

APA Transmission Pty Limited

Growling Grass Frog Targeted Survey Report

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EXECUTIVE SUMMARY

APA Transmission Pty Limited, a wholly owned subsidiary of the APA Group (together referred to as APA) is proposing to construct and operate a 56.2 km in length high pressure gas pipeline which will connect AGL's proposed Gas Import Jetty at Crib Point to the Victorian Transmission System (VTS), east of Pakenham.

Monarc Environmental (Monarc) is providing ecological and environmental services to support the regulatory approval process for the CPP Pipeline on behalf of APA Transmission Pty Limited, including undertaking of targeted fauna surveys to inform State and Commonwealth Referral applications.

This report summarises the findings from targeted surveys of the Growling Grass Frog *Litoria raniformis* undertaken during March 2018. The aim of the surveys was to determine if the Growling Grass Frog was present or is likely to be present in the habitats within or adjacent to the proposed pipeline alignment. Presence or likelihood of presence will inform future management actions for the project.

A total of 12 locations were selected for Growling Grass Frog targeted surveys along the alignment. After initial site inspections, suitable habitat for the Growling Grass Frog was found at seven sites. These locations were assessed for four nights during optimal climatic conditions in March 2018, in accordance with Commonwealth survey guidelines (DEWHA 2009a). Water quality recorded at each of these seven sites was deemed to be suitable to support the Growling Grass Frog.

The Growling Grass Frog was recorded at Cardinia Creek South - Bloomfield Lane (KP 40-40.3, site CPT105) but is also assumed present at Cardinia Creek, Ballarto Road (also KP 40-40.3, site CPT106) given both sites are hydrologically connected and in very close proximity. Impacts to these sites will be avoided using Horizontal Directional Drilling (HDD) techniques.

The Growling Grass Frog was not recorded but may be present at the following locations where suitable habitat was located:

- KP 20.32
- KP 23.05 - avoided by HDD
- KP 31.1
- KP 41.5 - avoided by HDD
- KP 48.55

Mitigation actions could be used to further avoid impacts. Such actions are discussed in the Flora, Fauna and Impact Assessment report for this project, also being prepared by Monarc.

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1 Introduction

1.1 Project Overview

APA Transmission Pty Limited, a wholly owned subsidiary of the APA Group (together referred to as APA) is proposing to construct and operate a high pressure gas pipeline which will connect AGL's proposed Gas Import Jetty at Crib Point to the Victorian Transmission System (VTS), east of Pakenham.

Refer to the Flora and Fauna Assessment - Crib Point Pakenham Pipeline (Monarc 2018) for a full description of the project.

1.2 Purpose of this report

Monarc Environmental (Monarc) is providing ecological and environmental services to support the regulatory approval process for the CPP Pipeline on behalf of APA, including undertaking of targeted fauna surveys to inform State and Commonwealth Referral applications.

This report summarises the findings from targeted surveys of the Growling Grass Frog *Litoria raniformis* undertaken during March 2018. The aim of the surveys was to determine if the Growling Grass Frog was present or is likely to be present in the habitats within or adjacent to the proposed pipeline alignment. Presence or likelihood of presence will inform future management actions for the project.

The overall aim of this survey was to determine if the Growling Grass Frog was present or is likely to be present in the habitats within or adjacent to the alignment. Presence or likelihood of presence will inform future management actions for the project.

1.3 Study Area

The proposed pipeline is to be installed between Crib Point, approximately 63km south-south-east of Melbourne on Victoria's Mornington Peninsula and Pakenham, about 56km east-south-east of Melbourne. Refer to **Figure 1** for an overview of the pipeline alignment.

The total alignment will be approximately 56.2km in length, with a project corridor up to 30 metres in width. In environmentally sensitive areas, subject to the results of studies undertaken for the project, the project corridor may be reduced to avoid or minimise impacts to sensitive features.

The following is a brief description of the proposed route:

- From the Crib Point jetty, the route heads in a westward direction, crossing The Esplanade and entering private property (BP owned) where it turns north heading towards Woolleys Road. It then travels north-west, adjacent to Woolleys Road within the Esso/APA easement (PL11/46) before crossing Woolleys Road. It continues in a north-westerly direction through private property and entering Warringine Park at approximately KP3.25.
- The route travels in a north-westerly direction until approximately KP3.8 where it turns and heads directly north. It travels in this direction through the park for approximately 1.1km before turning westwards inside the park, along Reid Parade, before exiting Warringine Park, (KP 5.2). From here it turns northwards to follow the Frankston-Flinders Road service lane for approximately 900 metres. At this point it turns east into High St where it enters the Stony Point

rail easement for 500 metres before heading turning left into Cool Store Road at KP6.8. It then turns back into Frankston-Flinders Road to continue northwards for a further two kilometres on the eastern side of the road.

- The route crosses Graydens Road then heads northwards, then east through private land, crossing the Stony Point Rail line and Frankston-Flinders Road to the north of Hastings at approximately KP9.8 to travel in a north-easterly direction for the remainder of the route through to Pakenham.
- As it heads north-easterly, the route follows Esso's pipeline easement (PL27/35) from KP10.4, south of Denhams Road, Hastings to KP29.7 near the South Gippsland Highway. The route is directly adjacent to the Esso easement for this component and travels through private land parcels, crossing several major and minor road easements and key drainage lines connected to the Western Port Ramsar Wetland.
- From the South Gippsland Highway, the route branches away from the Esso easement, travelling north-easterly through private land parcels, major and minor road easements and drainage lines before crossing the Princes Freeway and Princes Highway to meet PL75 within private land.

1.4 Scope of Works

Monarc Environmental (Monarc) was commissioned to undertake targeted Growling Grass Frog *Litoria raniformis* surveys in suitable habitat along the pipeline alignment. Access to properties was staged and commenced after 28 February 2018. These surveys were to consist of

- Determining suitable habitat along the alignment for Growling Grass Frogs,
- Describe the suitable habitats for Growling Grass Frogs along the alignment in accordance with recommended approaches (DEWHA, 2009),
- To undertake field surveys within suitable Growling Grass Frog habitats along the alignment that correspond to required survey techniques by the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA, 2009),
- Preparation of this report, summarising the works undertaken, the findings and recommendations.

