



**AQUATICA**  
ENVIRONMENTAL



5483 and 5495 Princes Highway, Traralgon  
Dwarf Galaxias, Flinders Pygmy Perch and  
Growling Grass Frog Assessment

Report Prepared for Beveridge Williams

December 2022

**Aquatica Environmental**

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**Cover Photograph:** Dam 2 on the site ([Redacted])

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# 1. INTRODUCTION

## 1.1 Background

Aquatica Environmental (Aquatica) was engaged by Indigenous Design Environmental Management (IDEM), on behalf of Beveridge Williams, to conduct a Dwarf Galaxias (*Galaxiella pusilla*), Flinders Pygmy Perch (*Nannoperca sp 1*) and Growling Grass Frog (*Litoria raniformis*) survey at a proposed land subdivision and residential development at 5483 and 5495 Princes Highway, Traralgon (the site, Figure 1)).

The assessment was required to further inform the project and support a planning application in relation to the proposed residential subdivision. IDEM recently undertook an ecological assessment of the site which assessed that Dwarf Galaxias, Flinders Pygmy Perch and Growling Grass Frog had a “moderate” likelihood of occurrence in the study area and that:

*“... targeted surveys are recommended be completed in spring,...”*

*“Targeted surveys of all waterbodies including the wetland and drainage lines for threatened aquatic and semi-aquatic amphibian and fish species to determine habitat suitability, species presence/absence and to provide additional mitigation measures to minimise any impacts” (Fuhrmann and Brooker, 2022).*

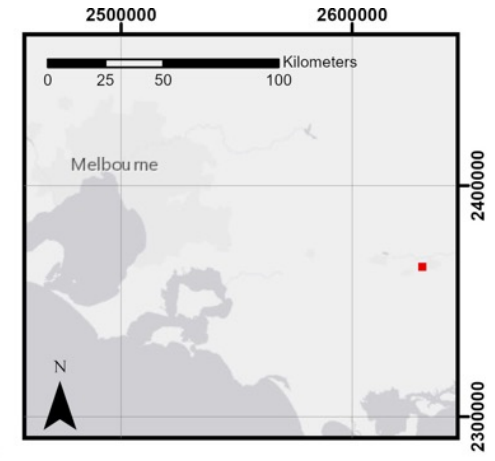
In accordance with IDEM’s request, Aquatica Environmental undertook a targeted survey for Dwarf Galaxias, Flinders Pygmy Perch and Growling Grass Frog in waterways on the site to further inform the project. The results of that survey have been incorporated into this report which included the following tasks:

1. Data and literature review (desktop review);
2. Undertaking of targeted surveys on the site; and
3. Development of this summary report.

## 1.2 Assumptions and Limitations

This assessment and report are based on the following assumptions and limitations:

- This assessment targeted Dwarf Galaxias, Flinders Pygmy Perch and Growling Grass Frog only. A high level assessment of possible Swamp Skink (*Lissolepis coventryi*) habitat was made during the initial diurnal fish/frog survey. No other aquatic fauna was targeted or given consideration as part of this assessment.
- The findings of the assessment were based on a desktop review of publicly available information, targeted surveys undertaken in December 2022.
- The assessment and survey effort, combined with information available from other sources, is considered suitable to assess the overall aquatic biodiversity values potentially present at bridge project area.
- The information outlined in this report relies on the accuracy of biodiversity database information, GIS layers and spatial imagery. To minimise potential errors, the most current available data was obtained from relevant sources.
- The absence of detection of a threatened species during an assessment does not mean absence of the species in the project area. However, we have endeavoured to exercise sufficient effort to determine with relative confidence whether Dwarf Galaxias, Flinders Pygmy Perch or Growling Grass Frog may or may not occur as either a population or individuals.



**Title:** Waterbodies  
**Reference:** 21375BW  
**Drafted by:** A. Fuhrmann (08/12/2021)  
**Reviewed by:** T. Brooker (08/12/2021)  
**Version:** Final for publication  
**Datum:** GDA 1994 VICGRID94

**Legend**

- Study Area
- Cadastre
- Contours 10-20m
- Mapped Wetland No. 81329
- Boyds Creek and Tributaries

While all effort has been made to ensure the content of this map is correct and accurate, Indigenous Design cannot explicitly guarantee that it is free from error and accepts no responsibility for damages resulting from its use.

Figure 1 Site location (Source: IDEM)

## 2. SPECIES DESCRIPTIONS

### 2.1 Dwarf Galaxias

#### 2.1.1 Conservation Status

The DG is listed as ‘vulnerable’ under the EPBC Act, ‘vulnerable’ under the FFG Act, and ‘endangered’ on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Hero et al 2004).

#### 2.1.2 General Description

DG are a small freshwater fish endemic to south-eastern Australia that occur only in Victoria, South Australia and Tasmania. Typical maximum lengths are 40 millimetres (mm) for males and 34 mm for females, with records up to 48 mm (Allen et. al. 2003) (Photo 1).

The Dwarf Galaxias most commonly occur in slow flowing or still, shallow, permanent and temporary, freshwater habitats such as swamps, drains and the backwaters of streams and creeks. Habitat often (but not always) contains dense aquatic macrophytes and emergent plants (Saddler et. al. 2010).

Dwarf Galaxias spend their entire life cycle in freshwater environments, and their diet consists primarily of small aquatic macroinvertebrates. Spawning occurs in late winter to spring (mostly April through to October) when females lay from 65 to 250 eggs on the underside of aquatic or submerged vegetation, or on hard surfaces (Saddler et. al. 2010). They are a short-lived fish with only one year’s age-class having been observed, and adults dying after spawning, indicating they are an annual species (Humphries 1986 in DEE 2019).



Photo 1 Dwarf Galaxias, adult and gravid female (left) and male (right) from Wades Creek, Victoria (A. Jenkin)

#### 2.1.3 Habitat Requirements

Dwarf Galaxias are a non-migratory species adapted primarily to wetland environments (Saddler et. al. 2010). Within wetland-type environments, Dwarf Galaxias have a wide range of habitat requirements but typically occur in slow flowing, still, shallow, permanent and temporary, freshwater to slightly brackish waterways. These include wetlands, swamps, the backwaters of streams and creeks, drains and ditches, usually with dense aquatic, emergent or flooded vegetation (Allen et. al. 2003 and Saddler et. al. 2010). Additionally, Dwarf Galaxias are tolerant of a wide range of variations in temperature, salinity and pH, and are only found at lower elevations.

The species can occur in wetlands that are ephemeral and partially or completely dry up during summer, where the wetlands rely on seasonal flooding and linkages to more permanent waterbodies, including connectivity to rivers and creeks. Dwarf Galaxias are also known to seek refuge in freshwater crayfish/yabby burrows and are capable of

aestivating (dormancy) in damp mud during drier periods (Wager & Jackson 1993; McDowall 1996 and Inland Fisheries Service 2000 in DEE 2019).

The National Recovery Plan for Dwarf Galaxias (Saddler et. al. 2010) notes that Dwarf Galaxias have different habitat requirements (i.e. niches) depending on life stage and season including:

- **Transient habitat:** Ephemeral habitat that retains water for less than one month following inundation and is mostly used for dispersal.
- **Spawning habitat:** Ephemeral habitat with abundant aquatic or submerged vegetation that retain water for 1-3 months following inundation and during the May to October breeding season.
- **Short-term refuge habitat:** Ephemeral water bodies that retain water for more than three months but do not have the attributes to support a permanent population.
- **Long-term refuge habitat:** Permanent water bodies that provide permanent refuge for Dwarf Galaxias populations and where source stock can disperse and repopulate transient, spawning and short-term refuge habitats (i.e. those listed above).

