

FINAL REPORT:

Conservation Management Plan for the Growling Grass Frog *Litoria raniformis* at the proposed Nar Nar Goon Racecourse

PREPARED FOR:

Pakenham Racing Club

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Ecology Partners Pty Ltd

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SUMMARY

Introduction

Ecology Partners Pty. Ltd. was commissioned by the Pakenham Racing Club to prepare a Conservation Management Plan (CMP) for the nationally threatened Growling Grass Frog *Litoria raniformis* for the proposed racecourse at Nar Nar Goon. A previous flora and fauna assessment, along with targeted Growling Grass Frog surveys have recently been undertaken within the study area for the proposed development.

The study area contains several artificial waterbodies (i.e. farm dams), and these sites provide variable quality habitat for Growling Grass Frog. Most are dominated by exotic flora, and dry out during summers, although three farm dams present in the north-eastern portion of the study area are in 'good condition' and support a high percentage cover of fringing, emergent and submerged vegetation. During the recent surveys a total of three male Growling Grass Frogs were detected within two of these farm dams. It is likely that Growling Grass Frog would use other waterbodies (i.e. sites containing suitable habitat features for the species) within the study area as limited survey effort was undertaken during the recent surveys.

Pakenham Racing Club propose to develop a racecourse with associated infrastructure and buildings such as stables, administration buildings, and carpark on the study area. Although a development plan has not been formalised, commercial buildings, and also residential buildings are proposed along the Nar Nar Goon - Longwarry Road.

The proposed racecourse development is likely to lead to the removal of several waterbodies where Growling Grass Frog has recently been detected. In addition, there is potential for farm dams to be isolated from other sites as part of the development, thus potentially limiting the ability of frogs to disperse within and between sites, which may compromise the long-term viability of the local population.

Objectives

The purpose of the Growling Grass Frog CMP is to provide measures to minimise impacts to local populations prior to, and during construction. The plan also provides information on habitat creation and management requirements, to ensure that the populations within the study area persist in the future.

Significance

The Growling Grass Frog is a nationally-listed species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and is likely to include individuals from the northern-most part of a metapopulation within Nar Nar Goon.

Management

Principally, this will be done through establishment, and management of preferred habitat as a series of wetlands in the south-western portion of the study area. Waterbodies will be established as soon as practicable, and it is hoped that Growling Grass Frog will colonise these wetlands shortly after establishment. In the event that Growling Grass Frog does not naturally colonise these sites, assisted translocation by a qualified ecologist/zoologist will be undertaken.

Three additional plans will be required to provide preferred habitat in the long term. These include:

- A Revegetation Plan within the proposed wetlands and their surrounds (it is possible that vegetation offsets required for the loss of vegetation elsewhere within the study area may be undertaken in the vicinity of the proposed wetlands);
- A Weed Management Plan which is to be prepared and implemented concurrently with the Revegetation Plan to manage weeds within the study area; and,
- An Erosion and Sediment Control Plan designed to maintain water quality within created wetlands.

Ongoing monitoring of populations and associated habitats, and reporting for a minimum period of three years is recommended. This report is subject to regulatory approval, and is likely to require approval from Cardinia Shire Council, DSE, Melbourne Water and DEWHA. An EPBC Act referral will also need to be prepared given that the proposed development will lead to the direct removal of suitable habitat for Growling Grass Frog.

1 INTRODUCTION

1.1 Background

Ecology Partners Pty. Ltd. was commissioned by the Pakenham Racing Club to prepare a Conservation Management Plan (CMP) for the nationally threatened Growling Grass Frog *Litoria raniformis* for the proposed racecourse at Nar Nar Goon. A previous flora and fauna assessment, along with targeted Growling Grass Frog surveys have recently been undertaken within the study area (Biosis Research 2008).

The study area contains ten artificial waterbodies (i.e. farm dams), and these sites provide variable quality habitat for Growling Grass Frog. Most are dominated by exotic flora, and dry out during summers (Biosis Research 2008), although three farm dams present in the north-eastern portion of the study area are in ‘good condition’ and support a high percentage cover of fringing, emergent and submerged vegetation. During the recent surveys a total of three male Growling Grass Frogs were detected within two of these farm dams (Biosis Research 2008). It is likely that Growling Grass Frog would use other waterbodies (i.e. sites containing suitable habitat features for the species) within the study area as limited survey effort was undertaken during the recent surveys by Biosis Research (2008). In addition, the study area contains other biodiversity values, although the focus of the report is to provide detailed conservation management actions/measures to ensure that populations of Growling Grass Frog persist on within the study area in the future.

