MODEINA ESTATE – PRECINCT 2

GROWLING GRASS FROG MANAGEMENT PLAN

Dennis Family Corporation



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1. MANAGEMENT PLAN OBJECTIVES

DFC (Project Management) Pty. Ltd. engaged Brett Lane and Associates Pty. Ltd. (BL&A) to prepare a Management Plan for the conservation of the threatened Growling Grass Frog (*Litoria raniformis*) within the Kororoit Creek environs, in relation to the development of Precinct 2 of the Modeina Estate in Burnside.

The proposed development includes a multi-lot residential subdivision, a school and community facilities. It is a continuation of the Modeina Estate Precinct 1 situated on Westwood Drive in Burnside, Victoria, approximately 20 kilometres west-north-west of Melbourne. The Kororoit Creek forms the northern and eastern boundaries of Modeina Estate..

This 10-year Management Plan relates to Precinct 2 of the residential development, which is located in the north and east of the Modeina Estate. An EPBC Act approval (2011/6063) has been granted by the federal Department of the Environment and Energy for the project, of which this plan forms a condition.

The development involves creation of residential housing lots, a school, an unencumbered reserve adjacent to the study area and a Growling Grass Frog Buffer Zone that extends 35 metres from the Kororoit Creek centre line. This buffer zone is defined in the EPBC Act approval and is referred to in this plan as the *Growling Grass Frog Management Buffer* (GGFMB).

This plan aims to provide guidance on measures to ensure Growling Grass Frogs are not impacted by this project. The primary focus of the plan is the protection of the species along Kororoit Creek. The objectives of this plan, in accordance with Condition 3 of the EPBC Act approval, are to:

- Detail management measures that demonstrate how the Growling Grass Frog Management Buffer will be demarcated to minimise vehicle access;
- Detail revegetation, environmental weed control measures and other management activities within the Growling Grass Frog Management Buffer;
- Detail any construction activities and management measures to avoid significant impacts during construction; and
- Detail measures to inform on-site personnel of their obligations under the Growling Grass Frog Management Plan.

The Management Plan is divided into the following sections:

Section 2 provides a background to Growling Grass Frog ecology;

Section 3 describes the field assessment methods and results;

Section 4 describes Growling Grass Frog habitat quality within the Growling Grass Frog Buffer Zone; and

Section 5 details the management actions under the Growling Grass Frog Management Plan.



2. SPECIES DESCRIPTION AND STATUS

2.1. Legislative Protection

The Growling Grass Frog (*Litoria raniformis*) is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) and is listed as threatened under the Victorian *Flora and Fauna Guarantee Act* 1988 (FFG Act). It is also listed as Endangered in Victoria under the Department of Environment, Land, Water and Planning (DELWP) threatened species advisory list (DELWP 2015a) and has been recognised internationally as Endangered by the Global Amphibian Assessment of the CI/CABS – IUCN/SSC Biodiversity Assessment Initiative (IUCN 2008).

2.2. Description

The Growling Grass Frog is a large species of frog growing to a size of 85 millimetres. It is dull green to bright emerald green with blotches of brown or rich golden bronze and numerous large warts above and whitish below (see Photograph 1). It has a narrow blackish stripe from the nostrils along each side to the groin. The groin itself is bright blue or blue-green (Cogger 2000).



Photograph 1: Growling Grass Frog

2.3. Distribution

This species was once distributed over much of south-east Australia, including Tasmania. Whilst populations still exist in their former range, many populations have experienced a significant decline. In Victoria, the species is found in isolated populations in the greater Melbourne area, and in south-west Victoria. There are also small isolated populations in central Victoria and Gippsland. Populations of Growling Grass Frogs persist in several parts of the greater Melbourne area, such as at the Cardinia, Merri and Kororoit Creek Catchments (Biosis Research 2012).

2.4. Habitat

The Growling Grass Frog is predominantly aquatic and associated with vegetation fringing permanent water bodies such as streams, lagoons, farm dams and old quarry sites (Cogger 2000). Hydroperiod and vegetation cover (including both total vegetation cover and



vegetation heterogeneity, including emergent, submergent and floating vegetation) are important factors in determining habitat suitability for Growling Grass Frogs (Heard *et al* 2010). It is usually associated with water bodies supporting large areas of fringing and aquatic vegetation such as Common Reed (*Phragmites australis*), Cumbungi (*Typha* spp.) and Water Ribbon (*Triglochin procera*) (Organ 2002), dense mats of floating/submerged vegetation (Hamer & Organ 2008; Heard *et al* 2008) and waterbodies with a longer hydroperiod (Heard *et al* 2010). Other key habitat attributes include water depth (>1.5 m is preferred; Heard *et al* 2010), the prevalence of bare ground and rocks along the bank of the waterbody (Heard *et al* 2008) and low canopy cover (Clemann *et al* 2013).

Growling Grass Frogs breed in summer and prefer permanent waterbodies, or those in close proximity to permanent water, so that tadpoles have sufficient water in which to complete development. In these areas, frogs over-winter beneath thick vegetation, logs, rocks and other ground debris, sometimes at considerable distances from waterbodies (Smith & Clemann 2008).

It has been reported that Growling Grass Frogs are capable of moving up to one kilometre in 24 hours (Smith & Clemann 2008). Where a number of waterbodies occur in close proximity, metapopulation dynamics appear to be important (Heard *et al* 2006). The longterm viability of such metapopulations is crucially dependent on the rate of dispersal. Hence, alterations to the landscape that decrease connectivity between habitat patches, or create barriers to dispersal, are likely to have negative consequences for the viability of the larger metapopulation (Smith & Clemann 2008).

2.5. Threats

Threats and potential threats to Growling Grass Frog (sources: SAC 1999; DEWHA 2009) include:

- Disease Chytridiomycosis, cause by Chytrid fungus, a water borne pathogen affecting amphibian populations worldwide;
- Habitat loss and fragmentation through agricultural and urban land clearing;
- Drainage and degradation of wetlands;
- Increasing wetland salinity;
- Road kills;
- Increasing pollution, e.g. biocides and increased ultraviolet-B radiation due to reduced ozone layer, and
- Increased tadpole predation by introduced fish including the Mosquito fish or Plague Minnow (Gambusia holbrooki).

Infection of frogs with the Chytrid fungus has recently emerged as a significant contributor to the decline of this species (Heard *et al* 2014). The translocation of individuals between habitats could pose threat to an existing population by spread of disease such as Chytrid fungus (Heard *et al* 2010).



3. PRECINCT 2 GROWLING GRASS FROG HABITATS

3.1. Study area

The study area refers to the Growling Grass Frog Management Buffer (GGFMB), a 35 metre buffer from Kororoit Creek as it runs adjacent to the Modeina Estate (Figures 1-4).

3.2. Existing information

Growling Grass Frog is known to be present in Kororoit Creek (DELWP 2015b), and the Kororoit Creek corridor is identified as important for the conservation of the Growling Grass Frog within the Melbourne Growth Area (Biosis Research 2012).