#### 2.1.4 Distribution

Although they are still widely distributed across south-eastern Australia (Figure 2), populations are fragmented and patchy across the landscape (Saddler et. al. 2010). A decline in their abundance has been attributed to habitat loss due to wetland drainage, alterations to flow regimes, climate change, habitat damage (i.e. grazing and agriculture) and competition and predation by introduced fish species such as the Eastern Gambusia or Mosquitofish (*Gambusia holbrooki*) (DEE 2019).

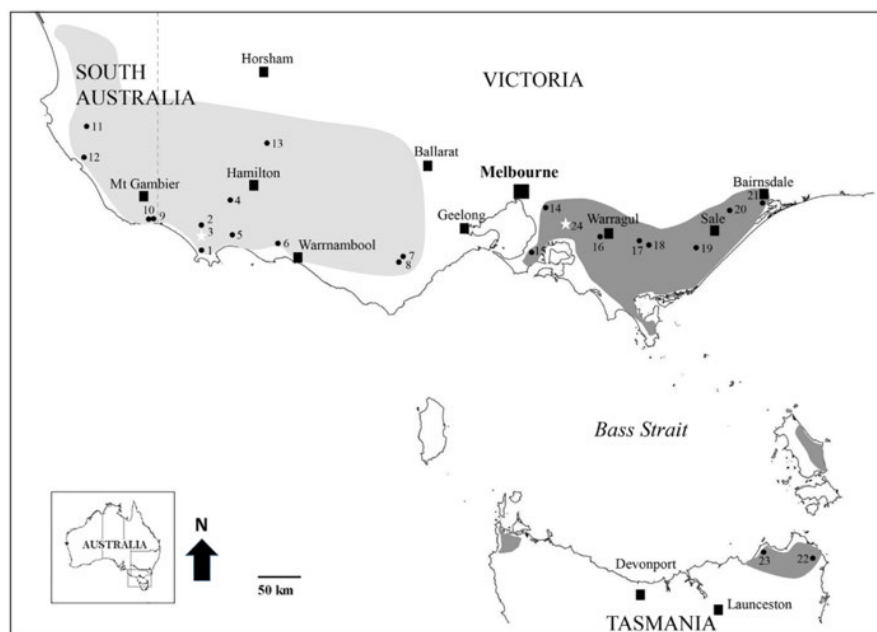


Figure 2 Dwarf Galaxias distribution (dark grey) (Source: Coleman et. al. 2015)

#### 2.1.5 Key Threats

Major threats to the Dwarf Galaxias in the region include (DEE 2019):

- Degradation and loss of habitat throughout its range, caused by wetland drainage, wetland inundation, fouling by livestock, ploughing, concreting of waterways, chemical pollution and European Carp (*Cyprinus carpio*) associated degradation.

- Alteration to flow regime and reduced connectivity throughout its range, caused by dam and levee construction, surface and groundwater abstraction, drawdown associated with forestry/revegetation.
- Drying caused by climate change, reducing suitable habitat and connectivity throughout its range.
- Competition and predation by legally and illegally introduced aquatic species such as the Eastern Gambusia, Brown Trout (*Salmo trutta*), Rainbow Trout (*Oncorhynchus mykiss*) and Redfin (*Perca fluviatilis*)
- Illegal collection leading to localised depletions, possibly intensifying with increased community awareness.

## 2.2 Flinders Pygmy Perch

### 2.2.1 Conservation Status

Flinders Pygmy perch is listed as ‘vulnerable’ under the FFG Act.

### 2.2.2 General Description

The Flinders Pygmy Perch is a small, laterally compressed fish which grows to a maximum size of 85 mm (Photo 2 and Photo 3).

The species was previously included under Southern Pygmy Perch (*N. australis*), however, it was recently identified as a very divergent genetic lineage representing a previously unrecognised taxon. This taxon was previously described (from Flinders Island) as a subspecies of *N. australis*, (Scott 1971) and work is currently underway to revise the taxonomic description and formally elevate it to full species status.

Similarly to its parent species, Flinders Pygmy Perch inhabit a wide range of well-vegetated aquatic environments. These include low-gradient waterways and floodplains characterised by still or gently flowing streams, lakes, billabongs, drains, dams, swamps and ephemeral creeks and wetlands and dense aquatic macrophyte cover or wood at shallow depths, which may have little or no flow in summer (DELWP 2020).

Spawn occurs during spring to summer (September to January) at water temperatures of above 16°C (Kuitert et al. 1996 in DELWP 2020). Very little is known of the breeding biology of this species, although it is assumed that breeding behaviour is similar to Southern Pygmy Perch, which lays demersal, non-adhesive eggs over aquatic vegetation and the substrate.



Photo 2 Flinders Pygmy Perch from near Moe, Victoria (A Jenkin)



Photo 3 Flinders Pygmy Perch from Iguana Creek, Victoria (A Jenkin)

### 2.2.3 Habitat Requirements

Flinders Pygmy Perch typically occurs in slow-flowing or still waters that possess large amounts of aquatic vegetation (particularly emergent vegetation) such as lakes, ponds and slow-flowing rivers, creeks and drainage lines (Kuitert et al. 1996, Woodward and Malone 2002). It is also found in the vegetated margins of moderate flow in larger streams, and can persist in isolated pools as streams dry (Raadik unpublished data).

### 2.2.4 Distribution

Flinders Pygmy Perch is distributed in Victoria in coastal Gippsland catchments from near the NSW/Victorian border in the east (Genoa/Wallagaraugh rivers), westward to the La Trobe River catchment, and extending into the South Gippsland catchment as far west as Merrimans Creek (Figure 3). A small population, possibly translocated, is also present further west in Pebble Creek, a tributary of the Franklin River system in Corner Inlet. It is also found on the east side of Flinders Island and the very north east of Tasmania (Anson River).

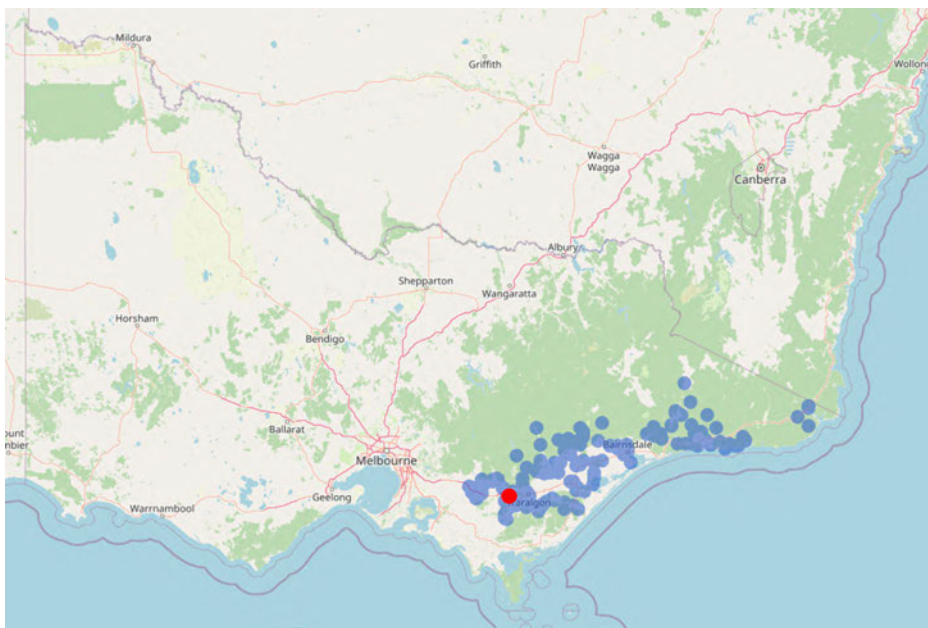


Figure 3 Flinders Pygmy Perch distribution in Victoria (ALA 2022)

## 2.2.5 Key Threats

Key threats include (DELWP 2020):

- Habitat damage or loss through water level/flow changes due:
  - agriculture,
  - urban or industrial development,
  - climate change impacts,
  - unrestricted stock access causing disturbance,
  - infilling, siltation,
  - increased turbidity, or
  - destruction/removal of instream habitat.
- Reduction and loss of surface water quantity and quality (through climate change impacts, and through extraction for stock and agriculture; and
- Competition with and/or predation by alien fish species such as Eastern Gambusia (*Gambusia holbrooki*), Redfin (*Perca fluviatilis*), Brown Trout (*Salmo trutta*) and Rainbow Trout (*Oncorhynchus mykiss*).