1.5 Limitations

Refer to the Flora and Fauna Assessment - Crib Point Pakenham Pipeline (Monarc 2018) for a discussion of limitations associated with all flora and fauna assessments undertaken for the project by Monarc.

2 Background

2.1 Species Status

The Growling Grass Frog is also known as the Green and Golden Frog, the Warty Bell Frog and Southern Bell Frog. The species is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Within Victoria, the species is Listed as Threatened under the *Flora and Fauna Guarantee Act 1989* (FFG Act) and Endangered under the Victorian Department of Environment, Land, Water and Planning (DELWP) '*Advisory List of Threatened Vertebrate Fauna in Victoria*' (DSE 2013).

A National Recovery Plan has been approved by the Commonwealth Government (Clemann & Gillespie 2012). Significant impact guidelines have also been published by the Commonwealth Government for this species (DEWHA 2009a).

2.2 Species Characteristics

The Growling Grass Frog is one of Australia's largest frogs with females growing to a maximum of 104mm (Anstis 2013). They vary in colour and pattern but in general are olive to bright emerald green with irregular gold, brown, black or bronze spotting. Their backs are warty and usually have a pale green mid-dorsal stripe while a cream or yellow stripe underlined by a dark brown stripe runs from the nostril, through the eye, above the inner ear and down the sides of the body to the groin as a dorso-lateral fold. On their bellies, Growling Grass Frogs are white and coarsely granular. During the breeding season males may become yellow or dark grey/black under the throat (DEWHA 2009b).

2.3 Habitat preferences

Growling Grass Frogs tend to be associated with permanent still or slow flowing waterbodies such as streams, farm dams and billabongs. They can also use temporarily inundated waterbodies for breeding purposes, provided that they contain water over the breeding season. Typically, the species prefers well vegetated water bodies that support extensive areas of emergent, submerged and floating vegetation as these provide both basking sites and protection from predators as well as areas for egg deposition (DEWHA 2009b). Typical vegetation includes *Typha* sp. (Cumbungi), *Phragmites australis* (Common Reed) and *Eleocharis* sp. (Spike-rush) in or at the edge of water bodies. Terrestrial vegetation and other debris around the perimeter of the waterbody can also provide foraging, dispersal and over-wintering sites for the frogs which often find refuge in soil cracks, flood debris or fallen timber. Rocks and other solid features can also provide an important level of habitat complexity supplying shelter, over-wintering refuge and basking and foraging platforms.

Depending on seasonal conditions the frogs may be active from October to March but the breeding period generally occurs from November to February, often following local flooding and a marked rise in water levels which triggers calling in breeding males (DoEE 2018). Males generally call while afloat amongst rushes or sedges and during the breeding season animals can be found floating amongst aquatic vegetation within or at the edge of suitable water bodies. In summer, the frog is sometimes found during the day basking on grassy banks near water and in wet weather may move away from water to forage on the ground in surrounding vegetation. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.

In general, waterbodies with appropriate characteristics and which are located within 500m of each other are more likely to support a population of GGF compared with isolated sites. Predatory exotic fish such as Eastern Gambusia (*Gambusia holbrooki*), however, can affect the viability of habitats.

2.4 Species distribution

The Growling Grass Frog was once widespread across most of south-eastern Australia but its range has significantly decreased since the 1980s. Most remaining populations are highly localised but isolated populations persist in the greater Melbourne area, south-west, central and eastern Victoria. It has been documented in several studies conducted in the growth areas of Melbourne including important populations in the river systems of the Mornington such as Clyde Creek, Cardinia Creek, Gum Scrub Creek and Toomuc Creek (DELWP 2017).

3 Methods

3.1 Desktop Assessment

A desktop review was undertaken to ascertain potential presence of the Growling Grass Frog along the alignment based on known records in the area. The desktop review included a search of relevant literature, online resources and the following ecological databases:

- The Commonwealth Government's EPBC Act Protected Matters Search Tool (PMST) for potential species records and species habitat within a 5km buffer of the proposed pipeline corridor (DoEE 2018b); and
- The DELWP Victorian Biodiversity Atlas (VBA) (DELWP 2018) for existing records of species occurring within a 5km buffer of the proposed pipeline corridor. The database records sightings of all species reported to DELWP (including the locality and date of sighting) and indicates whether species are listed under the EPBC Act, Victorian FFG Act or DELWP Advisory Lists.

The search of the VBA showed that more than 190 sightings of the Growling Grass Frog have been reported between 1999 and 2016 within a 5km buffer of the alignment. Numerous sightings have been recorded along the alignment and 5km buffer, mostly concentrated in the following areas: Ballarto Rd, McDonalds Drain Rd, Oakview Lane and Princes Highway sections of the alignment. In addition, monitoring for the Victorian Desalination Project reported the presence of Growling Grass Frogs at Lower Gum Scrub Creek and McDonalds Drain Road three years post construction (AECOM/Watersure 2016).

Information from both databases and aerial imagery was then compiled to obtain a preliminary list of locations that may provide suitable Growling Grass Frog habitat within the vicinity of the alignment. On-ground habitat assessments were then undertaken from 15-28 March 2018 to confirm habitat suitability. The 12 locations identified for surveys are listed in **Table 2** and presented in **Figure 2**.

3.2 Survey conditions

Growling Grass Frog surveys are to be undertaken in accordance with Commonwealth EPBC Act Policy Statement 3.14 - *Significant Impact Guidelines for the vulnerable Growling Grass Frog* (Commonwealth Guidelines) (DEWHA 2009a) which include the following survey condition requirements:

- Nocturnal surveys are to be undertaken between November and March (calling primarily takes place between November and December however the frogs may still be active in March);
- Daytime temperatures prior to survey are to be greater than 15°C with moderate to no wind; and
- Night temperatures during survey are to be greater than 12°C with moderate to no wind.
- A minimum of two nights of survey under ideal conditions.

In addition, the *Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes* (Heard et al 2010) states that for nocturnal surveys to have a 0.99 cumulative probability of detection (*P*), the required nocturnal surveys should be increased to four if the surveys are done in December-March.

3.3 Targeted Surveys

A site inspection was conducted to assess the habitat suitability of the 12 preliminary locations that may provide suitable Growling Grass Frog habitat. Basic water quality parameters were collected from the waterbody including Dissolved Oxygen, Electrical Conductivity, pH, Turbidity, Temperature, Salinity, and Total Dissolved Solids (See Table 3).