Kororoit Creek has been identified as supporting an important population under the federal *Environmental Protection and Biodiversity Conservation* (EPBC) *Act* 1999 (EHP 2011). Targeted surveys undertaken in January 2003 (BL&A 2003) recorded several Growling Grass Frogs in Kororoit Creek within the GGFMB (Figures 1-4).

3.3. Field methods

A field assessment was conducted on 24th September 2015. During this assessment, the GGFMB was surveyed on foot. The quality of Growling Grass Frog habitat was mapped and classified along Kororoit Creek and associated riparian areas. Mapping was undertaken through a combination of aerial photograph interpretation and ground-truthing using a hand held GPS (accurate to approximately five metres).

Classification of habitat within the waterway and adjacent terrestrial habitat on the creek banks included recording the attributes listed below.

- Within the waterway:
 - Water depth and velocity;
 - Bank gradient;
 - Percentage cover of floating native vegetation and dominant species;
 - Percentage cover of emergent native vegetation (i.e. fringing vegetation on the stream margins) and dominant species; and
 - Presence and percentage cover of emergent rock on the stream margins.

(*Note:* Whilst submerged vegetation is also recognised as influencing Growling Grass Frog habitat quality, this component was not included in the habitat classification.)

- Terrestrial habitat:
 - Native vegetation species composition and cover;
 - Weed species and cover; and
 - Presence of surface rock.

Sections of the creek and riparian vegetation with similar attributes were grouped together as habitat classes, described in the next section.



3.4. Habitat assessment

Growling Grass Frog habitats are described here either as 'waterway' habitats – the creek line and margins; or terrestrial habitats – areas above the normal water level.

Waterway habitats in the study area are generally of good to very good quality, with standing water occurring throughout most of the year, deep pools, good water quality and a moderate to high cover of fringing and in-stream aquatic vegetation.

Terrestrial habitat within the GGFMB is largely confined to the steep escarpments adjacent to the waterway. While these are unlikely to provide core habitat to Growling Grass Frog, it is recognised that Growling Grass Frog may travel overland through this zone and utilise it for overwintering. Furthermore, actions and environmental threats within this zone are likely to affect core Growling Grass Frog habitat within Kororoit Creek itself.

Given the good quality of the existing waterway habitats, this plan does not explore specific interventions within the waterway, but rather focuses on:

- Mitigating potential adverse impacts to water quality arising from nearby development construction;
- Managing any potential infrastructure works required to be undertaken within the terrestrial and/or waterway habitats within the GGFMB;
- Rehabilitation of streambank waterway habitat in the form of fringing vegetation, where required;
- Rehabilitation and management of terrestrial habitats within the GGFMB; and
- Design and management of the interface between the GGFMB and the development.

Because the terrestrial habitats within the GGFMB interface with the Modeina Estate development, this is the area in which the majority of management actions will be undertaken.

3.4.1. Waterway habitats

Seven habitat classes were identified along Kororoit Creek (creek line and banks) during the field assessment. These habitats are shown on Figures 1-4 and described in Table 1, below.



Table 1	Growling Gra	ass Frod wate	enwav hahitate
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Habitat class	Description	Photograph
1	Kororoit Creek is deep with a steep bank through this section. In- stream native vegetation cover is 5%*, including 10% emergent, dominated by Cumbungi and Common Reed, and no floating vegetation.	
2	Kororoit Creek is deep with a low bank through this section, including rocks along the creek edge. In-stream native vegetation cover is 7%*, including 10% emergent, dominated by Common Reed, and 3% floating, dominated by Water Ribbons.	
З	Kororoit Creek is of moderate depth with a steep bank through this section. In-stream native vegetation cover is 23%*, including 40% emergent, dominated by Cumbungi and Common Reed, and 5% floating, dominated by Water Ribbons and Slender Knotweed.	
4	Kororoit Creek is shallow with a low bank through this section. In- stream native vegetation cover is 5%*, including no emergent and 10% floating, dominated by Water Ribbons.	



Habitat class	Description	Photograph
5	Kororoit Creek is deep with a moderate bank gradient through this section. In-stream native vegetation cover is 13%*, including 15% emergent, dominated by Cumbungi and Common Reed, and 10% floating, dominated by Water Ribbons.	
6	Kororoit Creek is narrow with a steep bank through this section. In- stream native vegetation cover is 10%*, including 10% emergent, dominated by Cumbungi and Common Reed, and 10% floating, dominated by Water Ribbons and Slender Knotweed.	
7	Kororoit Creek is deep with a moderate bank gradient through this section. In-stream native vegetation cover is 18%*, including 20% emergent, dominated by Cumbungi, Tall Spike-sedge and Common Reed, and 15% floating, dominated by Water Ribbons, Slender Knotweed and Pacific Azolla.	

*Calculation of percentage vegetation cover adapted from Heard *et al* 2010. Percentage vegetation cover was calculated by summing percentage cover of emergent and floating vegetation, and dividing by two.

The scores for the various habitat attributes in each waterway habitat class are provided in Table 2. Management priorities for habitat classes where stream margin habitat quality could be improved through revegetation or placement of rock habitat are also identified in this table and discussed in Section 6.5.



Habitat class	1	2	3	4	5	6	7
In-stream features							
Water depth	Deep	Deep	Moderate	Shallow	Deep	Shallow	Deep
Water velocity	Moderate	Moderate	Moderate	Fast	Slow	Fast	Slow
Floating native vegetation	0	3	5	10	10	10	15
Stream margin features	Stream margin features						
Bank gradient	Steep	Low	Steep	Low	Moderate	Moderate	Moderate
Emergent native vegetation	10	10	40	0	15	10	20
Emergent rock	0	0	1	20	10	15	0
Management priority	Medium	Medium	Low	High	Low	Low	Medium

Table 2: Growling Grass Frog waterway habitat

*Calculation of percentage vegetation cover adapted from Heard et al 2010. Percentage vegetation cover was calculated by summing percentage cover of emergent and floating vegetation, and dividing by two.



3.4.2. Terrestrial habitat

Ecological values within the area of terrestrial habitat were relatively uniform across the GGFMB. It had consistently high weed cover, including the declared noxious weeds Artichoke Thistle, African Box-thorn, Common Prickly-pear, Sweet Briar, Blackberry, Gorse, Spiny Rush and Serrated Tussock (Photograph 2). Scattered and clumps of indigenous shrubs and eucalypts were recorded throughout this habitat (Photograph 3). Other weeds recorded within this zone are listed in Appendix 1

Trees and shrubs included River Red-gum (many planted), Silver Wattle, Blackwood, Sweet Bursaria, Berry Saltbush, Nodding Saltbush and Tangled Lignum. Native species in the ground layer were primarily graminoids including Sedges, Rushes, Kangaroo Grass and Spiny-headed Mat-rush.



Photograph 2: Terrestrial habitat dominated by introduced species



Photograph 3: Planted eucalypts in terrestrial habitat



3.4.3. Rock platforms

Within the GGFMB there occurred three natural tessellated rock platforms forming pedestrian access across the creek. The locations of these crossings are shown on Figures 1-4, and a photograph of one of the platforms included below (Photograph 4).