## 2.3 Growling Grass Frog

### 2.3.1 Conservation Status

The Growling Grass Frog is listed as 'vulnerable' under the EPBC Act, 'vulnerable' under the FFG Act and 'endangered' on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Hero et al 2004).

### 2.3.2 Description

Growling Grass Frog can reach up to 104 mm in length, making them one of the largest frog species in Australia. They vary in colour and pattern but are mostly olive to bright emerald-green, with irregular gold, brown, black or bronze spotting. Their backs are warty and commonly have a pale green stripe down their back. On the underside their bellies are usually white and coarsely granular (Department of the Environment 2021).

Breeding generally occurs during November and March, usually triggered by local flooding and a rise in water levels, however exact timing varies seasonally and depending on location. During the breeding season, males may become

yellow or dark grey/black under the throat and their groin can turn turquoise blue (DEC NSW 2005 in Department of the Environment 2021).



Photo 4 Growling Grass Frog (SWIFT 2022)

### 2.3.3 Habitat Requirements

Growling Grass Frog mostly occur in still or slow-flowing water bodies such as wetlands, lagoons, swamps, lakes, ponds and farm dams. These water bodies are typically dominated by aquatic and emergent vegetation including species such as Triglochin, Typha, Phragmites and Eleocharis. However, they have been recorded in a wide range of habitat types including agriculture and higher rainfall pastoral lands, irrigation channels, farm dams and open grassland. Generally larger and more permanent water bodies, with a higher portion of dense emergent and/or fringing vegetation, are more likely to support Growling Grass Frog (Department of the Environment 2021).

Growling Grass Frog have three primary habitat requirements to support a population including:

- Basking habitat: Frogs are active during both day and night during the warmer months and require aquatic/emergent vegetation, grassy banks, rocks or logs where they have been observed to bask on both sunny and overcast days (DEE 2018)
- Breeding habitat: Breeding is dependent upon permanent freshwater waterbodies with submerged aquatic vegetation for breeding. Their preference is for the shallower/perimeter part of waterbodies (up to 1.5 metres in depth) where there is generally a complex aquatic and emergent vegetation structure (Threatened Species Unit 2001, Ehmann & White 1997 and Courtice and Grigg 1975 cited in DEE 2018).
- Refuge habitat: Used for overwintering/hibernation, the species is known to use a range of refuge habitats including cracks in soil, fallen timber, rocks, debris and dense vegetation on low, frequently inundated floodplains (Cogger 2000 and S. Wassen undated, pers. comm. cited in NSW DEC 2005a cited in Department of the Environment 2021).

Growling Grass Frog are also highly mobile and have been recorded to move up to one kilometre in a 24-hour period (Department of the Environment 2021). However, this mobility tends to be more associated with ephemeral habitats (Wassen 2005 in Department of the Environment 2021).

### 2.3.4 Distribution

Growling Grass Frog was once widely distributed across Victoria, only being absent from the western desert regions and the eastern alpine regions (Littlejohn 1963, 1982; Hero et al. 1991 in Mahony 1999 in Department of the Environment 2021) (Figure 4). However, Growling Grass Frog has disappeared from most of its former Victorian range and now only persists in isolated populations in the greater Melbourne area, in the south-west of Victoria, and a few sites in central Victoria and Gippsland (Department of the Environment 2021).

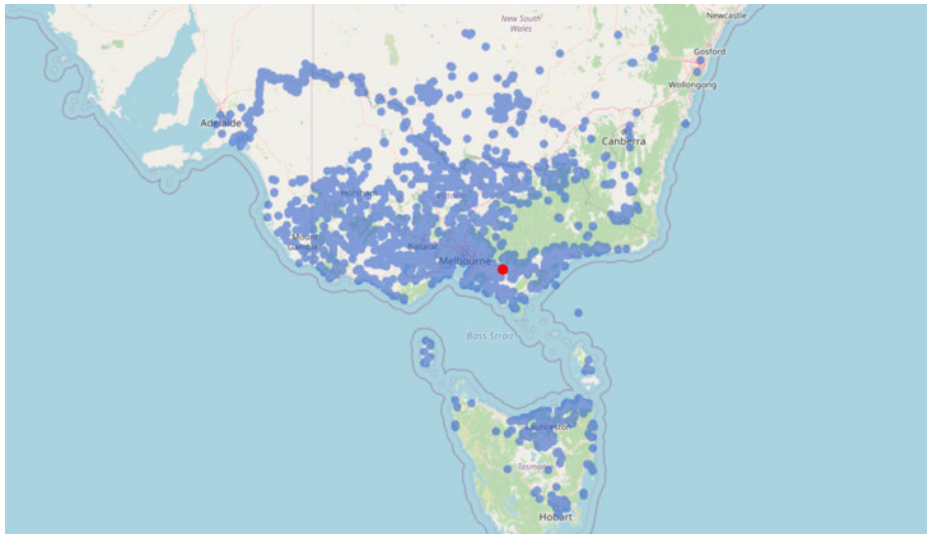


Figure 4 Growling Grass Frog historical distribution in Victoria (ALA 2022)

### 2.3.5 Key Threats

Key threats to Growling Grass Frog include (Department of the Environment 2021; Backhouse et al. 2008):

- Habitat loss and fragmentation
- Habitat degradation
- Altered flooding regimes
- Disease
- Predation by introduced fish
- Drought
- Chemical pollution of waterways
- Biocides
- Salinisation
- Roadkill
- Ultraviolet-B radiation

## 3. METHODOLOGY

### 3.1 Desktop Review

In order to provide context to the targeted survey results, Aquatica Environmental undertook a desktop review of the project area. The desktop review included a review of the following sources of information:

- The Commonwealth Department of Environment's Protected Matters Search Tool (PMST) for matters of national environmental significance (MNES), using a 10-kilometre search radius on the site (DAWE 2021)
- The Department of Environment, Land, Water and Planning (DELWP) Victorian Biodiversity Atlas (VBA), using a 10-kilometre search radius on the site
- An internet resources search for reports or other sources of information relevant to the aquatic biodiversity of the site and study area
- Aquatica Environmental's previous experience undertaking surveys for the target species in and around the Warragul area

### 3.2 Targeted Surveys

#### 3.2.1 Dwarf Galaxias and Flinders Pygmy Perch

Aquatica Environmental undertook a two-day/over-night targeted survey for Dwarf Galaxias and Flinders Pygmy Perch in the two on-site dams and associated drainage lines on the, and at a 'control' site near Traralgon, where a Dwarf Galaxias and Flinders Pygmy Perch population is known to occur (Figure 5). The control site was included to confirm the survey methods were reasonably able to detect the species if present at the time.

Three survey techniques were deemed suitable for the available habitat including:

- **Hand-held dip-net:** Dip-netting was undertaken in and around the range of available aquatic habitats at each site using a fine and soft mesh dip-net.
- **Bait traps:** Set in the dams in the afternoon, baited with phosphorescent baits (i.e. glow sticks) and left in situ before being retrieved the next morning.
- **Fyke nets :** Set in the dams in the afternoon and left in situ before being retrieved the next morning.