Assessment of habitat conditions and water quality reduced the number of locations deemed suitable for the Growling Grass Frog from 12 to seven.

Targeted surveys were then conducted at these seven sites between 15 and 28 March 2018 in accordance with Commonwealth Guidelines (DEWHA 2009a) and included the following:

- Survey nights were selected based on projected weather conditions outlined in Section 3.2;
- Surveys were conducted between 2100hrs and 0200 hrs using a combination of active searching with spotlights in appropriate habitat, call recording and call playback (using the advertising call of the male) and a search of banks and emergent vegetation where appropriate.
- Since March 2018 was at the tail end of the recommended survey period for the species, the number of nocturnal surveys undertaken was increased to four at each site to increase chances of detection (Heard et al. 2010).

Surveys commenced with a period of listening at each survey point to determine if any frogs were active in the area (minimum 10 minutes). Males are likely to respond to playback during the breeding season therefore calls were broadcast at several locations along the waterbody (maximum of 50m spacing) and at least two locations within each of the smaller water bodies. After playback, ten minutes was spent listening for any evidence of Growling Grass Frog response. All frogs audible during the survey were recorded for later confirmation against reference recordings of frog calls and all species detected during the surveys were noted.

Active searching along the edge of the waterbody was also undertaken throughout the survey. Habitat features such as vegetation composition and structure, presence of refuge or shelter sites and suitable dispersal sites were also noted. Features noted about each of the survey sites included availability of breeding habitat (e.g. suitable vegetation) and location in the landscape (e.g. proximity to other possible Growling Grass Frog sites).

4 Results

A total of seven amphibian species were recorded from seven locations surveyed between 15 and 28 March 2018 (Refer to **Figure 3** for Site Photos). A Growling Grass Frog was recorded from only one location, at CPT105 (Cardinia Creek South - Bloomfield Lane, Cardinia). CPT125 had the most number of amphibian species recorded. The most commonly observed amphibian was the Eastern Common Toadlet which was recorded in all sites. These results are discussed below and summarised in **Table 5**.

The presence of organisms that may prey on the Growling Grass Frog - either as an adult, metamorphling or tadpole were also noted during the surveys. These include European Carp *Cyprinus carpio*, Eels *Anguilla* sp., Red Fox *Vulpes vulpes*, and Eastern Gambusia *Gambusia holbrooki*.

4.1 Survey Conditions

Field conditions during the targeted surveys are summarised in **Table 3** and conform to recommended guidelines (DEWHA 2009a). Night time temperatures during the surveys were between 13 and 29°C while wind speed was between 0 and 22kph.

Below average rainfall had been received in the project area in February and March 2018 contributing to low or no water flow within most drainage lines.

The following rainfall records were obtained from the Bureau of Meteorology for Cerberus (approximately three km south of the start of the survey area):

- Monthly rainfall for March 2018: 27.6 mm;
- Monthly rainfall for March 2017: 59.6 mm;
- Monthly rainfall for March for all years: 44.9 mm.

Growling Grass Frogs could recolonise areas of suitable habitat, even if not recorded during these surveys, once those habitats recover from dry conditions.

4.2 Water Quality

Water quality parameters recorded at waterbodies with adequate water flow are summarised in **Table 4** below. Seven locations had sufficient water to enable water quality monitoring. Water quality data were not collected in locations that were deemed not suitable for the Growling Grass Frog.

General Water Quality guidelines for the Peninsula (Part 3 Scheduled area for the Western Port) as reported in the *State Environmental Protection Policy (Waters of Victoria) 1988* provide guidance on suitable water quality parameters to protect beneficial uses. Water temperatures, salinity and electrical conductivity, pH and Dissolved Oxygen were all within acceptable levels. Water turbidity was outside acceptable limits at each site being greater than 86 NTUs. A NTU reading of 25 or less is deemed acceptable. However, these high NTU readings would not totally inhibit Growling Grass Frog inhabitation of the surveyed sites.

4.3 Habitat Descriptions

The results of the habitat assessment of the preliminary locations undertaken during March 2018 are presented below and summarised in **Table 1**.

Table 1: Summary of Habitat Assessments for the Growling Grass Frog Targeted Surveys.

Survey Location	Habitat Type	Vegetation Cover (%)					Surrounding Habitat	Predators Present	Water Level	Remarks
		Emergent	Submerged	Floating	Fringing	Terrestrial				
CPT 057	Farm Dam; Drainage line	50	30			100	Swamp Scrub; Road	Fox	Dry in the drainage line but dam held water	Surveys Completed. Suitable habitat for GGF in dam.
CPT 061	Farm Dam				10	20	Swamp Scrub		Normal	Not Suitable for GGF
CPT 062	Wetland		80	80			Swamp Scrub		Normal	Surveys Completed. Suitable habitat for GGF.
CPT 063	Farm Dam	20							Low	Not Suitable for GGF
CPT 078	Outfall Drain	80			60	15	Phalaris	Carp, Eastern Gambusia	Low	Surveys Completed. Suitable habitat for GGF.
CPT 097	Inlet Drain						Blackberry, Phalaris		Dry	Not Suitable for GGF
CPT 105	Creek	100					Scattered Wattles within mown Phalaris	Fox		Surveys Completed. Suitable habitat for GGF
CPT 106	Creek	60			30	20	Scattered Wattles within mown Phalaris	Eel, Fox, Eastern Gambusia	Low	Surveys Completed. Suitable habitat for GGF
CPT 108	Creek	70			50		Road	Eastern Gambusia	Low	Surveys Completed. Suitable habitat for GGF
CPT 118	Drain	20					Phalaris		Dry	Not Suitable for GGF
CPT 125	Creek	80					Pasture Grasses, Phragmites & Blackberry	Fox, Eastern Gambusia	Low	Surveys Completed. Suitable habitat for GGF

Survey Location	Habitat Type	Vegetation Cover (%)					Surrounding Habitat	Predators Present	Water Level	Remarks
		Emergent	Submerged	Floating	Fringing	Terrestrial				
CPT 132-135	Drainage Line								N/A	No further survey required; Restricted Access

4.3.1 CPT057 (KP20.32)

A farm dam and roadside drainage line within private property north of South Boundary Road East, Pearcedale.