Pakenham Racing Club proposes to develop a racecourse with associated infrastructure and buildings such as stables, administration buildings, and carparks on the study area. Although a development plan has not been developed, commercial buildings are proposed, along with residential buildings along the Nar Nar Goon - Longwarry Road.

The proposed racecourse development is likely to lead to the removal of two waterbodies where Growling Grass Frog has recently been recorded. In addition, there is potential for farm dams to be isolated from other sites as part of the development, thus potentially limiting the ability of frogs to disperse within and between sites, which may comprise the long-term viability of the local population.

1.2 Objectives

The purpose of the Growling Grass Frog CMP is to provide measures to minimise impacts to local populations prior to, and during construction. The plan also provides information on habitat creation and management requirements, to ensure that the populations within the study area persist in the future. Specifically, the purpose of the CMP is to:

- Provide an outline of the overall objectives, discuss the relevant timeframes, and provide a list of the organisations responsible for implementation of the CMP;
- Provide detailed management and habitat design measures including:

- Pre-construction habitat protection and enhancement requirements, including development design considerations; protection of current habitats; details of design, construction and location requirements of compensatory and additional habitat;
 - During construction management requirements, including salvage and translocation requirements and protocols; details of permits and qualifications required for personnel undertaking salvage and translocation; requirements for protecting existing habitat from sedimentation and pollution and direct disturbance that may result from construction activities; providing advice and recommendations on other habitat protection requirements, such as establishment of ‘no-go’ zones and clearly marked fencing;
 - Post-construction management requirements, including on-going monitoring and surveys for Growling Grass Frog; management of wetland and other important habitat within the study area and surrounding areas (i.e. waterbodies), including vegetation, water quality, water level and refuge site monitoring and management; protection of habitat from current and potential future threats (such as foxes, feral cats and *Gambusia*); and,
- Legislative requirements for reporting on the species and habitat monitoring and management activities.

A referral to the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) will also be prepared as part of the proposed development.

A rapid site assessment was undertaken on 12 August 2009 to briefly assess the habitat conditions present within the study area.

1.3 Study Area

The study area is approximately 230 hectares in area and is located in Nar Nar Goon approximately 60 kilometres south-east of Melbourne (Figure 1). It is bounded by Nar Nar Goon – Longwarry Road to the north, Chippendale Road and Ararat Creek to the west, and private farm properties to the east and south (divided by an open drain and water mains which run alongside it).

The study area has historically been used for agricultural purposes, including grazing for livestock and cropping. It continues to be used for these purposes, and currently contains ten artificial waterbodies (i.e. farm dams). The total area of these waterbodies is approximately 0.47 ha.

According to DSE’s Biodiversity Interactive Map (DSE 2009) the study area is within the Gippsland Plain bioregion, which extends from Port Phillip Bay in the west to Bairnsdale in the east, between the southern slopes of the Great Dividing Range and Wilsons Promontory, excluding the Strzelecki Ranges.

The study area is within the municipality of Cardinia Shire Council and within the Port Phillip and Westernport catchment.

2 GROWLING GRASS FROG

2.1 Conservation Status

Growling Grass Frog is commonly known by several other names; Warty Bell Frog, Southern Bell Frog, Warty Swamp Frog and Green and Golden Frog. The species is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is also listed as a threatened taxon under the EPBC Act and the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act). A draft Flora and Fauna Guarantee Action Statement (Robertson 2003) and a draft National Recovery Plan have been developed for the species. It is also listed as endangered in Victoria under the DSE Advisory List (DSE 2007) and vulnerable nationally (Tyler 1997). Overall the species is of national conservation significance.

Although formally widely distributed across southern eastern Australia, including Tasmania (Littlejohn 1963; 1982; Hero *et al.* 1991), the species has declined markedly across much of its former range. This has been most evident over the past two decades and in many areas, particularly in south and central Victoria, populations have experienced apparent declines (including within the study area) and local extinctions (AVW 2007; Mahoney 1999; Organ, A., Ecology Partners Pty. Ltd. pers. comm.).