Photograph 4: Rock platform in Kororoit Creek





- Property boundary
- Precinct 1 boundary
- Growling Grass Frog Management Buffer

Growling Grass Frog Habitat Classes



Growling Grass Frog records	

Rock platform

 \boxtimes





- Property boundary
- Precinct 1 boundary
- Growling Grass Frog Management Buffer

Growling Grass Frog Habitat Classes



- Growling Grass Frog records

 \boxtimes

Rock platform





- Property boundary
- Precinct 1 boundary
- Growling Grass Frog Management Buffer

Growling Grass Frog Habitat Classes



- Growling Grass Frog records
- Rock platform

 \boxtimes







- Property boundary
- ----- Precinct 1 boundary
- Growling Grass Frog Management Buffer

Growling Grass Frog Habitat Classes



- Growling Grass Frog records
- Rock platform

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 \boxtimes



4. RISKS TO GROWLING GRASS FROG HABITAT

Risks to Growling Grass Frog habitat identified in the GGFMP are described below.

4.1. Inappropriate access

Vehicle access and/or equipment and materials laydown within the GGFMB during construction would have adverse impacts on this habitat. Temporary measures to exclude these activities are outlined in Section 5.

Once construction of the Modeina Estate is completed and temporary measures to exclude inappropriate access are removed, any post-construction phase vehicle access to the GGFMB would be inappropriate and high levels of pedestrian activity will be discouraged to prevent adverse impacts to this habitat. Measures to restrict these activities are outlined in Section 5.

4.2. Sedimentation and pollution of the waterway

The period of highest risk of adverse impacts to water quality and waterway habitats from sediment runoff is considered to exist during the construction phase. Measures to mitigate these potential impacts and post-construction landscaping and revegetation measures to prevent sedimentation are outlined in Section 5.

Stormwater treatment measures to address the risks associated with pollution are outlined in Section 5.

4.3. Infrastructure works – direct impacts

The development of Modeina Estate will require the construction of sewer connections and drainage outfalls, some of which will encroach on the GGFMB. Without control measures in place these works could have an undue impact on this habitat. Measures to prevent undue impacts during infrastructure works are outlined in Section 5.

4.4. Introduced species

Both aquatic and terrestrial weeds are known to reduce the suitability of habitat for Growling Grass Frog by encroaching on preferred (relatively open) terrestrial habitat and competing with preferred native aquatic species (Heard *et al* 2010; Biosis Research 2012).

A full list of introduced species recorded within the GGFMB is included in Appendix 1. Weed control measures for high threat weeds are described in Section 6.2 and control methods these weed species are detailed in Appendix 2.

The majority of these high threat weeds are declared noxious weeds, listed as regionally controlled within the Port Phillip and Westernport catchment management area under the Catchment and Land Protection (CaLP) Act 1994. Under the CaLP Act, land managers have the responsibility to take all reasonable steps to prevent the growth and spread of regionally controlled weeds on their land.

4.4.1. Aquatic weeds

The declared noxious weed Spiny Rush was recorded within the Kororoit Creek waterway. Spiny Rush is listed as a regionally controlled weed within the Port Phillip and Westernport catchment management area under the *Catchment and Land Protection* (CaLP) *Act* 1994 and as a Weed of National Significance (WONS).



4.4.2. Terrestrial weeds

The weeds listed below are considered high threat weeds within the terrestrial habitat of the GGFMB.

- Artichoke Thistle (CaLP controlled noxious)
- African Box-thorn (CaLP controlled noxious, WONS)
- Blackberry (CaLP controlled noxious)
- Bridal Creeper (CaLP restricted noxious)
- Century Plant
- Common Prickly-pear (WONS)
- Fennel (CaLP restricted noxious)
- Gorse (CALP controlled noxious)
- Serrated Tussock (CaLP controlled noxious, WONS)
- Sweet Briar (CaLP controlled noxious)

4.5. Pest animals

During the field assessment, evidence of two pest species was recorded within the terrestrial habitat. These were:

- Rabbits (warrens); and
- Foxes (two sightings of individuals).

Pest animals may reduce the suitability of habitat for Growling Grass Frog and lead to unfavourable outcomes for the species by:

- The construction of warrens/dens, which may in turn:
 - Cause erosion and decrease water quality in adjacent waterways; and
 - o Occupy habitat which would otherwise be used by Growling Grass Frog;
- Predation.

Pest animal control measures are outlined in Section 5.



5. RISK MANAGEMENT

Management of the GGFMB is addressed in this section in terms of three main phases: planning and design, construction and post-construction until the completion of this 10-year Management Plan.

The proponent is responsible for management of potential risks to GGF arising from the Modeina Estate – Precinct 2 development during the planning, design and construction phases and up to the completion of this Managemen Plan.

5.1. Planning and design phase

5.1.1. Habitat protection

Habitat protection for Growling Grass Frog has been incorporated into the planning and design phase as per the *Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes* (Heard *et al* 2010), of which habitat protection is the first principle. This has been achieved through designation of the GGFMB and surrounding areas as reserves in the Precinct 2 concept plan, as well as incorporating measures to limit access and manage sediment and pollution in the development design, as described below.

In accordance with the Melbourne Water guidance document *Waterway Corridors: Guidelines for Greenfield development areas within the Port Phillip and Westernport Region* (2013b) the combined GGFMB and adjacent open space reserve will provide setback at a minimum of 50 metres required for 4th (and higher) order streams.

5.1.2. Limiting access

Management measures to limit vehicle and pedestrian access during the construction phase are addressed in Section 5.2.2.

Post-construction, permanent design measures will be employed to manage the following:

- Vehicle access at the interface between the development and the unencumbered open space reserve; and
- Pedestrian access at the interface between the unencumbered open space reserve and the GGFMP.

These measures are described in detail in Section 5.3.1.

5.1.3. Sediment and pollution control

Management measures to control sediment runoff and pollution during the construction phase are addressed in Section 5.2.

Post-construction, gross pollutants that commonly occur in urban storm water have a generally adverse effect on amphibians. Urban stormwater therefore requires appropriate mechanical or biological treatment (or both) if it is to be diverted into Growling Grass Frog habitat (Heard *et al* 2010).

The drainage plan for Modeina Precinct 2 (Appendix 4) has been prepared in accordance with the Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 1999). Details of urban stormwater management design in Modeina Precinct 2 are provided in Section 5.3.2.



5.2. Construction phase

This section details actions to protect Growling Grass Frog habitat during the construction phase of Precinct 2 of the Modeina Estate. Construction is expected to commence in September 2017 and be completed in 2023.

The majority of construction activities will occur in the residential development areas at least 50 metres from the primary Growling Grass Frog habitat in the creekline and well beyond the GGFMB. Therefore, it is highly unlikely that Growling Grass Frog will be encountered in these construction areas.

Specific mitigation measures for actions within the GGFMB are outlined in Section 5.2.5 and an emergency protocol in the event that Growling Grass Frog are encountered during construction is provided in 5.2.6.

5.2.1. Personnel briefing

Prior to construction, all construction personnel will be briefed about the occurrence of Growling Grass Frog in the Kororoit Creek environs and the emergency protocols in the event that the species is encountered during construction.

Information brochures have been prepared on this species for display in all site offices, providing a physical description of the species, their population distribution, habitat and similar species (Appendix 3).