This location was surveyed on four nights between 15 - 20 March 2018.

The dam supported 50% emergent aquatic vegetation cover and 30% submerged aquatic vegetation cover while terrestrial vegetation cover comprised of 80% exotic grasses, Kikuyu *Pennisetum clandestinum* and 20% native grasses. No basking sites or floating vegetation were observed. However, given the emergent vegetation and presence of terrestrial vegetation it is still possible Growling Grass Frogs may inhabit the farm dam at KP20.32.

The drainage line was bordered by a swamp scrub on one side and a road on the other side. The drainage line was dry at the time of the surveys. The drainage line was not considered suitable habitat during the time of survey.

The following amphibians were recorded from this location - Common Eastern Froglet *Crinia signifera*, Spotted Marsh Frog *Limnodynastes tasmaniensis* and Striped Marsh Frog *L. peronii*. However, no Growling Grass Frogs were observed during the survey.

4.3.2 CPT061 (KP22.87)

A farm dam within private property west of Vowell Drive, Pearcedale. This location was surveyed on 15 and 23 March 2018.

The dam only supported 10% fringing vegetation cover and no emergent aquatic vegetation or basking sites. Moreover, terrestrial vegetation had only 20% cover.

This location was deemed not suitable habitat for the Growling Grass Frog.

4.3.3 CPT062 (KP23.05)

A wetland complex within private property east of Vowell Drive, Pearcedale. This location was surveyed four times between 23 and 28 March 2018.

The wetland was generally shallow and depth ranged from approximately 30cm to 60cm and predominately muddy substrate. The riparian vegetation at the wetlands was restricted to a narrow, semi-continuous band of predominately native species (Swamp scrub species) less than 5 m wide around the banks. There was very little emergent vegetation and macrophytes were restricted to isolated patches of submerged vegetation including Water Ribbons *Triglochin* sp. Although cattle and horses were fenced away from the wetlands there were still evidence of some bank erosion. Shading of the wetlands was estimated at <5%. Exotic Agapanthus *Agapanthus praecox* subsp. *orientalis* and Blackberries *Rubus fruticosus* sp. agg. were recorded around the area. On one of the survey nights, the wetland had up to 80% cover of floating ferns *Azolla* sp.

It is possible Growling Grass Frogs may inhabit the wetland complex at KP23.05.

The following amphibians were recorded from this location - Common Eastern Froglet, Southern Brown Tree Frog *Litoria ewingi*, Striped Marsh Frog, and Whistling Tree Frog *Litoria verreauxii*. However, no Growling Grass Frogs were observed during the surveys.

4.3.4 CPT063 (KP23.8)

A farm dam within private property west of Craigs Lane, Pearcedale. This location was surveyed on 15 March 2018 and the land use at the time of the survey was a horse stud.

The dam supported 20% emergent aquatic vegetation cover. The water was cloudy and green, potentially due to cyanobacteria. Horses were present in the paddock.

A second dam was situated nearby, which was built by Esso during the recent pipeline construction, but did not support any aquatic vegetation at the time of survey.

This location was deemed not suitable habitat for the Growling Grass Frog.

4.3.5 CPT078 (KP31.1)

The Western Outfall Drain, located in Tooradin within a Melbourne Water easement, had a stream width ranging from approximately 4 to 7 m. The drain was shallow with an estimated average depth of around 50 cm interspersed with many deeper (> 90 cm) pools. The substrate of Western Outfall Drain was dominated by sand. This location was surveyed four times between 23 - 28 March 2018.

The riparian vegetation at Western Outfall Drain was restricted to a narrow, semi-continuous band with a mixture of native (*Persicaria* sp., *Juncus* sp., and Common Tussock Grass *Poa labillardierei*) and exotic species (Kikuyu, *Phalaris* sp.) less than 2m wide on either bank. Instream macrophytes were dominated by large patches of emergent vegetation, including Cumbungi *Typha orientalis* and Common Reed which blocked areas of the drain so that it was reduced to a 1m wide section. Slender Knotweed *Persicaria decipiens* and an exotic grass, Water Couch *Paspalum distichum*, occupied areas that were not filled with Cumbungi or Common Reeds, leaving a narrow channel (~1-1.5m wide) for water to flow through. Shading of the creek was estimated at <5%.

It is possible Growling Grass Frogs may inhabit the wetland complex at KP31.1.

The Common Eastern Froglet was the only amphibian recorded from this location at the time of the nocturnal surveys.

Potential Growling Grass Frog predators such as European Carp, and Eastern Gambusia were observed at this location.

4.3.6 CPT097 (KP37.1)

Tooradin Inlet Drain is located in a DELWP easement on Adams Road, Dalmore. This location was surveyed on 23 and 24 March 2018.

The drain supported emergent Common Reed but was dry at the time of the surveys. The surrounding area supported Blackberries and *Phalaris* sp.

This location was deemed not suitable habitat for the Growling Grass Frog at the time of the surveys.

4.3.7 CPT105 (KP40.1)

The proposed crossing at Cardinia Creek is located within a Melbourne Water easement in Cardinia. In the vicinity of the crossing, Cardinia Creek was generally 6-8m in width. The creek was shallow with an estimated average depth of around 40 cm interspersed with many deeper (> 70 cm) pools. The substrate of Cardinia Creek was dominated by sand.

The riparian vegetation at Cardinia Creek was restricted to an access track along the western side of the creek, with a levy bank separating this creek from the smaller (and dry) creek that parallels Cardinia Creek. The vegetation between the two creeks included Black Wattle (*Acacia mearnsii*), interspersed with Gorse (*Ulex europaeus*) and Blackberry with pasture species underneath. The vegetation on the eastern side of the creek included the same exotic species on the other side with the addition of Hawthorn (*Crataegus monogyna*). Instream macrophytes were dominated by large patches of emergent vegetation, including Cumbungi and Common Reed, these plants occupied large sections of the creek between each bank, leaving large pools in between. A large proportion of filamentous algae were also observed throughout the reach. Other forms of instream habitat included undercut banks. Although both banks of Cardinia Creek were fenced to exclude stock access, there were still evidence of some bank erosion and slumping throughout the reach. Shading of the creek was estimated at <5%.