#### 3.2.2 Growling Grass Frog

The Growling Grass Frog survey was undertaken in broad accordance with the following methodologies:

- Survey Guidelines for Australia's Threatened Frogs (DEWHA 2010);
- Biodiversity Precinct Structure Planning Kit (DSE 2010); and
- Hygiene Protocol for the Control of Disease in Frogs DECC NSW 2008).

The targeted survey included two nocturnal surveys and a diurnal survey undertaken in unison with the fish survey.

The diurnal surveys were undertaken on the days of 8/9 December 2022 and nocturnal surveys were undertaken on the evenings of 8 and 19 December 2022 in the two on-site dams (Figure 5). Two Growling Grass Frog control sites were also referenced during the survey to provide context to the site results, including a small population that occurs in Trafalgar and a larger population that occurs in Koo Wee Rup (Figure 6).

The surveys were undertaken by experienced ecologists (Table 1) of which included at each location:

- Active surveys included call playback, searching on and under floating debris and organic matter, down cracks and under rocks surrounding the fringes of the dams, and dip-netting for tadpoles and metamorphs in the dams.

- Nocturnal surveys including active listening for 10-15 minutes for calls, call playback and spotlighting. For call play-back the ecologists undertook approximately ten minutes of quiet listening, followed by approximately five minutes of call playback/mimicry followed by a further ten minutes of quiet listening.

The frog species and the number of observed individuals, as well as the approximate numbers of calling males, were recorded during each survey. The survey effort is considered adequate as Heard et al (2010) demonstrates that a threshold of 95% detection probability, at least two surveys are required when surveys are conducted in October–December, whereas three are required in January–March.

Table 1 Survey dates, times and conditions

Parameter / Survey	Diurnal 1	Nocturnal 1	Diurnal 2	Nocturnal 2
Date	7-8 Dec 2022	8 Dec 2022	20 Dec 2022	20 Dec 2022
Surveyor	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Start Time	08:50	21:00	12:30	21:00
Finish Time	17:00	22:00	13:30	22:00
Methods	Call play-back, dip-net, visual	Listening, call play-back, spotlight	Call play-back, dip-net, visual	Listening, call play-back, spotlight
Temperature	15.5	13.7	20.2	14.5
Humidity (%)	84	78	53	67
Wind Speed average (km/h)	2.0	16.5	16.7	16.7
Wind Direction	ENE	SW	ESE	E
Rain (mm)	0.0	0.2	0.0	0.0
Cloud Cover (Octas)	2	3	0	0
Previous 24hr rain (mm)	0.0	0.2	0.0	0.0

### 3.2.3 Permits and Approvals

The targeted survey was conducted in accordance with the following approvals and permits held by Aquatica Environmental:

- Wildlife and Small Institutions Animal Ethics Committee (AEC) approval (No. 30.21);
- Scientific Procedures Fieldwork Licence (No. SPFL20394);
- *Fisheries Act 1995* General Research permit (No. RP1312);
- *Wildlife Act 1975* research permit (No. 10010203); and
- *Flora and Fauna Guarantee Act 1988* permit to “take protected fish” (No. 10010202).