5.2.2. Staged construction and temporary access restrictions

Construction will be undertaken in stages, with stages grouped into zones according to general commencement/construction period. Prior to commencement of construction of each zone, temporary 'No-Go' construction fencing will be erected on the boundary between development and the GGFMB – or the top of the escarpment, whichever is furthest from the creek. This temporary fencing will also encircle the zone on all sides except those sides abutting previous development. Once a construction zone is complete, No-Go construction fencing will remain in place at the boundary with the GGFMB until permanent vehicle access restrictions are in place.

No-go fencing will be:

- Highly visible;
- Temporary construction fencing or permanent post-and-wire fencing where longer-term fencing is planned;
- In place for the whole period of construction of the zone;
- Checked for breaches and maintained on a daily basis; and
- Removed from the boundary with the GGFMB *only* after a permanent vehicle exclusion treatment has been erected along the boundary of the unencumbered open space.

An example of construction zones and temporary construction fencing for construction zones is provided in Appendix 5.

Note: the configuration of these zones may change nearer to commencement of construction; however, the same principles described above will apply to any construction zone configuration.



5.2.3. Weed management

The proponent has engaged Greening Australia to undertake weed management and revegetation within the GGFMB according to an adaptive Weed Management Strategy prepared by Greening Australia. A baseline weed survey was undertaken by Greening Australia in August 2017.

All weed control will be undertaken by Greening Australia or another suitably experienced bushland contractor in a staged manner in association with each construction zone (group of stages) so as not to expose large areas of soil at any one time, which could lead to sediment run-off.

Weed control will also be undertaken within each construction zone prior to construction in each stage with the aim of reducing the production and spread of propagules from existing weeds in the construction area to the GGFMB. Weed control will be documented in a Construction Environmental Management Plan approved by Melton City Council prior to the commencement of works in each zone.

This CEMP will also prescribe machinery and vehicle hygiene protocols to prevent the spread of weeds and weed control activities to be undertaken across the site during at least three distinct times each year to address varying lifecycles of target weeds.

The construction contractor will notify the proponent of any significant weed outbreaks observed in disturbed areas during construction and these outbreaks will be controlled by the bushland contractor.

Revegetation of areas subject to weed control will also be undertaken in a staged manner as described in Section 6.4.

5.2.4. Sediment control

Best practice sediment control measures will be employed during the construction period in accordance with the *Urban Stormwater Best Practice Environmental Management Guidelines* (CSIRO 1999). This includes the following:

- The use of sediment fences erected down slope of exposed soil and stockpiles in areas that drain to Kororoit Creek to prevent sediment run-off entering the creek (in particular, this applies to the construction of drainage outfalls, which extend into the GGFMB);
- Sediment fences will be checked for breaches and maintained on a daily basis;
- Minimisation of the area of disturbed soil at any one time;
- Stockpiles will be minimised and these will be positioned away from the watercourses and drainage lines;
- Litter traps will be installed to filter stormwater runoff entering waterways;
- Sediment traps (i.e. gravel sausages) will be installed at pit entries; and
- Site rehabilitation after construction works to restore the stability of land and promote recovery of pre-existing vegetative cover.

It should be noted that the school site (western part of Zone A1 - Appendix 5) will have additional sediment control measures in place during construction of the school as agreed to with the Department as part of a variation to Condition 4 of the EPBC Act approval.



5.2.5. Works within the GGFMB

Works within the GGFMB will involve the construction of four linear stormwater outfalls from the development area to Kororoit Creek, for which the topsoil will be stripped for a width of 4 metres, a trench excavated, pipes laid and backfilled and topsoil replaced.

Risk management actions for work within the GGFMB will be undertaken in accordance with the Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 1999) to maintain the quality of any run-off entering Kororoit Creek in accordance with the objectives outlined in these guidelines.

Where linear works within the GGFMB are required between the development area and the creek, the following mitigation measures will be implemented.

Fencing

- A section of No-Go fencing between the adjacent construction zone and the GGFMB will be removed at the entry point for works and temporary construction fencing fencing or water-filled barriers will be immediately erected along each boundary of the approved linear construction footprint from the existing No-Go fencing to the creek;
- Silt fencing will be erected on or inside this temporary fencing where the works are upslope of Kororoit Creek. Silt fencing will be inspected daily during construction within the GGFMB;
- On completion of works, No-Go fencing will be re-erected along the construction zone boundary; and
- Areas of disturbance associated with the construction of drainage outfalls will be rehabilitated and revegetated with indigenous species.

Timing

Where possible, the timing for undertaking construction works within the GGFMB will be outside the breeding season of the frog which is generally from October to March. During this warmer time, the frogs are more likely to be active and mobile and therefore potentially more susceptible to impacts of the construction phase.

For works required to be undertaken during the breeding season, an exclusion period up to one hour after sunrise and commencing one hour prior to sunset will apply between November and February (i.e. peak calling and activity time for Growling Grass Frog).

Hygiene controls

Hygiene controls will be implemented during the construction period within the GGFMB to reduce the potential introduction and spread of the infectious disease *Chytridiomycosis* between amphibians, which is caused by a Chytrid fungus that attacks the frogs' skin. Chytrid fungus is listed as a key threatening process under the EBPC Act. Best-practice measures will need to be implemented. To prevent the spread of this pathogenic organism, the following hygiene protocol will be undertaken:

- Vehicle tyres will be disinfected with bleach (active ingredient benzalkonium chloride) prior to entering the GGFMB; and
- People working in the GGFMB will disinfect their shoes with bleach before re-entering the broader construction site.

Hygiene controls will be in accordance with the Hygiene protocol for the control of disease in frogs (DECC NSW 2008).



5.2.6. Emergency protocol

If any Growling Grass Frogs are observed in the construction footprint, work must cease and the project zoologist immediately contacted to salvage and relocate the frog to suitable habitat in Kororoit Creek within 100 metres of the point of salvage under an appropriate permit. Growling Grass Frog *must not* be handled by unlicensed personnel.

Injured Growling Grass Frogs must be reported to the Melbourne Zoo and DELWP as outlined in the Growling Grass Frog brochure, which must be on display at all site offices (Appendix 3).

5.3. Post-construction phase

The following management prescriptions will be implemented by the proponent.

5.3.1. Permanent access restrictions

Temporary No-Go fencing around each construction zone will remain in place until permanent treatments limiting access to the unencumbered space are in place, as described below.

Vehicle access to the unencumbered open space and the GGFMB

This interface will exclude unauthorised vehicle access to the unencumbered open space to protect the ecological values and Growling Grass Frog habitat beyond in the GGFMB. These permanent vehicle exclusion treatments will be in place along the entire perimeter of the unencumbered open space in the form of:

- A low bollard-and-chain fence; or
- Boulders.

These interface treatments are shown in a Landscape Concept Plan for the precinct (Appendix 6).

Boundary between unencumbered open space and GGFMB

The boundary between the GGFMB and unencumbered open space, which in most cases occurs at or near the top of escarpment, will be demarcated to discourage high levels of pedestrian access to the GGFMB.