This location, Cardinia Creek South, is near Bloomfield Lane, and was surveyed four times between 15 and 23 March 2018. Growling Grass Frogs have been historically recorded from the Cardinia Creek (DEWHA, 2009a).

A Growling Grass Frog was recorded from this location on 19 March 2018. A Common Eastern Froglet and foxes were also observed at this location.

4.3.8 CPT106 (KP40.1)

Cardinia Creek North is the same creek as described above (CPT105) but located at the Ballarto Road end. It was surveyed four times between 15 and 20 March 2018.

Growling Grass Frogs have been historically recorded from the Cardinia Creek (DEWHA, 2009a).

The only amphibian recorded from the site was a Common Eastern Froglet. No Growling Grass Frogs were observed during the surveys. Given the recording of a Growling Grass Frog at CPT 105 along the dispersal corridor of the Cardinia Creek, Growling Grass Frogs are assumed to be present at CPT106. Potential predators such as Eels, Foxes and Eastern Gambusia were recorded from this location.

4.3.9 CPT108 (KP41.5)

Deep Creek and Toomuc Creek were surveyed four times between 16 and 23 March 2018.

The crossing at Deep Creek is located in Cardinia. It is a DELWP managed creek system. In the vicinity of the crossing, Deep Creek was approximately 6-8m in width. Deep Creek was deep with an estimated depth of 130cm and the substrate was dominated by mud.

The riparian vegetation at Deep Creek was restricted to a band of exotic and few native species less than 5m wide on either bank with Blackberry the dominant species. The instream macrophytes included Common Reed which formed large patches across the channel, leaving pool areas in between these patches. A large proportion of filamentous algae were also observed throughout the reach. Shading of the Creek was estimated at <5%. Rock beaching was present in areas where an existing pipeline traverses the creek, making ideal basking sites for Growling Grass Frogs.

The crossing at Toomuc Creek is a DELWP managed creek system. Near the proposed crossing, Toomuc Creek was approximately 6m in width. The Creek was deep with an estimated depth of 120cm. The substrate of Toomuc Creek was dominated by mud.

The riparian vegetation at Toomuc Creek was restricted to a band of exotic and few native species less than 5 m wide on either bank. A levy bank is on the western side of the creek and this was covered with Blackberry and *Phalaris* sp. with Blackberry the dominant species. The instream macrophytes included Common Reed which formed large patches across the channel, leaving pooled areas in between these patches. A large proportion of filamentous algae were also observed throughout the reach. Shading of the Creek was estimated at <5%. Rock beaching was present in areas where an existing pipeline traverses the creek, making ideal basking sites for Growling Grass Frogs.

It is possible Growling Grass Frogs may inhabit the Deep Creek and Toomuc Creek where they intersect the alignment based on the habitat assessment.

The amphibians recorded from this site were the Common Eastern Froglet and the Southern Brown Tree Frog. No Growling Grass Frogs were observed during the surveys. Eastern Gambusia were recorded from this location.

4.3.10 CPT118 (KP46.3)

Hagelthornes Drain in Pakenham South is within a private property west of Koo Wee Rup Road.

This location was surveyed on 16 March 2018 but was found to be dry. The location supported about 20% emergent aquatic vegetation cover, predominately Slender Knotweed. Fringing vegetation included Blackberries, Rushes *Juncus* sp., and *Phalaris* sp. The surrounding area was predominantly *Phalaris* sp.

4.3.11 CPT125 (KP48.55)

Pakenham Creek, located on McDonalds Drain Road, Pakenham was surveyed four times between 23 and 28 March 2018.

The crossing at Pakenham Creek is located southeast of Pakenham. It is a Melbourne Water managed creek system. In the vicinity of the crossing, Pakenham Creek was approximately 40cm deep and stream width ranged from 4-6m. The substrate of Pakenham Creek was dominated by sand.

The riparian vegetation at Pakenham Creek was restricted to a mixture of native and introduced species less than 5m wide on either bank. The native species included Paperbarks *Melaleuca* spp. and Tea Trees *Leptospermum* spp. while introduced species were mostly Blackberry (dominant) and Gorse. Instream macrophytes included patches of Common Reed, Slender Knotweed and Cumbungi. A large proportion of filamentous algae were also observed throughout the reach. Other forms of instream habitat included woody debris and undercut banks. Although both banks of Pakenham Creek are fenced to exclude stock access, there is still evidence of some bank erosion and slumping throughout the reach. Shading of the creek was estimated at <5%.

It is possible Growling Grass Frogs may inhabit Pakenham Creek where it intersects the alignment based on the habitat assessment and using the precautionary principle.

The following amphibians were recorded from this location - Eastern Banjo Frog *Limnodynastes dumerilii*, Common Eastern Froglet, Southern Brown Tree Frog, Striped Marsh Frog and Whistling Tree Frog. However, no Growling Grass Frogs were observed during the surveys.

Foxes and Eastern Gambusia were recorded from this location.

4.3.12 CPT132-135 (KP53.0)

This location is within private property adjacent to a drainage line within the Bairnsdale Rail Line easement in Nar Nar Goon. This location was surveyed on 16 and 17 March 2018. The land use at the time of the survey was a chicken farm.

At the northern side of the properties, along the railway line, the drainage line and vegetation has been fenced off by the Level Crossing Authority. It has been designated as Environmental Protection Area and signposted. The fenced area was measured at 400m but continues for much further. No further surveys were conducted at this location.

5 Summary

A site inspection was conducted to assess the habitat suitability of the 12 preliminary locations that may provide suitable Growling Grass Frog habitat, based on desktop research and preliminary information. After initial site inspections, suitable habitat for Growling Grass Frogs was found at seven sites. These locations were assessed for four nights during optimal climatic conditions in March 2018. Water quality recorded at each of these seven sites was deemed to be suitable to support Growling Grass Frogs.

A total of seven amphibian species were recorded from the seven locations. It was noted that potential Growling Grass Frog predators such as carp, eels, foxes, and Eastern Gambusia were recorded in all but one of the seven sites.