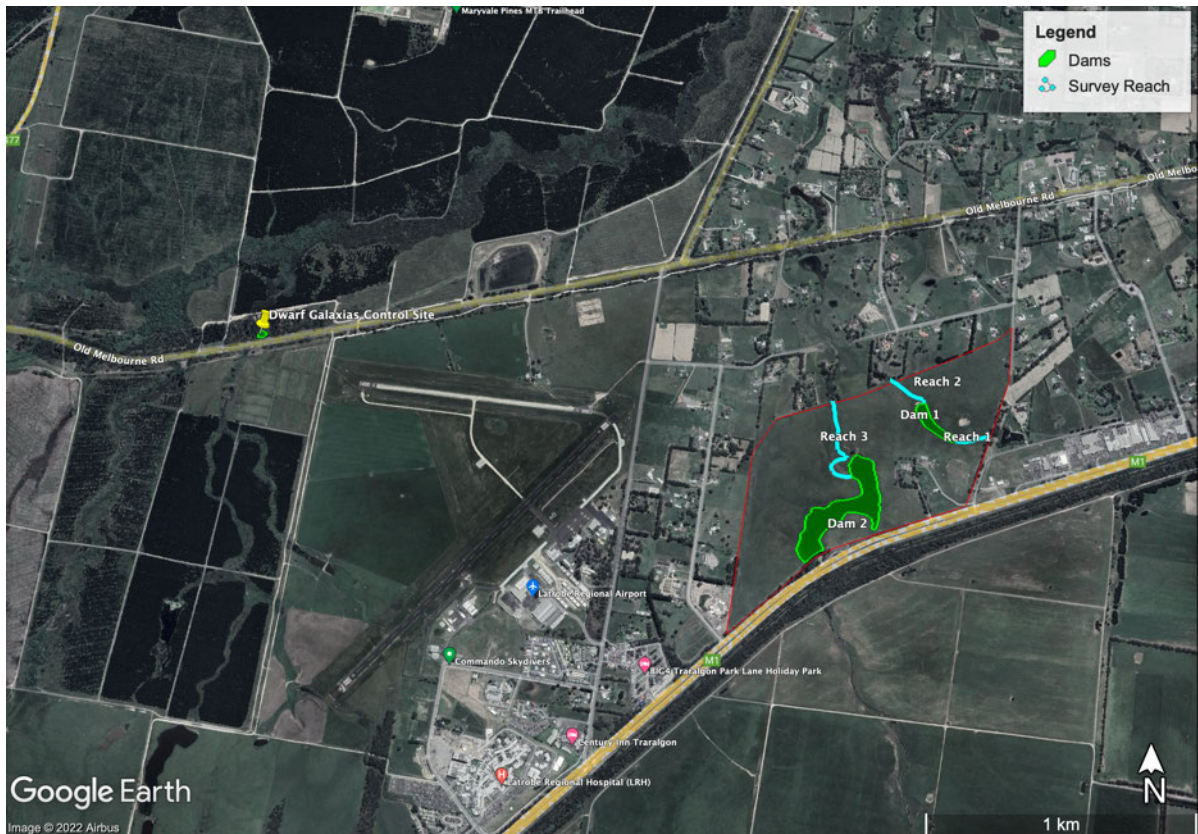


Figure 5 Dwarf Galaxias control site location relative to the site

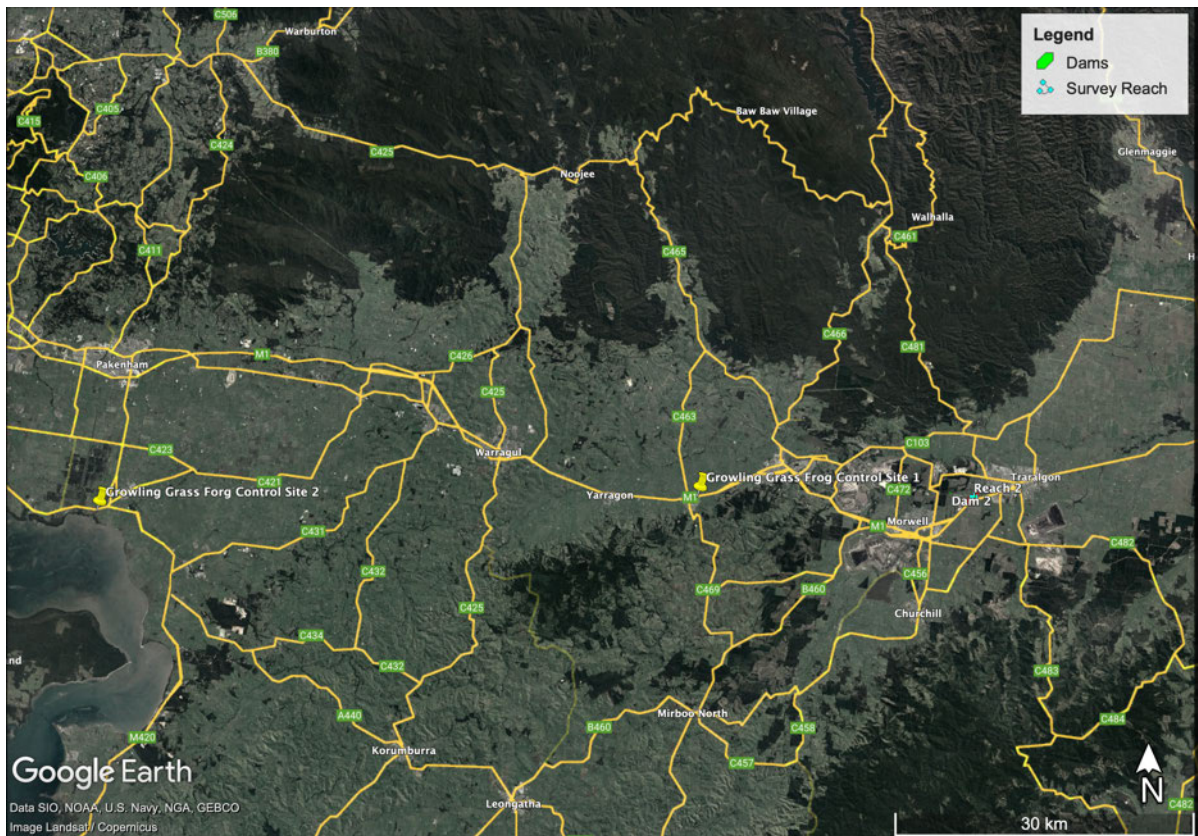


Figure 6 Growling Grass Frog control site 1 and 2 locations relative to the site

### 3.3 Swamp Skink Habitat Assessment

Aquatica Environmental does not espouse to have reptile ecology nor Swamp Skink (*Lissolepis coventryi*) specialisation, however, has identified and successfully surveyed for the species at a site to the West of Morwell. Based on our experience and the relevant species habitat descriptions (Humphery et al 2017, Clemann 2000, SAC 2000, Manning 2002, Robertson and Clemann 2015) a preliminary and high level assessment of the sites habit suitability was undertaken in unison with the targeted Dwarf Galaxias, Flinders Pygmy Perch and Growling Grass Frog surveys.

It is recommended that should there be any uncertainty with regards to Aquatica Environmental's assessment outlined in this report, then a Swamp Skink specialists should be engaged to validate the findings and further inform the project.

## 4. RESULTS

### 4.1 Desktop Review

Dwarf Galaxias records occur in the Morwell and Latrobe River system, including in Plough Creek, Waterhole Creek and Morwell River (Figure 7). A recent October 2022 survey undertaken by Aquatica Environmental, in Boyd's Creek immediately upstream of the site on the south side of the Princes Freeway, failed to detect the species and they were assessed as 'unlikely' present. The nearest current records is in an unnamed tributary of Waterhole Creek, to the immediately west and downstream of the site.

Similarly to Dwarf Galaxias, Flinders Pygmy Perch records occur in the Morwell and Latrobe River system, including in Plough Creek, Waterhole Creek and Morwell River (Figure 8). A recent October 2022 survey undertaken by Aquatica Environmental, in Boyd's Creek immediately upstream on the south side of the Princes Freeway, recorded large numbers of Flinders Pygmy Perch. The species has also been regularly detected at the same downstream site where Dwarf Galaxias have been detected.

No recent records of Growling Grass Frog occurred within the 10 kilometre of the site search buffer (Figure 9). The three historical records from the 1970s are inaccurate and may not actually occur in the search buffer. The nearest recent records of the species are from nearly 30 kilometres west at Traralgon and over 50 kilometres to the east near Sale.

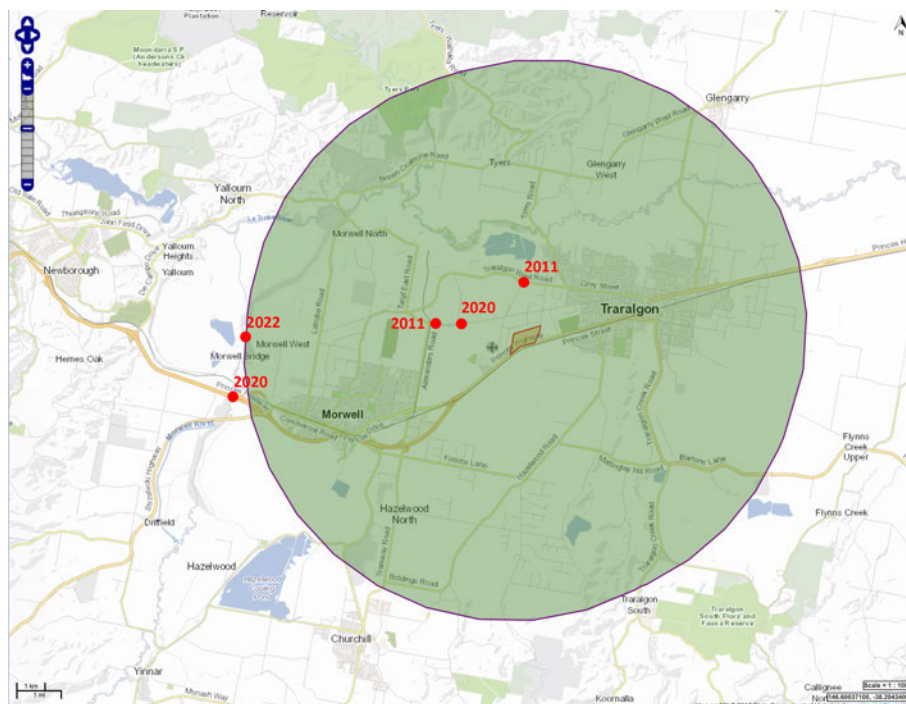


Figure 7 Dwarf Galaxias records (source: VBA)

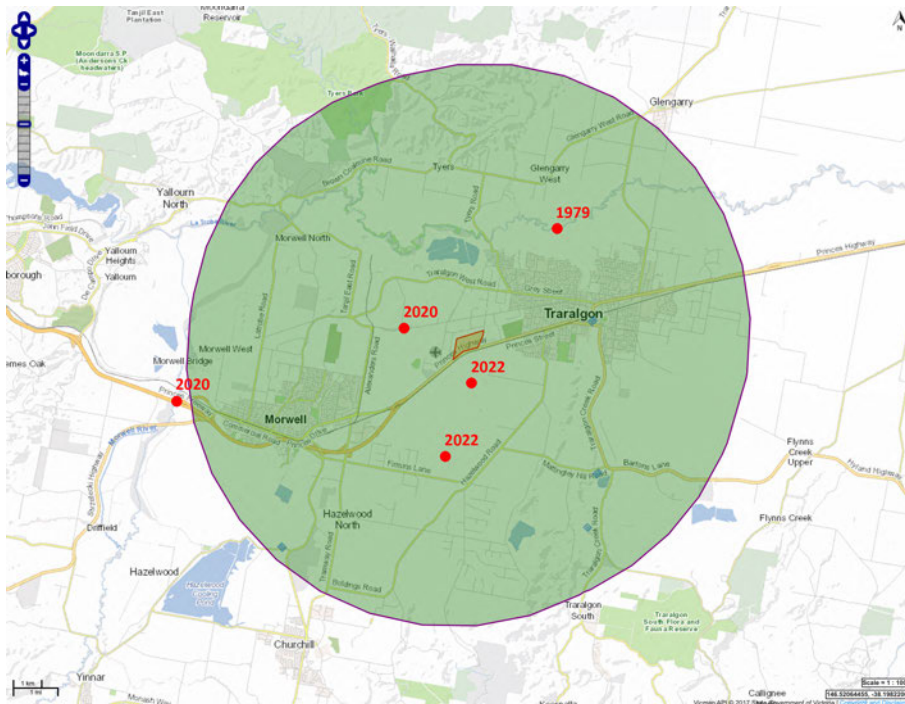


Figure 8 Flinders Pygmy Perch records (sources VBA)