Demarcation will include one or more of the following methods:

- Placement of natural and non-intrusive barriers such as local rocks (where available from construction activity elsewhere within the development) and dense plantings of low native shrubs such as correas, saltbushes or wattles;
- Clear signposting of the limit of mown areas;
- Spade edges or paths.

These interface treatments are shown in a Landscape Concept Plan for the precinct (Appendix 6).

5.3.2. Urban stormwater management

The drainage plan for Modeina Precinct 2 (Appendix 4) has been prepared in accordance with the Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 1999).

As indicated in this drainage plan, the majority of stormwater runoff from the development (including most of Precinct 1) will drain into a sediment pond located in the southeast of



the development, well out of the GGFMB. Stormwater from the main catchment will be treated by way of this sediment pond, bioswale and gross pollutant trap (GPT) and conveyed to the creek via a drainage outfall.

Stormwater from six small catchments bordering the northern reaches of the creek will each be treated using a bio-swale and a drainage outfall to Kororoit Creek. Two bio-swales associated with Precinct 1 of the Modeina development have already been partly constructed and planted out (Photograph 5).

Bio-swales will be constructed with a range of slopes to minimise erosion depending on the ultimate landscape treatment – i.e. increasing gradient for: grassed and mowed; planted out with groundcovers; or stabilised with rocks. Where bio-swales are to be located within the GGFMP, these will be revegetated with indigenous aquatic species and, where available, logs will be placed among fringing vegetation to provide potential overwintering sites for Growling Grass Frog.

Drainage outfalls will utilise local rock (where available from construction activity elsewhere within the development) and be designed such that flat rocks at water level are both submerged and emergent, to provide platforms for Growling Grass Frog. The gradient of the outfall will allow frogs to move between the creek and riparian vegetation. Revegetation adjacent to the drainage outfalls will be undertaken with emergent aquatic species identified in Table 3 to prevent invasion by exotic species.



Photograph 5: Bio-swale associated with Precinct 1 (Stage 6)



6. 10 YEAR MANAGEMENT COMMITMENTS

6.1. Responsible parties

The proponent is responsible for ensuring that this Management Plan is satisfactorily implemented. The management actions outlined in this Management Plan will be implemented by the proponent.

The land containing the GGFMB will be vested to Melton City Council two years postcompletion of the development and will become public land within the broader Kororoit Creek corridor. Notwithstanding this, if the land is vested to Council during the 10-year management perioed, the 10-year management actions outlined in this Management Plan will continue to be implemented by the proponent for the rest of the 10-year management period.

If the vesting of land to Council occurs after the 10-year management period outlined in this Management Plan, the final year (Year 10) actions outlined in Table 7 will be implemented by the proponent each year until the land is vested to Council. Once vested, Melton City Council will implement ongoing management of the GGFMB in perpetuity.

Melbourne Water also retains management responsibility for management of the creek up to the 1-in-100 flood line for the period of this Management Plan and in perpetuity, under existing statutory arrangements for the management of waterways in Melbourne's urban areas.

6.2. Weed control

Weed control and revegetation within the GGFMB will be undertaken according to an adaptive Weed Management Strategy prepared by Greening Australia and measures outined in Appendix 2.

Weed control will be undertaken by experienced bushland management personnel using herbicides appropriate for use near waterways, with cut-and-paste methods employed for woody weed removal wherever feasible, as described in Appendix 2 and the Weed Management Strategy.

6.3. Pest animal control

Harbour for pest animals will be monitored regularly and management measures implemented involving removal of harbour undertaken as outlined in Section 6.7.

6.4. Revegetation

Following staged weed-control in terrestrial habitat within the GGFMB, these areas will be revegetated with locally indigenous species to create suitable habitat for Growling Grass Frog, as described below. Where required, creek margins will be revegetated with 'emergent' vegetation. These actions are in accordance with the relevant management priorities for Melbourne Water's Lower Kororoit Creek management unit (Melbourne Water 2013a).

Revegetation for each development stage will be undertaken in the first year using tubestock and will be monitored for survival for the first two years. Where stands have perished, these will be replaced. Species will be sourced locally to maintain the local genetic diversity.

Recommended species for revegetation of the terrestrial habitat and creek margins are provided in Table 3, including minimum planting densities.



Habitat type and use by Growling Grass Frog	Common name	Scientific name	Planting density (plants per square metre)	
	Australian Sweet-grass	Glyceria australis	4	
	Common Spike-sedge	Eleocharis acuta	4	
Emergent, fringing	Common Swamp Wallaby-grass	Amphibromus nervosus	4	
vegetation (stream	Gypsywort	Lycopus australis	1	
existing vegetation	Hollow Rush	Juncus amabilis	4	
insufficient – for	Slender Knotweed	Persicaria decipiens	2	
shelter, basking and calling sites	Swamp Billy-buttons	Craspedia paludicola	2	
	Tall Sedge	Carex appressa	4	
	Tassel Sedge	Carex fascicularis	4	
	Green Rush	Juncus gregiflorus	4	
Terrestrial habitat –	Common Blown-grass	Agrostis avenacea		
between creek and top of escarpment:	Common Tussock- grass	Poa labillardierei	4	
grasses and graminoids – used for	Spiny-headed Mat-rush	Lomandra longifolia		
shelter, movement	Sword Tussock-grass	Poa ensiformis		
corridor, overwintering	Weeping Grass	Microlaena stipoides		
	Prickly Moses	Acacia verticillata		
	River Bottlebrush	Callistemon sieberi	4	
Terrestrial habitat –	Sweet Bursaria	Bursaria spinosa	<u></u>	
medium shrub layer	Woolly Tea Tree	Leptospermum lanigerum		
	Blackwood	Acacia melanoxylon	1 every 4 m ²	
Terrestrial habitat – top of escarpment: occasional trees	River Red Gum	Eucalyptus camaldulensis	n/a	

Table 3: Recommended species ar	nd density for revegetation
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6.5. Habitat creation

Terrestrial shelter and winter hibernation sites in the form of rocks and fringing vegetation occur in relatively high abundance along the section of the Kororoit Creek within the GGFMB. Rock piles may be provided for Growling Grass Frogs on creek margins in sections where emergent rock cover is lower and where rock has been made available through nearby construction (Section 3.4.1).

Rock size will vary and include larger rocks (300 to 1000 millimetres diameter) and spacing will optimise habitat variability (Hamer & Organ 2006).



6.6. Monitoring and evaluation

The following monitoring and evaluation actions will be undertaken for this management plan.

6.6.1. Construction phase

Environmental mitigation measures audits

Audits of the implementation of construction and environmental mitigation activities will be undertaken at a minimum of three-month intervals during the construction phase to determine whether the outcomes of this plan are being met. Audits will determine:

- Evidence of personnel briefing (based on records or material provided to personnel);
- No-Go fencing is in place and effective; and
- Sediment control measures are in place and effective.

Corrective actions - audits

The circumstances in which corrective actions would be required, and the action to be taken, are provided in Table 4.