2.2 Habitat Requirements

This species is largely associated with permanent or semi-permanent still or slow flowing waterbodies (i.e. streams, lagoons, farm dams and old quarry sites) (Hero *et al.* 1991; Barker *et al.* 1995; Cogger 1996; Ashworth 1998). Frogs can also utilise temporarily inundated waterbodies for breeding purposes providing they contain water over the breeding season (Organ 2003).

Based on previous investigations there is a strong correlation between the presence of the species and key habitat attributes at a given waterbody. For example, the species is typically associated with waterbodies supporting extensive cover of emergent, submerged and floating vegetation (Robertson *et al.* 2002; Organ 2004; 2005b). Emergent vegetation provides basking sites for frogs and protection from predators, while floating vegetation provides suitable calling stages for adult males, and breeding and oviposition (egg deposition) sites. Terrestrial vegetation (grasses, sedges), rocks and other ground debris around wetland perimeters also provide foraging, dispersal and over-wintering sites for frogs.

Within the study area and immediate surrounds waterbodies supporting the above mentioned habitat characteristics and that are located within at least 300-500 metres of each other are more likely to support a population of *L. raniformis*, compared with isolated sites lacking important habitat features (Hamer and Organ 2008).

Indeed, recent studies have revealed that the spatial orientation of waterbodies across the landscape is one of the most important habitat determinants influencing the presence of the species at a given site (Robertson *et al.* 2002; Heard *et al.* 2004a, 2004b; Hamer and Organ 2008).

For example, studies have shown there is a positive correlation between the presence of the species and the distance of freestanding waterbodies to another occupied site. This is comparable to the spatial dynamics of many amphibian populations, including the closely related Green and Golden Bell Frog *Litoria aurea* (Hamer *et al.* 2002).

2.3 Habitat within the Study Area

Many of the waterbodies within study area provide marginal habitat for the species. That is, seven of the 10 farm dams are of poor quality to Growling Grass Frog as they lack the preferred habitat characteristics (as described above) (Biosis Research 2008). Three of the farm dams were observed to provide good quality habitat for the species and support a high percentage cover of emergent and submergent vegetation (Biosis Research 2008). A drainage line which bisects the study area in a north-south direction, albeit dominated by exotic vegetation, may provide a dispersal corridor for individuals moving between sites.

2.4 Habitat and Distribution Surrounding the Study Area

Growling Grass Frog has previously been recorded to the south of the study area, including on the other side of Ararat creek, near Nine Mile Road, Convent School Road and Daly Road (Biosis Research 2008) (Figure 2). It is possible that the population within the study area forms part of the larger metapopulation within the greater Pakenham area, and these populations are generally recognised as being nationally significant. Indeed, dispersal between occupied sites throughout the landscape is likely to be important for the long-term maintenance of this metapopulation.

2.5 Threatening Processes

Causes of the decline of Growling Grass Frog are not fully understood. However, factors that are likely to have contributed to the decline include habitat loss, fragmentation and degradation (such as land clearing for agriculture and urban development), altered flooding regimes of natural waterbodies, predation on eggs and tadpoles by introduced fish, salinisation, chemical pollution of waterbodies by fertilisers and pesticides, and infection by the amphibian chytrid fungus (White and Pyke 1996; Hamer *et al.* 2002). Some of these factors are presently acting on the metapopulations in Pakenham, although habitat loss and modification represent the greatest threat to the extant population within the study area.

2.6 Potential Impacts

On the basis of the current distribution and habitat requirements of Growling Grass Frog within the study area, the primary impact to the species and its habitats is associated with the direct removal of suitable wetland and terrestrial habitat for the species.

All ten waterbodies known to, or that have a potential to support habitat for Growling Grass Frog are proposed to be eventually directly impacted by the proposed racecourse development. The removal or disturbance of these waterbodies will lead to the direct removal of suitable breeding, foraging and dispersal habitat within the study area. Where possible, the loss of suitable aquatic and terrestrial habitat for Growling Grass Frog will be reinstated and enhanced. In addition, given that the waterbodies are proposed to be disturbed during construction, a Growling Grass Frog salvage and translocation plan has been developed (Section 3). The key recommendation from this plan is to develop a series of wetlands within at least 50 metres of the Ararat Creek, which provide preferred habitat for Growling Grass Frog (which is discussed in greater detail below).