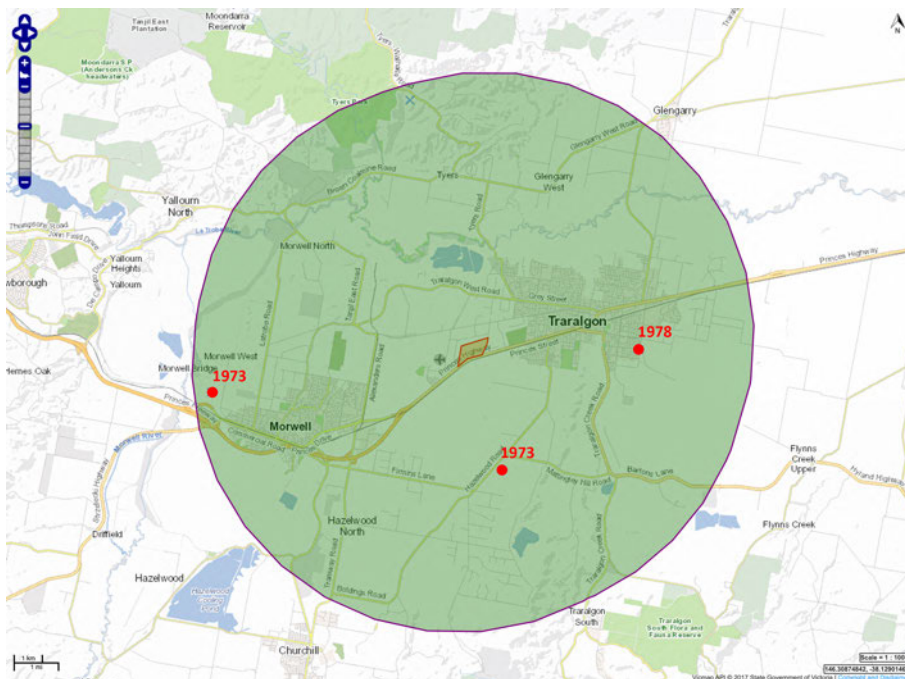


Figure 9 Growling Grass Frog records (sources VBA)

## 4.2 On-site Aquatic Habitat

The broad habitat types on the site include two large dams, the larger of which (Dam 2) is also referred to as Boyd’s Lake, and the femoral drainage lines connecting the dams to upstream and downstream habitats (Figure 10). it is important to note that stock (namely cattle) had free access to all of the waterways and water bodies on the site resulting in pugging, trampled vegetation and erosion impacts.

Each of these five habitat areas was surveyed separately and they are characterised as follows:

- **Reach 1:** A shallow but wide drainage line (Photo 5) which drains from the east across Regan Road and into Dam 1. Vegetation consisted of Rush (*Juncus spp.*), Sedge (*Cyperus spp.*), a range of water tolerant herbaceous species and pasture grasses. There was no shrub or tree overstory and the reach was heavily impacted by cattle pugging.
- **Dam 1:** A constructed dam approximately 200 metres long and 40 meters wide with a small island set towards one end. Aquatic vegetation consisted mostly Ribbon Weed (*Vallisneria spp.*) and Pond Weed (*Potamogeton spp.*), and fringing vegetation was similar to Reach 1.
- **Reach 2:** Set downstream of Dam 1 and approximately 160 metres and discharged into an off-site farm dam. The reach was characterised by the same wetland species as Reach 1 (Photo 7a).
- **Reach 3 (Boyd's Creek):** Set downstream of Dam 2, the approximately 300 metre reach of Boyd's Creek included an open flat channel towards its downstream extent (Photo 7b), but was more eroded and channelised at its upstream extent. It upper limit, at the discharge point of Dam 2, had a large ephemeral wetland. Vegetation was similar to Reach 1 and 2, with the addition of Swamp Lily (*Ottelia spp.*). However, with significantly more cattle pugging and impact including very turbid water caused by recent cattle movement in the water.
- **Dam 2 (Boyd's Lake):** Is a very large constructed dam, approximately 500 metres in overall length and 120 metres at its widest. Aquatic vegetation included large and dense stands of Water Ribbons, Pond Weed, and exotic lilies. Fringing vegetation was similar to the Reaches 1, 2 and 3, and Dam 1.



Figure 10 On-site habitat areas targeted for survey



Photo 5 Reach 1 looking upstream to the east



Photo 6 Dam 1 looking downstream northwest



Photo 7 Reach 2 looking downstream to the north (a) and Reach 3 / Boyd's Creek looking downstream to the north (b)



Photo 8 Dam 2 ' Boyd's Lake looking upstream southwest

## 4.3 Targeted survey

### 4.3.1 Dwarf Galaxias and Flinders Pygmy Perch

Dwarf Galaxias were not recorded on the site, despite considerable survey effort in areas of moderately suitable habitat and their easy recording at the nearby control site. Based on the results of this survey, the recent survey undertaken by Aquatica Environmental upstream (which also failed to detect the species), however they're ready detection at the downstream control site, it appears that Dwarf Galaxia are not currently resident in the middle to upper reaches of the waterways in and around the site. Accordingly is considered unlikely that Dwarf Galaxia are currently resident on or upstream of the site.

Conversely Flinders Pygmy Perch were readily detected in Dam 1 and Reach 3. They were not detected in Dam 1 or Reach 1 and 2, However it is probable they are present in that drainage line and dam. Given the species has also recently been detected in the same waterways immediately upstream and downstream of the site it is clear that waterways on the site currently contain a large population of the species.

Other aquatic fauna recorded during the survey included a range of 90 fish, invertebrates and the reptile along with a number of introduced fish species (Table 2).

Table 2 Dwarf Galaxias and Flinders Pygmy Perch survey results

Species recorded	Reach 1	Dam 1	Reach 2	Reach 3	Dam 2	Control Site
Dwarf Galaxias	-	-	-	-	-	5
Flinders Pygmy perch	-	-	-	3	10s	8
Mosquitofish ( <i>Gambusia holbrooki</i> )	-	1000s	10s	10s	100s	-
Australian smelt ( <i>Retropinna semoni</i> )	-	-	10s	10s	100s	-
Southern Short-fin Eel ( <i>Anguilla australis</i> )	-	1	-	-	10s	-
Flathead Gudgeon	-	-	-	-	6	-
Goldfish	-	1	-	4	9	-
Freshwater Shrimp ( <i>Paratya spp.</i> )	-	10s	-	-	100s	-
Eastern Snake-neck Turtle	-	1	-	-	10s	-



Photo 9 Flinders Pygmy Perch from Dam 1



Photo 10 A single fyke net haul from Dam 1 including Flinders Pygmy Perch, Australian Smelt, Mosquitofish, Southern Short-finned Eel and Eastern snake-neck Turtle

#### 4.3.2 Growling Grass Frog

No Growling Grass Frog were detected during the survey despite four rounds of survey effort and confirmation of species activity as follows:

- 2-3 individuals responded to call playback at a control site in Trafalgar one hour prior to commencing the Diurnal 1 survey on 7<sup>th</sup> December 2022 (i.e. they were calling under same conditions in the nearby region).
- At least five individuals responded to call playback at a control site at Koo Wee Rup the day and night prior to Diurnal 2 and Nocturnal 2 surveys (i.e. 19 December 2022, Gannon, P. 2022 pers comm. 19 December). they had also been regularly calling at this location around the time of the Diurnal 1 and Nocturnal 1 surveys.
- Tadpoles were detected at the Koo Wee Rup control site on 11 December 2022 (McCaffery, N. 2022. Pers comm, 11 December).
- Growling Grass Frog were heard calling in Melbourne, under similar conditions, at about the same time as the Nocturnal 2 survey.