Table + Outcouve actions - construction phase

Trigger	Corrective action
Non-compliance with environmental mitigation measures during an audit.	Implement environmental mitigation measure within two working days of identification of non-compliance.
Non-compliance with environmental mitigation measures across two consecutive rounds of audits.	Implement environmental mitigation measure within two working days of identification of non-compliance.
	Testing of water quality upstream and downstream of outfalls (beyond mixing zone) to determine the influence of stormwater inputs and whether water quality meets the objectives for water quality in the catchments of Port Phillip Bay as per the SEPP (Waters of Victoria) guidelines.

Any corrective actions required to be implemented will be documented in an annual report provided to the Commonwealth and published on the proponent's website (Section 6.6.3).

6.6.2. Habitat quality and population monitoring

Habitat quality and GGF population monitoring, as described below, will be undertaken annually during construction and at the intervals defined in Table 7 up until Year 10 of this management plan.

Habitat quality monitoring

Habitat quality is dependent on a number of factors including habitat structure, water quality and the availability of movement corridors between wetlands (DEWHA 2009). One of the primary factors determining whether Growling Grass Frog utilise a particular habitat is vegetation composition (Hamer & Organ 2006). High quality habitats support a good



cover of fringing, emergent, submergent and floating vegetation (Robertson *et al* 2002). Logs, rocks and debris are also important habitat features which will not be removed from the GGFMB.

Habitat quality monitoring will continue annually through the construction phase and will be undertaken in Years 7 & 10 of this Management Plan (post-construction). This will assess the quality of GGF habitat within the GGFMB in accordance with Heard *et al* (2010) and compare against the baseline values contained within this plan to ensure construction activities are not impacting on GGF habitat.

Population monitoring

GGF population monitoring will continue annually through the construction phase and will be undertaken in Years 7 & 10 of this Management Plan (post-construction).

Surveys will be undertaken over a minimum of two evenings during optimal weather conditions (i.e. warm and windless nights) during the breeding season (November to February) at various locations along Kororoit Creek adjacent to Precinct 2. Surveys will involve:

- Visual encounter surveys at various locations along the creek, involving spotlighting in areas of suitable habitat such as along vegetated margins; and
- Call playback in at least three locations each location within close proximity of existing wetlands along the creek.

GGF population monitoring actions will adhere to the hygiene protocols recommended by the New South Wales Parks and Wildlife Services (DECC NSW 2008).

The first of these monitoring events took place in January 2017, during which Growling Grass Frog was detected in a constructed wetland adjacent to Kororoit Creek near 'The Point' in the northeast.

Reports of annual monitoring will be provided to the proponent to be published along with an annual report provided to the Commonwealth and published on the proponent's website (Section 6.6.3).

Corrective actions – monitoring

The circumstances in which corrective actions would be required in relation to habitat and population monitoring, and the actions to be taken, are provided in Table 5.

6.6.3. Reporting

The proponent will prepare an annual report to be provided to the Commonwealth Department within three months of the anniversary of the commencement of construction and published on the proponent's website.

The annual report will document the actions contained in this Management Plan that were undertaken during the preceding year and the outcomes of these actions. Any actions that could not be undertaken should be noted and the reasons why these were not undertaken provided.



Trigger	Corrective action
A significant decline in habitat quality that is not attributable to prevailing climatic and hydrological conditions	Testing of water quality upstream and downstream of outfalls (beyond mixing zone) to determine the influence of stormwater inputs and whether water quality meets the objectives for water quality in the catchments of Port Phillip Bay as per the SEPP (Waters of Victoria) guidelines.
Failure to detect GGF over the course of two rounds of GGF population monitoring	Testing of water quality upstream and downstream of outfalls (beyond mixing zone) to determine the influence of stormwater inputs and whether water quality meets the objectives for water quality in the catchments of Port Phillip Bay as per the SEPP (Waters of Victoria) guidelines.
A significant decline in habitat quality that is not attributable to prevailing climatic and hydrological conditions	Testing of water quality upstream and downstream of outfalls (beyond mixing zone) to determine the influence of stormwater inputs and whether water quality meets the objectives for water quality in the catchments of Port Phillip Bay as per the SEPP (Waters of Victoria) guidelines.
Failure to detect GGF over the course of two annual rounds of GGF population monitoring	Testing of water quality upstream and downstream of outfalls (beyond mixing zone) to determine the influence of stormwater inputs and whether water quality meets the objectives for water quality in the catchments of Port Phillip Bay as per the SEPP (Waters of Victoria) guidelines.

Table 5: Corrective actions – post construction phase

Any corrective actions required to be implemented will be documented in an annual report provided to the Commonwealth and published on the proponent's website (Section 6.6.3).



6.7. Management actions

 Table 6: Management actions – construction environmental mitigation

Management actions & methods	Management Plan reference	Timing	Responsible party	Monitoring frequency
 Temporary construction fencing will be erected on the GGFMB boundary or the top of the escarpment – whichever is furthest from the creek – and will encircle the zone on all sides except that abutting existing developmen. The temporary fencing will be sturdy and highly visible with signage reading 'NO GO ZONE' (or similar) affixed at 25-metre intervals. NO GO ZONES will be strictly enforced. The temporary fencing and signage will be maintained and remain in place for the duration of construction and clean-up for each zone and will remain at the boundary with the GGFMB until permanent vehicle access restriction measures are in place. 	Section 5.1.2	Prior to the commencement of construction for each construction zone, until permanent vehicle access restrictions are in place	Construction Contractor/ Proponent	Daily on commencement of activities
 Sediment control in the form of sediment fencing will be installed between the construction footprint and the GGFMB Works will be avoided during high rainfall events to prevent excessive run-off into waterways Sediment controls will be maintained and remain in place for the duration of construction and clean-up for each zone 	Section 5.2.4	Prior to the commencement of construction for each construction zone	Construction Contractor/ Proponent	Daily on commencement of activities
Weed management (wash-down, laydown and fill): All vehicle wash-down areas and equipment lay-down areas are to be identified and located outside the GGFMB Any fill to be placed within the site will be clean and free of weed material	Section 5.2.3	Prior to the commencement of construction for each construction zone and ongoing during construction	Construction Contractor/ Proponent	Daily on commencement of activities
Weed management (hygiene control): Vehicles and machinery brought on site are to be free of weed material and personnel are to ensure that they do not carry seeds or mud (on their clothes or footwear) into or out of the development site	Section 5.2.3	Ongoing implementation	Construction Contractor/ Construction Personnel/ Proponent	Daily on entry to the site
Weed control: the construction contractor must notify the proponent of any significant weed outbreaks observed in disturbed areas during construction	Section 5.2.3	Ongoing implementation	Construction contractor/ Proponent	Daily
Pest animal management: Rubbish and rubble will be regularly removed from the construction area so as not to provide harbour for pest animals	Section 6.3	Ongoing implementation as required	Construction contractor/ Proponent	Daily
Environmental mitigation measures audits: Audit of the implementation of construction and environmental mitigation activities and implementation of any corrective actions required	Section 6.6.1	Ongoing during construction	Construction contractor/ Proponent	Three-monthly
Permanent vehicle access restrictions: Low bollard-and-chain fencing or boulders installed to prevent vehicle access	Section 5.3.1	Prior to dismantling of temporary construction fencing such that a continuous barrier to vehicle access is in place	Construction contractor/ Proponent	Ongoing