Growling Grass Frog was recorded at Cardinia Creek South - Bloomfield Lane (KP 40-40.3, site CPT105) but is also assumed present at Cardinia Creek, Ballarto Road (also KP 40-40.3, site CPT106) given both sites are hydrologically connected and in very close proximity. These sites will be avoided from impact using Horizontal Directional Drilling (HDD) techniques. Growling Grass Frogs were not recorded but may be present at:

- KP 20.32
- KP 23.05 - avoided by HDD
- KP 31.1
- KP 41.5 - avoided by HDD
- KP 48.55

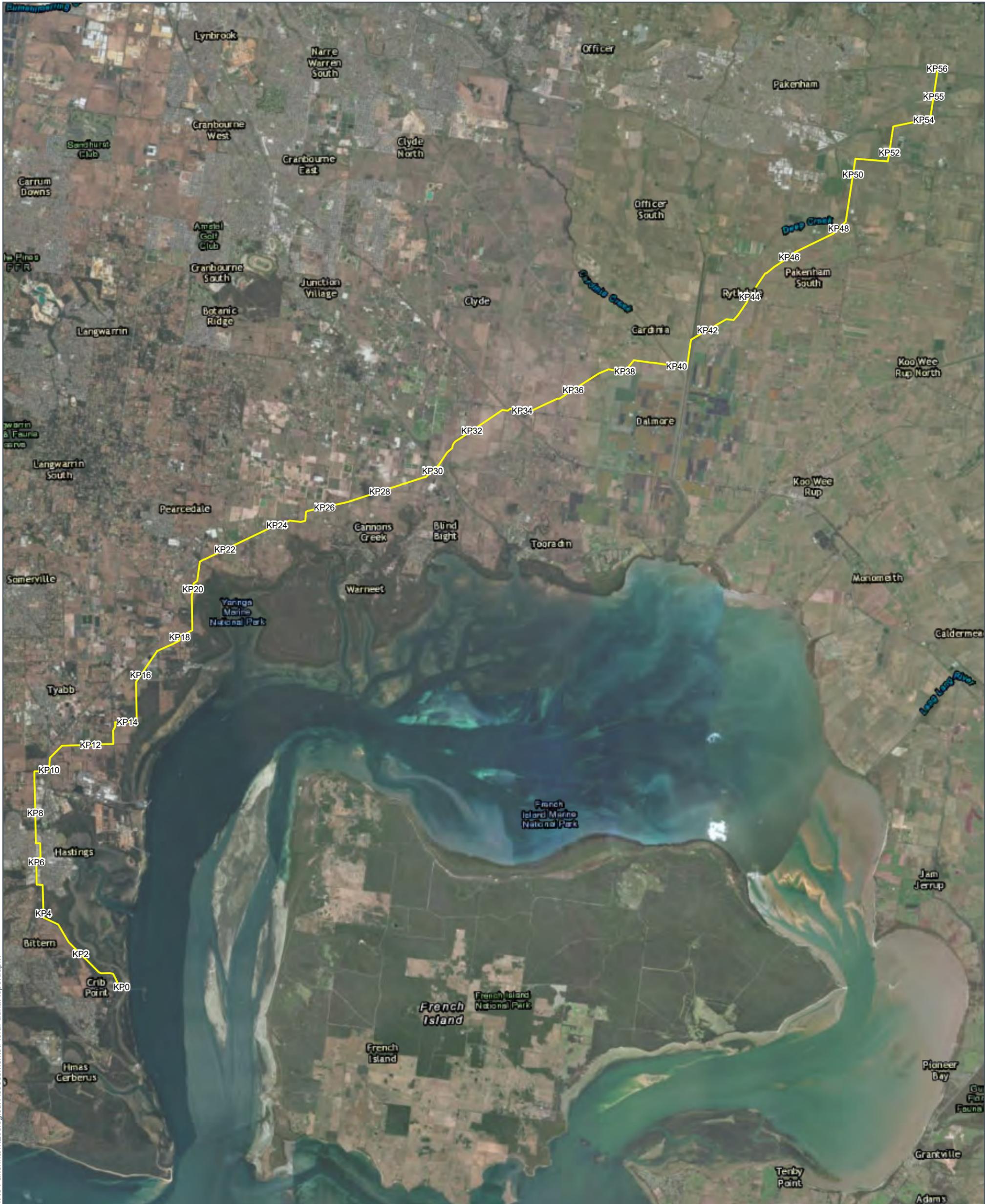
Mitigation actions could be used to further avoid impacts. Such actions will be discussed in the Flora, Fauna and Impact Assessment report for this project, also being prepared by Monarc.