Habitat within the drainage lines on the site would at best potentially represent dispersal habitat if there was a resident or nearby population. Further, habitat in the dams was also relatively marginal, missing a key habitat requirement being large dominating stands of emergent vegetation such as Typha, Phragmites and Eleocharis.

At least five common species of frog were recorded on the site during the four rounds of survey (Table 3). A range of tadpoles were also observed while undertake netting is part of the targeted fish survey. The tadpole species was not identified however it can be confirmed none of them were Growling Grass Frog tadpoles.

It is reasonable to expect that given the diurnal and nocturnal surveys were undertaken in suitable conditions and the control populations in the region were calling and all had evidence of breeding, if present on the site Growling Grass Frog should have been detectable.

Given the lack of any recent Growling Grass Frog records within a reasonable range of the site, the site not containing the full range of habitat required to likely support a population and the spaces not detected on the site

during the survey, despite them being active at similar times and under similar conditions in the water region, it appears that Growling Grass Frog are unlikely to occur on or immediately abutting the site.

Table 3 Growling Grass Frog Survey results

Common Name	Scientific Name	Diurnal 1	Nocturnal 1	Diurnal 2	Nocturnal 2
Growling Grass Frog	<i>Litoria raniformis</i>	-	-	-	-
Common Froglet	<i>Crinia signifera</i>	100s	100s	5	10s
Striped Marsh Frog	<i>Limnodynastes peronii</i>	5	10	1	5
Eastern Banjo Frog	<i>Limnodynastes dumerilii</i>	3	-	-	-
Whistling Tree Frog	<i>Litoria verreauxii</i>	-	10s	-	10s
Peron's Tree Frog	<i>Litoria peronni</i>	-	-	-	2

#### 4.4 Swamp Skink Habitat Assessment

The Swamp Skink is a cryptic species that generally inhabits densely vegetated, wet environments throughout south-east Australia (Humphery et al 2017). The species is usually restricted to the densely vegetated fringes and near riparian margins of swamps, wetland, stream and associated watercourses, and adjacent wet heaths (*Melaleuca* or *Leptospermum* thickets), sedgeland and saltmarshes (Clemann 2000, SAC 2000, Manning 2002). Although not present in all Swamp Skink habitats, where they do occur, rocks and logs (and artificial debris) are often used as basking, shelter and retreat sites (Robertson and Clemann 2015).

There was very little in the way of densely vegetated fringing or riparian habitats on the site, namely due to intensive grazing and trampling by cattle. There was also very little in the way of rocks, logs and other structures that could be utilised by the species for shelter and basking.

Key threats to the species, relevant to the site, include (Clemann 2000):

- Loss and fragmentation of habitat (see next point);
- Clearing for agriculture (as has already occurred on the site);
- Degradation of riparian vegetation (no riparian vegetation is present on the site); and
- Grazing and trampling of habitat by stock (as is occurring on the site).

Aquatica Environmental does not espouse to have reptile ecology specialisation, however, has identified and successfully surveyed for the species at a site to the West of Morwell. Based on Aquatica Environmental's limited experience, habitat fringing the aquatic environments on the site did not appear to provide the structure, type or density of habitat characteristics required to support the species. Further, heavy trampling by cattle where there is slightly denser areas of vegetation (i.e. Reach 1) would seem a significant impediment to the species' presence on the site.

## 5. POLICY AND LEGISLATION IMPLICATIONS

Table 4 provides a brief outline of the ecological policy and legislation that is relevant to the target species and assessment findings (i.e. Flinders Pygmy Perch present but Dwarf Galaxias and Growling Grass Frog unlikely present).

Table 4 Policy and legislation implications

Legislation / Policy	Criteria	Potential Implications for Project
<b>Commonwealth</b>		
Environment Protection and Biodiversity Conservation Act 1999	<p>The <i>Environment Protection and Biodiversity Conservation Act 1999</i> (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as matters of national environmental significance. There are nine matters of national environmental significance (MNES) to which the EPBC Act applies, these are:</p> <ul style="list-style-type: none"> <li>• world heritage properties</li> <li>• national heritage places</li> <li>• wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed)</li> <li>• nationally threatened species and ecological communities</li> <li>• migratory species</li> <li>• Commonwealth marine areas</li> <li>• the Great Barrier Reef Marine Park</li> <li>• nuclear actions (including uranium mining)</li> <li>• a water resource, in relation to coal seam gas development and large coal mining development.</li> </ul>	None relating to Growling Grass Frog or Dwarf Galaxias as the species are considered unlikely present on the site.
<b>State</b>		
<i>Flora and Fauna Guarantee Act 1988</i>	<p>The Victorian <i>Flora and Fauna Guarantee Act 1988</i> (FFG Act) was established to provide a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes. Amended in 2019, one of the main features of the Act is the listing process, whereby native species and communities of flora and fauna, and the processes that threaten native flora and fauna are listed in the schedules of the Act. This assists in identifying those species and communities that require management to survive and identifies the processes that require management to minimise the threat to native flora and fauna species and communities within Victoria.</p>	The FFG Act only applies on public land. In this instance a permit under the FFG Act to 'take protected fauna' is required of FFG Act listed fauna handling is required along any perimeter of the site that may interact with public land. Should this scenario occur the permit would likely need to be supported with a salvage and translocation plan for Flinders Pygmy Perch.
<i>Wildlife Act 1975</i>	<p>The <i>Wildlife Act 1975</i> forms the procedural, administrative and operational basis for the protection and conservation of native wildlife within Victoria.</p> <p>The purposes of the Act are:</p> <ol style="list-style-type: none"> <li>1. To establish procedures in order to promote: <ul style="list-style-type: none"> <li>• The protection and conservation of wildlife</li> </ul> </li> </ol>	In accordance with this Act, if any native wildlife is located within the waterways or vegetation proposed for clearing (i.e. turtles or frogs), a licence is required to take or