Table 7: 10-year management actions – including construction phase

Management actions & methods	Management Plan reference	Timing	Responsible party	Year 0*	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10#
Baseline weed survey: undertake baseline weed survey of Precinct 2. (<i>Note:</i> undertaken by Greening Australia in August 2017)	Section 5.2.3	Prior to commencement in Precinct 2	Bushland contractor/ Proponent	x										
Baseline habitat survey: undertaken for this report	Section 3.4	Completed	Ecologist/Proponent	Х										
Pre-construction weed control: Undertake weed control measures within each construction zone to reduce the propagule load and potential for weed spread	Section 5.2.3	Prior to commencement in each construction zone	Bushland contractor/ Proponent	x	х	х	х	x	x	Х^				
Revegetation and habitat creation in the GGFMB:	Section 6.4 Section 6.5	Staged following weed control outlined in the WMS – completed by 2023	Bushland contractor/ Proponent	x	х	х	х	х	x	х				
Weed control in the GGFMB: Undertake staged weed control measures in the GGFMB according to the Weed Management Strategy (WMS)	Section 5.2.3	Staged according to the WMS – completed by 2023	Bushland contractor/ Proponent	x	х	х	х	х	х	х				
Weed control – outbreaks: control any significant weed outbreaks in disturbed areas during construction to prevent weeds invading the GGFMB and waterways.	Section 5.2.3	Ongoing implementation as required	Bushland contractor/ Proponent	x	х	х	х	х	x	Х^				
Weed control – ongoing: control weeds within the GGFMB according to the Weed Management Strategy and measures outined in Appendix 2,	Section 6.2	Ongoing implementation as required	Bushland contractor/ Proponent	x	х	х	х	x	x	x	х	х	х	x
Habitat quality monitoring: Assessment of the quality of GGF habitat within the GGFMB and implementation of any corrective actions required	Section 6.6.2	Annually until 2 years post- construction	Ecologist/Proponent	x	х	х	х	х	x	Х^	х			х
GGF population monitoring: Surveys over a minimum of two evenings at various locations along Kororoit Creek adjacent to Precinct 2 and implementation of any corrective actions required	Section 6.6.2	November to February	Ecologist/Proponent	x	х	х	х	x	x	Х^	х			x
Reporting: prepare an annual report to be provided to the Commonwealth Department and published on the proponent's website	Section 6.6.3	Within three months of the anniversary of the commencement of construction	Proponent (with input from Ecologist)	x	х	Х	x	x	x	x	Х	x	Х	х

* Prior to commencement of works in Precinct 2 (except Project Area B)

^ Any year that construction is ongoing (construction is expected to be completed in Year 6)

And any additional years prior to vesting the land to Melton City Council if this has not occurred by the end of Year 10



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Ap	oendix	1:	Flora	species	recorded	in	the	studv	area
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Origin	Common name	Scientific name	CaLP Act	WONS	Lifeform
Indigenous species					
	Silver Wattle	Acacia dealbata			Т
	Blackwood	Acacia melanoxylon			Т
	Berry Saltbush	Atriplex semibaccata			Т
	Pacific Azolla	Azolla filiculoides			F
	Sweet Bursaria	Bursaria spinosa			Т
	Sedge	Carex spp.			Т
	Tangled Lignum	Duma florulenta			Т
	Nodding Saltbush	Einadia nutans			Т
	Tall Spike-sedge	Eleocharis sphacelata			E
	River Red-gum	Eucalyptus camaldulensis			Т
	Rush	Juncus spp.			T/E
	Spiny-headed Mat-rush	Lomandra longifolia			Т
	Slender Knotweed	Persicaria decipiens			E
	Common Reed	Phragmites australis			E
	Blunt Pondweed	Potamogeton ochreatus			S
	Kangaroo Grass	Themeda triandra			Т
	Water Ribbons	Triglochin procerum			E/F
	Broad-leaf Cumbungi	Typha orientalis			E
Introduced species					
*	Century Plant	Agave americana			Т
*	Angled Onion	Allium triquetrum	R		Т



Origin	Common name	Scientific name	CaLP Act	WONS	Lifeform
*	Bridal Creeper	Asparagus asparagoides	R	WONS	Т
*	Oat	Avena spp.			Т
*	Turnip	Brassica spp.			Т
*	Large Quaking-grass	Briza maxima			Т
*	Artichoke Thistle	Cynara cardunculus subsp. flavescens	С		Т
*	Petty Spurge	Euphorbia peplus			Т
*	Fennel	Foeniculum vulgare	R		Т
*	Desert Ash	Fraxinus angustifolia subsp. angustifolia			Т
*	Galenia	Galenia pubescens var. pubescens			Т
*	Spiny Rush	Juncus acutus subsp. acutus	С		T/E
*	Perennial Rye-grass	Lolium perenne			Т
*	African Box-thorn	Lycium ferocissimum	С	WONS	Т
#	Giant Honey-myrtle	Melaleuca armillaris subsp. armillaris			Т
*	Serrated Tussock	Nassella trichotoma	С	WONS	Т
*	Watercress	Nasturtium officinale			E
*	Common Prickly-pear	Opuntia stricta	С	WONS	Т
*	Soursob	Oxalis pes-caprae	R		Т
*	Ribwort	Plantago lanceolata			Т
*	Sweet Briar	Rosa rubiginosa	С		Т
*	Blackberry	Rubus fruticosus spp. agg.	С	WONS	Т
*	Gorse	Ulex europaeus	С	WONS	Т
*	Common Vetch	Vicia sativa			Т

* Introduced species # Native species outside its natural range



Key to Table

Declared Noxious Weed classifications and required actions under the CaLP Act

S	State Prohibited Weeds	Any infestations are to be reported to DELWP. DELWP is responsible for control of State Prohibited Weeds.
Ρ	Regionally Prohibited Weeds	Land owners must take all reasonable steps to eradicate regionally prohibited weeds on their land.
С	Regionally Controlled Weeds	Land owners must take all reasonable steps to prevent the growth and spread of regionally controlled weeds on their land.
R	Restricted Weeds	Trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials is prohibited.