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Figure 1: Overview Map



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LEGEND

LOCATION DIAGRAM

Crib Point Pakenham Pipeline Project
Figure 1: Overview of Pipeline Alignment

— Pipeline Alignment



WORK REQUEST NUMBER: 31-02984.00

DATA SOURCES:
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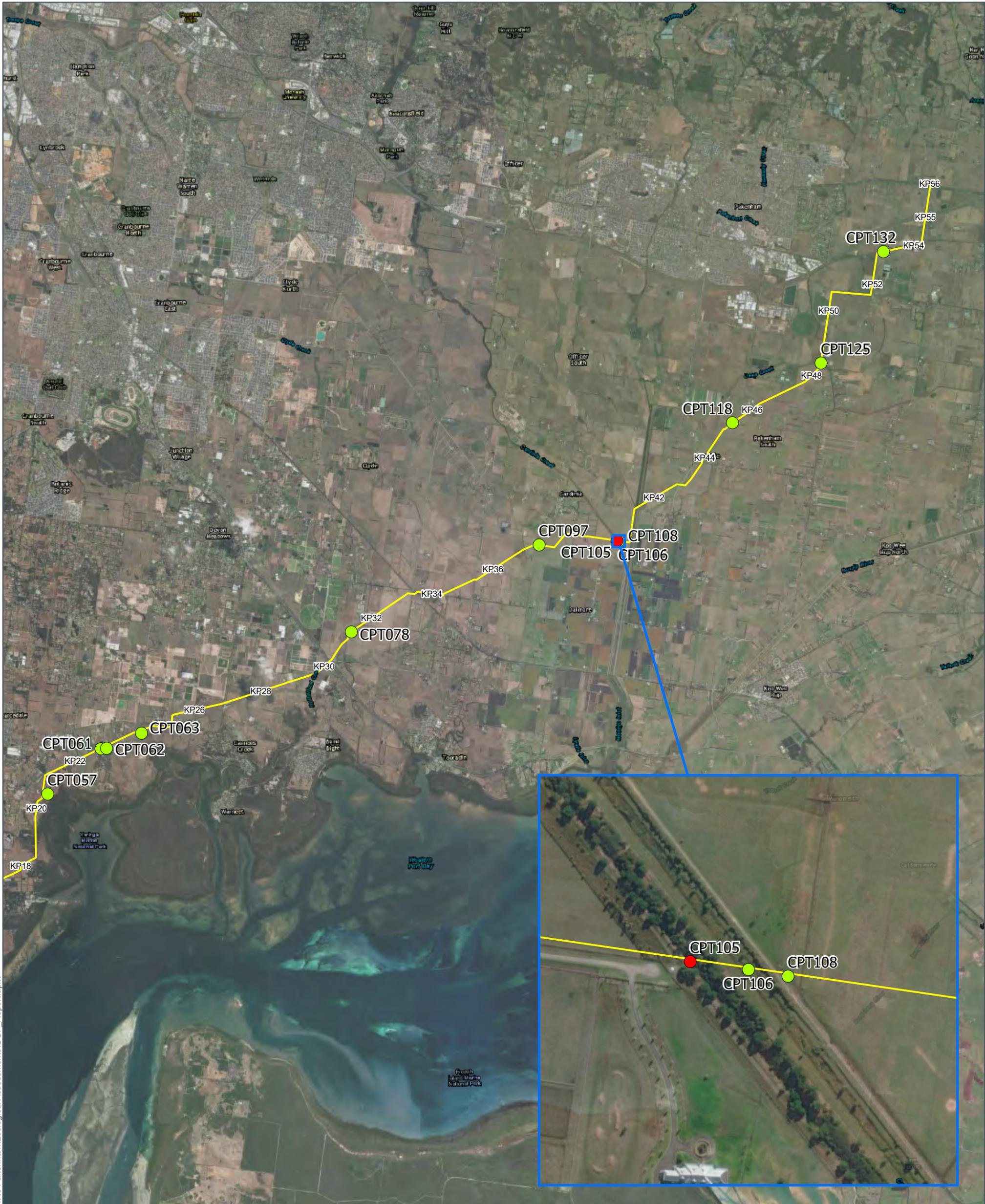
ISSUE DATE	AUTHOR	QA CHECK	APPROVED	MAP REV.	REVISION NOTE
20/08/2018	AB	JH	MV	B	Issued for Review
09/07/2018	KH	JH	CC	A	Issued for Review



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Figure 2: Growling Grass Frog Targeted Survey Location Map



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LEGEND

LOCATION DIAGRAM

**Crib Point Pakenham Pipeline Project
Figure 2: Growling Grass Frog Targeted
Survey Location Map**

Targeted Survey Locations

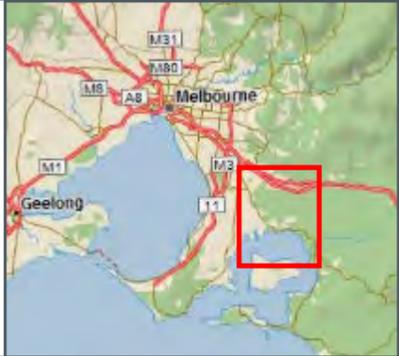
- GGF present
- GGF absent
- Pipeline Alignment

WORK REQUEST NUMBER: 31-02984.00

DATA SOURCES:
Service Layer Credits: Reference/World_Boundaries_and_Places: Esri, HERE, Garmin
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ISSUE DATE	AUTHOR	QA CHECK	APPROVED	MAP REV.	REVISION NOTE
21/08/2018	AB	JH	MV	B	Issued for Review
09/07/2018	KH	JH	CC	A	Issued for Review

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Figure 3: Photographic Log

	
<p>Photo 1: CPT057 - South Boundary Rd East Drainage Line (KP20.32)</p>	<p>Photo 2: CPT062 - Wetland at Vowell Drive East (KP23.05)</p>
	
<p>Photo 3: CPT078 - Western Drain Outfall (KP31.1)</p>	<p>Photo 4: CPT105 - Cardinia Creek South: Bloomfield Lane (KP40.1)</p>
	
<p>Photo 5: CPT106 - Cardinia Creek North: Ballarto Rd (KP40.1)</p>	<p>Photo 6: CPT108 - Deep Creek/Toomuc Creek (KP41.5)</p>



Photo 7: CPT125 - Pakenham Creek - McDonalds Drain Rd (KP48.555)



Photo 8: Striped Marsh Frog *Limnodynastes peroni*



Photo 9: Spotted Marsh Frog *Limnodynastes tasmaniensis*



Photo 10: Common Eastern Froglet *Crinia signifera*, the most commonly recorded species

Table 2. Growling Grass Frog Preliminary Survey Locations.

Site No.	Easement Number	KP	Location	Waterbody
1	CPT057	20.32	Private property north of South Boundary Road East and along roadside, Pearcedale	Farm Dam Roadside drainage line
2	CPT061	22.87	Private property west of Vowell Drive, Pearcedale	Farm Dam
3	CPT062	23.05	Private property east of Vowell Drive, Pearcedale	Wetland
4	CPT063	23.8	Private property west of Craig Lane, Pearcedale	Farm Dam
5	CPT078	31.1	Melbourne Water easement, Tooradin	Western Outfall Drain
6	CPT097	37.1	DELWP easement, Dalmore	Tooradin Inlet Drain
7	CPT105	40.1	Melbourne Water easement, Cardinia	Cardinia Creek North
8	CPT106	40.1	Melbourne Water easement, Cardinia	Cardinia Creek South
9	CPT105/108	41.5	DELWP easement, Cardinia	Toomuc Creek, Deep Creek
10	CPT118	46.3	Private property west of Koo Wee Rup Road, Pakenham South	Hagelthornes Drain
11	CPT125	48.55	Melbourne Water easement, Pakenham	Pakenham Creek
12	CPT132-135	53.0	Private property adjacent to Bairnsdale Rail line, Nar Nar Goon	Unnamed Drainage Line

Table 3: Summary of Field Conditions During the Growling Grass Frog Targeted Surveys.