Legislation / Policy	Criteria	Potential Implications for Project
	<ul style="list-style-type: none"> <li>• The prevention of taxa wildlife from becoming extinct</li> <li>• The sustainable use of and access to wildlife</li> </ul> <p>2. To prohibit and regulate the conduct of persons engaged in activities concerning or related to wildlife.</p> <p>This Act often sits as the default reference for other associated policies regarding wildlife management or other Victorian legislation. For example, the operation of the FFG Act often needs to be considered in conjunction with the provisions and procedures of the Wildlife Act, as some wildlife will be both protected wildlife under the Wildlife Act and listed threatened species under the FFG Act.</p> <p>With the exception of 'pest animals' declared under the CaLP Act or wildlife declared to be 'unprotected wildlife', the Wildlife Act defines certain wildlife as 'protected wildlife'. It is an offence to hunt, take or destroy threatened or protected wildlife without authorisation.</p>	<p>destroy it, including salvage and translocation.</p> <p>This will also apply to any works on/to the dams that may result in an impact to wildlife, including amphibians, reptiles, mammals, waterbirds, FFG Act listed crustaceans (i.e. Burrowing Crayfish), etc. but excluding fish.</p> <p>If native vegetation is proposed to be impacted by the works, the specific impacts of these works should be considered on a case-by-case basis with reference to this legislation.</p>
<i>Fisheries Act 1995</i>	<p>One of the objectives of the <i>Fisheries Act 1995</i> (Fisheries Act) is to protect and conserve fisheries resources, habitats and ecosystems including the maintenance of aquatic ecological processes and genetic diversity. One of the provisions of this Act is that a person must not, except as permitted by or under the Fisheries Act or any other Act, create an obstruction across or within a bay, inlet, river or creek or across or around an inter-tidal flat that:</p> <p>“(a) fish will or could be blocked and left stranded; or  (b) immature fish will or could be destroyed; or  (c) the free passage of fish will or could be obstructed.”</p> <p>This act is relevant if there is a likelihood that a development will impact on fish habitat and aquatic ecological processes. Similar to the FFG Act, action statements must outline the process that will be implemented to ensure the long-term protection of fish habitat and/or specific species</p> <p>In addition, Victoria has listed a number of species and genera as noxious under Section 75 of the Fisheries Act. By declaring a particular species noxious, the Victorian Government applies regulations to control the use and potential spread of such animals.</p>	<p>If fish handling, capture or translocation is required (i.e. capture and release of entrapped fish if the dams are to be decommissions) an Application for a General Permit for the purpose of research (this includes capture and release or translocation) may be required from the Victorian Fisheries Authority (VFA). This will need to be supported by a suitably experienced and licensed aquatic ecologist and salvage/relocation plan.</p> <p>Any noxious listed fish that may be encountered in a works area (i.e. the Eastern Gambusia in Dam 2), will require appropriate salvage and euthanising/disposal to prevent their re-release/spread.</p>

Legislation / Policy	Criteria	Potential Implications for Project
<i>Catchment and Land Protection Act 1994</i>	<p>The Catchment and Land Protection Act 1994 (CALP Act) is the principal legislation relating to the management of pest plants and animals in Victoria. Under this Act, landowners have a responsibility to avoid causing or contributing to land degradation, including taking all reasonable steps to conserve soil, protect water resources, eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds and where possible, eradicate established pest animals, as declared under the Act.</p> <p>Under the CaLP Act it is prohibited to:</p> <ul style="list-style-type: none"> <li>• Carry out extractive activity unless an authority has been issued;</li> <li>• Move vehicles or machinery from land on to a road without first ensuring precautions are taken to ensure the equipment is free of noxious weeds;</li> <li>• Remove soil, sand, gravel or stone which comes from land on which noxious weeds grow.</li> </ul> <p>The Act outlines and guides the control of state and regionally prohibited weeds and prohibited pest animals.</p>	<p>Measures will need to be outlined in the project's management plan that detail how the spread of disease, weeds and pests will be managed during construction.</p>
<i>Water Act 1989</i>	<p>The <i>Water Act 1989</i> (Water Act) provides the framework for allocating surface water and groundwater throughout Victoria. In Section 67 of the Act it states that works on waterways, such as the construction of dams, weirs and erosion control structures, are licensed in accordance with the Act. The Act allows conditions to be included in a works licence to protect the "environment, including the riverine and riparian environment".</p> <p>The purpose of the Water Act is to:</p> <ul style="list-style-type: none"> <li>• State the law relating to water in Victoria;</li> <li>• Maximise community involvement in the making and implementing for the use of conservation or management of water resources; and</li> <li>• Provide formal means for the protection and enhancement of the environmental qualities of waterways.</li> </ul>	<p>Under the Act approval must be sort from the local catchment management authority (CMA) and a "WoWL" is required to "construct, alter, operate, remove or decommission:</p> <ul style="list-style-type: none"> <li>• any works on a waterway a waterway; or</li> <li>• a bore.</li> </ul> <p>A WoWL may be required from West Gippsland CMA (WGCMCA) for any works that occur on the on-site waterways.</p>
<i>Environmental Protection Act 1970</i>	<p>The <i>Environmental Protection Act 1970</i> (EP Act) is Victoria's primary environment protection legislation, with a basic philosophy of preventing pollution and environmental damage by setting environmental quality objectives and establishing programs to meet them. Under the EP Act State environment protection policies (SEPPs) are established to provide more detailed requirements and guidance for the application of the Act to Victoria. The SEPPs administered by the Environment Protection Authority (EPA) cover air, land and groundwater, noise and water.</p>	<p>The EPA administers several regulations under this Act that include, but are not limited to, prescribed waste, noise, vehicle emissions, pollution of water by oil and noxious substances.</p> <p>Any works that may include a potential discharge to the waterway, emissions or noise may require additional consideration of this legislation.</p>

## 6. CONCLUSION AND RECOMMENDATIONS

Based on the results from the assessment the following conclusions can be made:

- The FFG Act protected Flinders Pygmy Perch is present in the site's waterways and water bodies, as well as those immediately upstream and downstream of the site.
- Dwarf Galaxias are unlikely present on the site due to a lack of detection despite significant survey effort. However, an important population occurs a short distance downstream from the site and consideration will need to be given to the potential impacts of development of the site on those downstream receiving waterways (i.e. site discharge of reduced water quality, sediments and pollutants, and changes to hydrology).
- Growling Grass Frog are unlikely present on the site due to a lack of ideal habitat, nearby records and detection on the site despite the species being detected at similar times under similar conditions (i.e. the spaces should have been detectable if present).
- The two dams and drainage lines (including Boyd's Creek) on the site support a range of aquatic habitats and aquatic fauna species. In addition to the detection of the FFG Act listed Flinders Pygmy Perch, the site's waterways also support native aquatic species including Australian Smelt, Flathead Gudgeon, Southern Short-fin Eel, Southern Long-necked Turtle and a wide range of common amphibians and aquatic invertebrates.
- Based on Aquatica Environmental's limited experience, habitat fringing the aquatic environments on the site did not appear to provide the structure, type or density of habitat characteristics required to likely support Swamp Skink. Further, heavy trampling by cattle where there is slightly denser areas of vegetation (i.e. Reach 1) would seem a significant impediment to the species' presence on the site.
- Decommissioning or dewatering of either dams will need to address the probable salvage and translocation of fish and other aquatic fauna within the dams and their relocation to other suitable habitat. Appropriate fisheries and wildlife permits and planning would be required for this task.
- Alternatively, if the dams can be retained and incorporated into the sites Water Sensitive Urban Design (WSUD) with stormwater management, impacts may be avoided and the aquatic values retained.

Considerations and recommendations:

- Design the site development so that the existing waterbodies and drainage lines are retained and ideally enhanced and protected by a minimum 30 metres buffer.
- A works on WoWL may need to be obtained from WGCMA for any works that occur on the site's main waterways such as Boyd's Creek.
- Development of the site will need to factor the uninterrupted maintenance of fish passage between known populations of fish and other aquatic fauna upstream and downstream of the site. Again this is particularly relevant to Boyd's Creek, but may also be similarly relevant to the Reach 1 and 2 drainage line, Particularly at its upstream extent where Reach 1 crosses Regan Road.
- Development of the site will need to factor downstream impacts associated with the change of land use, particularly those around possible increase volumes of stormwater, sediments and pollutants and changes to hydrology.
- Once the site's development plan had been finalised and should any of the drainage lines or dams require partial or complete decommissioning, engage with a suitably experienced and licenced / permitted aquatic ecologist to provide advice and assistance with planning, approval and aquatic fauna salvage and relocation.

- It is recommended that should there be any uncertainty with regards to Aquatica Environmental's Swamp Skink habitat assessment a species specialist should be engaged to validate the findings and further inform the project.

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