WONS Weed of National Significance

<u>Lifeforms</u>

- T Terrestrial
- **E** Aquatic Emergent
- **S** Aquatic Submergent
- **F** Aquatic Floating



Appendix 2: High threat weeds, control methods and target

Weed status	Common Name	Scientific name	Extent (June 2017)	Control method	Optimal timing	10-year control targ
CaLP controlled noxious, WONS	African Box- thorn	Lycium ferocissimum	Extensive number of large individuals, particularly along northern and eastern boundaries of site	Cut and paint mature plants using an appropriate herbicide. Spray seedlings with appropriate herbicide	Year-round	<1% cover
CaLP controlled noxious	Artichoke Thistle	Cynara cardunculus	Dominant throughout site	Remove any flowers before they go to seed. Spray with an appropriate herbicide.	Late Spring/early Summer	<5% cover
CaLP controlled noxious	Blackberry	Rubus fruticosus spp. agg.	Scattered individuals recorded throughout site	Cut and swab mature plants using an appropriate herbicide. Spot-spray seedlings with appropriate herbicide.	Late Spring/early Summer	<1% cove
CaLP restricted noxious, WONS	Bridal Creeper	Asparagus asparagoides	Small number of individuals recorded	Spot-spray seedlings with appropriate herbicide. Dig out established plants.	Seedlings: Autumn; Established plants: Winter to Spring	<1% cove
High threat weed	Century Plant	Agave americana	Small number of large plants and recruits recorded in close proximity to Kororoit Creek in the north of site	Cut and paint mature plants using an appropriate herbicide. Spray seedlings with appropriate herbicide.	Prior to flowering where possible	<1% cove
CaLP restricted noxious	Fennel	Foeniculum vulgare	Large swathe of tall Fennel plants in eastern section of site, near Kororoit Creek	Cut and swab mature plants using an appropriate herbicide. Manual removal of small plants only. Where removal is not possible in short term stems should be cut in spring before seed ripens.	Any time for cut and paste. Early spring for slashing.	<1% cover
CaLP controlled noxious	Gorse	Ulex europaeus	Scattered individuals recorded throughout site	Cut and paint mature plants using an appropriate herbicide. Spray seedlings with appropriate herbicide	Autumn	<1% cover
WONS	Prickly Pear	Opuntia spp.	Small number of individuals recorded in east of site near Kororoit Creek	Thoroughly wet the plant with a foliar spray using an appropriate herbicide.	Spring to early summer	<1% cover
CaLP controlled noxious, WONS	Serrated Tussock	Nassella trichotoma	Dominant throughout site	Spray using an appropriate herbicide	Autumn and spring	<5% cover
CaLP controlled noxious	Sweet Briar	Rosa rubiginosa	Scattered individuals recorded throughout site, particularly in the southern section	Spray with an appropriate herbicide and hand remove individual plants	Year-round	<1% cover



et	Control undertaken (include date_/_/_)
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Appendix 3: Growling Grass Frog brochure



Threats

The main threats to the species are habitat removal or disturbance; degradation, fragmentation and pollution of habitat (i.e. waterways or native vegetation), infection from Chytrid Fungus, and predation from introduced fauna. These impacts can result in local extinction of populations.

Conservation status

This species is listed as **vulnerable** under the federal *Environment Protection and Biodiversity Conservation Act* 1999; **threatened** under Victoria's *Flora and Fauna Guarantee Act* 1988 and **endangered** on DEPI's *Advisory List of Threatened Vertebrate Fauna in Victoria*.



Management and Recovery

If Growling Grass Frogs are detected on your work site, stop work and contact BL&A for directions to ensure that you do not breach your legal obligations.

<u>Do not harm or handle frogs.</u> Frogs must be translocated from the site to an allocated recipient site by a suitably qualified ecologist with a permit to handle the species, in accordance with a Salvage and Translocation Plan prepared for the project.

Contacts

Injured frogs should be reported immediately to either of the following contacts.

Melbourne Zoo

Elliott Avenue (PO Box 74), Parkville, 3052 (03) 9285 9300

Victorian Government Department of Environment and Primary Industries 136 186





Brett Lane & Associates Pty. Ltd. Ecological Research & Management

Suite 5, 61-63 Camberwell Road, Hawthorn East, Vic. 3123 P.O. Box 337, Camberwell, Vic. 3124 Ph. (03) 9815 2111

Growling Grass Frog



BIERA Brett Lane & Associates Pty. Ltd. Ecological Research & Management





Description

The Growling Grass Frog is a large ground-dwelling frog, growing to 104 mm in length.

It can be identified by:

- Blotchy or almost stripy colorings of bright to dull green and dull golden-brown, with a white under surface, sometimes with pale stripe down middle of head and back.
- Broad head with a fairly pointed, rounded snout.
- Conspicuous tympanum (ear) behind eyes
- Small discs on tips of fingers and toes.
- Un-webbed fingers but almost fully webbed toes.
- Distinctive low-pitched growling call ('cra-a-awk, crawk, crawk, cra-a-a-wk') during warm, wet nights in spring to autumn.



Growling Grass Frog (Litoria raniformis)

Distribution

This species inhabits woodlands, shrublands and flooded open plains or disturbed areas. It historically occurred across southeastern Australia, including southern NSW, Victoria (except the drier north-west and high country), southeastern SA, northeastern Tas. and the Murray Valley. Victorian populations have since declined to a few scattered colonies (Anstis 2013).



Records of the Growling Grass Frog in Victoria since 1984

Habitat

The Growling Grass Frog breeds in spring and summer in permanent ponds, flooded plains, slow-flowing creek pools and the edges of lakes, dams or swamps that support fringing and submerged vegetation. Adults can disperse up to 1 to 2 km away from water bodies when in search of mates or alternative water sources. During cooler periods, the Growling Grass Frog retreats under rocks or logs or in burrows near water bodies and enter a state of torpor (similar to hibernation).

Reference List

Anstis M 2013, *Tadpoles and Frogs of Australia*, New Holland Publishers, London.

Similar Species

Other frogs may be mistaken for the Growling Grass Frog. There are 13 species of frog that occur in Victoria's lowlands. The three species which are most similar in appearance to the Growling Grass Frog are shown below.



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South-eastern Banjo Frog. Orange-brown or golden band dividing fairly dark blotchy brown back from orange-brown (to yellow) mottled sides. Tympanum (ear) difficult to see. Pointed fingers and toes. Adults smaller in size (grows up to 73mm). Distinct 'bonk' call.



Striped Marsh Frog. Dark brown to black longitudinal stripes with scattered spots over sides and limbs. Pointed Fingers and toes. Adults smaller in size (grows up to 73mm). Produces 'tok' or 'wok' call.



Spotted Marsh Frog. Light grey-brown, beige or olive green with large scattered round or oval darker spots, often with a distinct cream of red stripe down middle of head and back. Pointed fingers and toes. Adults smaller in size (grows up to 47mm). Produces 'click' call.

Appendix 4: Modeina Precinct 2 Drainage Plan





Appendix 5: Growling Grass Frog Strategy Plan (Prepared by Bosco Jonson)









Growling Grass Frog Strategy Plan Concept Plan Precinct 2

LEGEND:

1/1/1/1	GGF BUFFER
-	TEMPORARY CONSTRUCTION FENCE TO PREVENT INADVERTENT VEHICLE ACCESS DURING CONSTRUCTION
	SILT FENCING TO BE INSTALLED DOWNHILL OF ANY WORKS PRIOR TO COMMENCEMENT OF WORKS WITHIN A ZONE
	NATIVE VEGETATION TO RETAIN
	APPROVED PROJECT AREAS
	ZONE 1
	ZONE 2
	ZONE 3
	ZONE 4
	ZONE 5
	ZONE 6
	ZONE 7
	ZONE 8

0 scale 1:2500 @ A1 DATE: 10 July 2017 REF: 29743 001 DWG: 2974300BA



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200





Appendix 6: Kororoit Creekside landscape concept









3 - indicative creek interface treatment

NTS

Rev. - August 2017 1656B J:\1330 DFC Burnside\1656B Kororoit Creek\5. Design\Drawings\InDesign

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