Survey Location	Date	Time	Temp - Start (°)	Temp - End (°)	Humidity (%)	Wind Speed (kph)	Cloud Cover (%)	Total Rainfall in previous 7 Days (mm)	Total Rainfall in previous 24 hrs (mm)	Moon Phase
CPT 057	15/03/18	9:50-10:30pm	16.0	16.0	80	5	50	0	0	9% visible
	16/03/18	7:40-8:10pm	22.0	21.0	65	0	70	0	0	0% visible
	19/03/18	11:10-12:00pm	18.0	17.1	85	5	80	2	<2	20% visible
	20/03/18	10:40-11:15pm	14.4	14.4	57	5	100	2	<2	Waxing Crescent
CPT 061	15/03/18	10:40-11:10pm	15.0	15.0	82	0	60	0	0	9% visible
	23/03/18	7:20 - 8:05 pm	29	29	53	<5	2	0	2	New Moon
CPT 062	23/03/18	7:20 - 8:05 pm	29	29	53	<5	2	0	2	New Moon
	24/03/18	7:45 - 8:05 pm	22	22	77	11	70	2	2	First Quarter
	27/03/18	7:45 - 8:20 pm	19	19	46	7	70	12	12	
	28/03/18	7:45 - 8:20 pm	19	17	79	9	80	24	12	
CPT 063	15/03/18	9:00 - 9:30 pm	20	17	60	0	70	0	0	9% Visible
CPT 078	23/03/18	8:10 - 8:55 pm	29	29	53	<5	2	2	0	
	24/03/18	8:40 - 9:35 pm	20	20	80	8	50	2	0	First Quarter

Survey Location	Date	Time	Temp - Start (°)	Temp - End (°)	Humidity (%)	Wind Speed (kph)	Cloud Cover (%)	Total Rainfall in previous 7 Days (mm)	Total Rainfall in previous 24 hrs (mm)	Moon Phase
CPT 078	27/03/18	8:35 - 9:25 pm	19	18	40	<2	80	24	12	
	28/03/18	8:45 - 9:30 pm	17		90	9	100	24	12	
CPT 097	23/03/18	8:55 - 9:35 pm	22	22	53	0	2	2	0	
	24/03/18	9:45 - 10:20 pm	20	20	83	0	50	2	0	First quarter
CPT 105	15/03/18	11:45 - 12:30 am	14	13	88	0	10	0	<2	
	16/03/18	9:10 - 9:50 pm	21	19.6	65	0	70	0	0	
	19/03/18	8:40 - 10:30 pm	21.6	20.4	65	10	80	2	<2	
	20/03/18	8:45 - 10:05 pm	16.0	15.0	52	10-14	100	2	<1	
CPT 106	15/03/18	11:45 - 12:30 am	14	13	88	0	10	0	<2	
	16/03/18	9:10 - 9:50 pm	21	19.6	65	0	70	0	0	
	19/03/18	8:40 - 10:30 pm	21.6	20.4	65	10	80	2	<2	

Survey Location	Date	Time	Temp - Start (°)	Temp - End (°)	Humidity (%)	Wind Speed (kph)	Cloud Cover (%)	Total Rainfall in previous 7 Days (mm)	Total Rainfall in previous 24 hrs (mm)	Moon Phase
	20/03/18	8:45 - 10:05 pm	16	15	52	10-14	100	2	<1	
CPT 108	16/03/18	10:12 - 11:15 pm	19.6	19.0	65	<5	100	0	<1	
CPT 108	19/03/18	7:00 - 8:00 pm	22.3	21.8	61	7	70	2	<2	
	20/03/18	7:30 - 8:30 pm	16.5	16.0	50	14	100	2	<1	
	23/03/18	10:30 - 11:25 pm	21.7	21.7	54	22	2	2	2	
CPT 118	16/03/18	11:35 - 12:05 am	19	18.6	80	<5	100	0	<1	
CPT 125	23/03/18	12:00 - 12:32 am	21.4	21.4	53	5	8	2	2	New Moon
	24/03/18	10:45 - 11:45 pm	19	18	80	11	40	2	0	
	27/03/18	10:10 - 10:50 pm	18	17	52	<3	70	24	12	
	28/03/18	10:00 - 11:00 pm	17	17	85	8	70	24	12	

Survey Location	Date	Time	Temp - Start (°)	Temp - End (°)	Humidity (%)	Wind Speed (kph)	Cloud Cover (%)	Total Rainfall in previous 7 Days (mm)	Total Rainfall in previous 24 hrs (mm)	Moon Phase
CPT 132 - 135	16/03/18	12:30 - 1:40 am	18.9	17	56	6	100	0	<1	

*Data from Cerberus Weather Station

Table 4: Summary of Water Quality Parameters During the Growling Grass Frog Targeted Surveys.

Survey Location	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	Salinity (ppt)	Total Dissolved Solids (mg/L)	Turbidity (NTU)
CPT 057	Dry/ No Water							
CPT 061	23/03/18	7.57	25.1	40.2	115	0.02	67	120
CPT 062	23/03/18	8.27	22.2	97.4	1097	1.04	928	139
CPT 078	28/03/18	7.03	18.3	19.4	774	0.33	10	197
CPT 105	19/03/18	7.63	19.6	101.2	194	0.06	126	86
CPT 106	19/03/18	7.63	19.6	101.2	194	0.06	126	86
CPT 108	19/03/18	7.88	19.2	116.5	712	0.3	463	137
CPT 125	24/03/18	7.0	19.4	31.2	253	0.09	170	426

Table 5: Amphibian Species Recorded During the Growling Grass Frog Targeted Surveys.

Common Name	Scientific Name	CPT057	CPT062	CPT078	CPT105	CPT106	CPT108	CPT125
Common Eastern Froglet	<i>Crinia signifera</i>	X	X	X	X	X	X	X
Eastern Banjo Frog	<i>Limnodynastes dumerilii</i>							X
Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i>	X						X
Striped Marsh Frog	<i>Limnodynastes peronii</i>	X	X					X
Southern Brown Tree Frog	<i>Litoria ewingii</i>		X				X	X
Growling Grass Frog	<i>Litoria raniformis</i>				X			
Whistling Tree Frog	<i>Litoria verreauxii verreauxii</i>		X					X
	Total	3	4	1	2	1	2	6