:	Pettavel Augmentation Project
PROJECT NO:	30049187
FIGURE NO:	2A
FIGURE TITLE:	Targeted Survey Locations
CREATED BY:	RS17486
DATE:	7/03/2024
VERSION:	2





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0 125 250 375 500
Meters

Scale: 1:10,000 @ A3
GDA2020 MGA Zone 55

LEGEND

- Study site
- Mt Duneed Estate
- Waterbodies
- Stream
- Major road
- Minor road
- Rail line

KEY MAP



SOURCES:

- Roads and Waterways © DEECA 2024
- Basemap © Light Gray Base: Vicmap, Esri, TomTom, Garmin, FAO, NOAA, USGS

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PROJECT: Pettavel Augmentation Project

PROJECT NO: 30049187

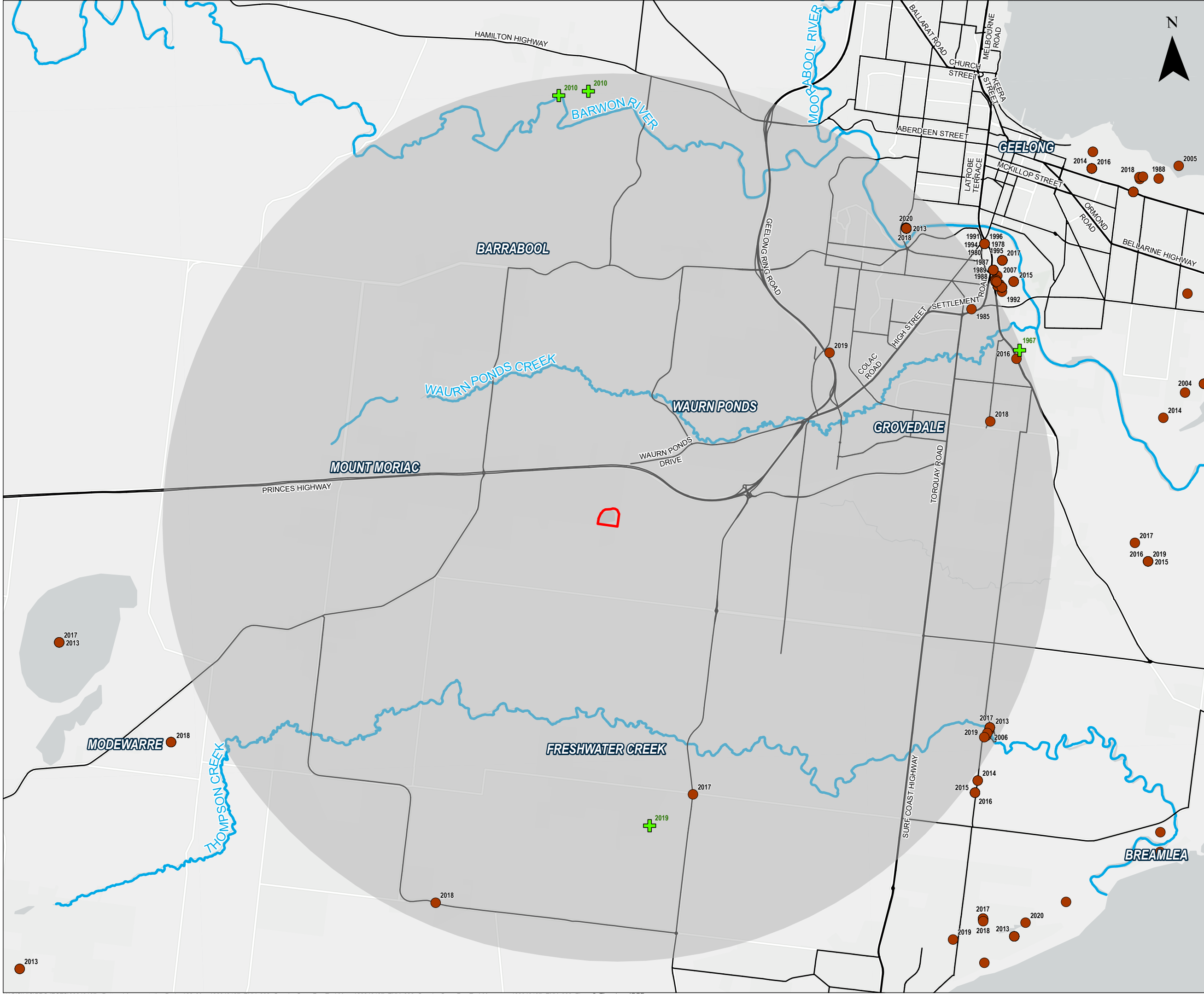
FIGURE NO: 2B

FIGURE TITLE: Landscape Conditions Plan

CREATED BY: RS17486

DATE: 7/03/2024

VERSION: 2





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SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

0 1000 2000 3000 4000
Meters

Scale: 1:80,000 @ A3
GDA2020 MGA Zone 55

LEGEND

- Study site
- Study area
- Major road
- River

Threatened Fauna Species

- Growing Grass Frog
- Latham's Snipe

KEY MAP



SOURCES:

1. Roads and Waterways © DELWP 2023
2. Basemap © Light Gray Base: Vicmap, Esri, TomTom, Garmin, FAO, NOAA, USGS
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PROJECT: Pettavel Augmentation Project

PROJECT NO: 30049187

FIGURE NO: 3

FIGURE TITLE: Threatened Fauna Species within 10km of the Study Site

CREATED BY: RS17486

DATE: 20/03/2024

VERSION: 2

Appendix 1 – Significant impact assessment

Significant Impact Criteria	Description of potential impact	Likelihood of Significant Impact
Permanent removal or degradation of terrestrial habitat (for example between ponds, drainage lines or other temporary/permanent habitat) within 200 metres of a water body in temperate regions, or 350 metres of a water body in semi-arid regions, that results in the loss of dispersal or overwintering opportunities for an important population.	A breeding population of Growling Grass Frog was detected within the borrow pit wetland, which will be removed as part of the Project. Excavation of land surrounding the wetland may be considered an impact to terrestrial habitat. However, the impacts are restricted to within the study site, the impacts are not linear and are unlikely to form a dispersal barrier or limit dispersal opportunities for land surrounding the site.	Unlikely
Alteration of aquatic vegetation diversity or structure that leads to a decrease in habitat quality.	A breeding population of Growling Grass Frog was detected within the borrow pit wetland, which will be removed as part of the Project. A new wetland will be constructed prior to excavation of the borrow pit wetland in accordance with a Growling Grass Frog Management Plan (SMEC 2024). The new wetland will support the species habitat requirements for breeding, refuge and foraging habitat in accordance with industry standards for the species. Growling Grass Frog will be captured prior to and during excavation of the borrow pit wetland and relocated to the new wetland. The management plan includes measures to: • Create a new wetland that specifically accommodates the habitat requirements of Growling Grass Frog. • Relocate Growling Grass Frogs from the borrow pit wetland to the new wetland. • Control the spread of Chytrid fungus. As such, there will not be a net reduction in habitat quality on the site. However, when considering only the impacts to the borrow pit wetland, the Project will result in a decrease in habitat quality.	Possible
Alteration to wetland hydrology, diversity and structure (for example any changes to timing, duration or frequency of flood events) that leads to a decrease in habitat quality.	As above.	Possible
Introduction of predatory fish and/or disease agents.	The introduction of predatory fish or disease agents to the existing aquatic habitat is unlikely as the borrow pit wetland will be removed. A new wetland will be constructed on site prior to excavation of the borrow pit wetland. This will ensure there is alternative suitable habitat on site prior to the removal of the borrow pit wetland. The introduction of predatory fish or disease agents to the new habitat during construction activities is considered possible, however biosecurity protocols will be implemented in accordance with a species management plan to minimise the risk of transfer or introduction of pathogens or pest species.	Unlikely
Net reduction in the number and/or diversity of water bodies available to an important population.	An 'important population' of Growling Grass Frog is defined as (DEWHA 2009): <i>Any viable population of Growling Grass Frog is considered to be an important population... ..A viable population is one which is not isolated from other populations or water bodies, such that it has the opportunity to interact with other nearby populations or has the ability to establish new populations when water bodies fill and become available.</i> Based on available information, the Growling Grass Frog population at the study site is considered to be an important population.	Unlikely

Significant Impact Criteria	Description of potential impact	Likelihood of Significant Impact
	Targeted surveys, including tadpole surveys, have confirmed that the Growling Grass Frog population is currently breeding. Further assessment would be necessary to determine breeding success (i.e. emergence of metamorphs). While the currently occupied wetland is proposed to be removed, a new wetland will be constructed prior to excavation of the borrow pit wetland in accordance with a Growling Grass Frog Management Plan (SMEC 2024). The new wetland will support the species habitat requirements for breeding, refuge and foraging habitat in accordance with industry standards for the species. Growling Grass Frog will be captured prior to and during excavation of the borrow pit wetland and relocated to the new wetland. The management plan includes measures to: • Create a new wetland that specifically accommodates the habitat requirements of Growling Grass Frog. • Relocate Growling Grass Frogs from the borrow pit wetland to the new wetland. • Control the spread of Chytrid fungus. As such, the Project will not result in a net reduction in the number and/or diversity of water bodies available to an important population.	
Removal or alteration of available terrestrial or aquatic habitat corridors (including alteration of connectivity during flood events).	The Project will not result in the removal or alteration of available terrestrial or aquatic habitat corridors (including alteration of connectivity during flood events).	Unlikely
Construction of physical barriers to movement between water bodies, such as roads or buildings.	As above.	Unlikely

Appendix 2 – Habitat photos

The following photos depict the borrow pit wetland and adjoining vegetation types.



Plate 1: Modified mown grass to the south of the borrow pit wetland.



Plate 2: Modified mown grass to the north of the borrow pit wetland.



Plate 3: Acacias adjoining wetland, indicating a lack of terrestrial fringing and refuge habitat along the margins.



Plate 4: Emergent vegetation within the eastern section of the wetland adjoined by acacias and open ground.



Plate 5: Emergent vegetation within the wetland, the predominant aquatic vegetation type.



Plate 6: Emergent vegetation and shallow marsh areas subject to and periodic inundation and ephemeral conditions.