Construction activities associated with the development within the study area have the potential to result in sedimentation of waterways and introduce sediment-laden runoff into the proposed wetlands and Ararat Creek. Sediment-laden water also has the potential to be transported offsite, downstream to areas containing potential habitat for Growling Grass Frog. There is also the potential for accidental spillage of chemicals from the construction area, which may runoff into drainage line, and the creeks.

Increase in sediment input and input of toxic substances into Victorian rivers and streams due to human activities are both threatening processes under Schedule 3 of the FFG Act. Erosion and sediment control measures, along with water quality monitoring will be implemented during construction to ensure that water quality in creeks and the proposed wetlands do not deteriorate.

Once the development is complete stormwater runoff from roads and paved surfaces has the potential to drain into nearby waterbodies, and any created wetlands and culverts. It is recommended that surface water flows be directed to the south east of the study area, and that some of the proposed wetlands provide a means of treating and improving water quality before it reaches the habitat wetlands.

The proposed habitat wetlands will be designed and managed principally for the conservation of Growling Grass Frogs. Construction personnel and human access will not be permitted during racecourse construction, and apart from maintenance/monitoring access, will not be encouraged post-construction.

3 CONSERVATION MANAGEMENT PLAN

3.1 Objectives

The primary objectives of this Conservation Management Plan (CMP) are to outline specific measures to ensure that:

1. The proposed racecourse development avoids impacts, where possible, to individuals which form the resident Growling Grass Frog population;
2. The study area which is currently occupied, continues to provide high quality habitat to Growling Grass Frog in the long-term; and,
3. The proposed wetlands (i.e. habitats) continue to support Growling Grass Frog populations within the study area.

The CMP provides comprehensive management guidelines which facilitate the ongoing protection and maintenance of Growling Grass Frog populations within the study area into the future, and features three main stages:

1. Provision of high quality preferred alternative habitat as soon as practicable, and approved by regulators, prior to commencement of major earthworks construction in the racecourse, or alteration to the existing three main farm dams that have been identified as providing suitable habitat (or alteration to input drainage catchments to those three farm dams).
2. Frog salvage and translocation plan once the proposed wetlands have been completed and provide suitable habitat; and,
3. Monitoring and maintenance recommendations subsequent to the completion of wetland and the primary racecourse construction works (the tracks, internal water storage, main access roads and carpark, administration and hospitality buildings, stalls, vet facilities, club stables and maintenance compound).

3.2 Management Plan Implementation, Timeframe and Review

The CMP will be implemented by the proponent, the Pakenham Racing Club and their contractors. It is likely to require approval from DEWHA, DSE, Melbourne Water and Council prior to inception. This CMP prescribes works for at least three years post works development of the racecourse. It will be revised and updated depending on the impacts associated with the racecourse development, and for any subsequent works which may impact on the proposed wetlands either directly or indirectly. At that time, additional management actions may also be recommended.

It is intended that the plan, along with the habitat protection and enhancement recommendations it details, will be reviewed each year after management and monitoring actions have been undertaken.

3.3 Proposed Schedule of Works

The proposed schedule of works will be undertaken in a timeframe which suits the biology of Growling Grass Frog, although it is somewhat dependant on the outcomes of the approvals process, and the proposed construction process. The Pakenham Racing Club is responsible for commissioning and overseeing the following:

Autumn 2010:

- Prepare an Erosion and Sediment Control Plan.
- Prepare a Weed Management Plan.
- Submit EPBC Referral to DEWHA.

Winter 2010:

- Prepare a Revegetation Plan.
- Commence excavation for the Growling Grass Frog ponds.

Spring 2010:

- Revegetate and undertake habitat enrichment works at the Growling Grass Frog Ponds. Ensure habitat is suitable containing sufficient water depth, water quality, cover etc.

Summer 2010/11:

Any frogs that have not relocated to the new ponds will be physically salvaged and relocated. Dams which provide potential habitat will be drained and backfilled within a day of relocating individuals.

Ongoing:

Implementing this Plan and monitoring the Growling Grass Frog population in accordance with this Plan

3.4 Pre-Construction Phase

3.4.1 Priority Areas for Conservation

It is understood that the proposed development will eventually require the removal of all 10 existing farm dams within the study area. The two farm dams which are known to support the Growling Grass Frog will be retained as long as possible, although development in and around these waterbodies has the potential to isolate the sites from other suitable sites in the wider area (i.e. wetland habitats to the south of the study area where the species has previously been

recorded). As such, the long-term viability of the populations at these sites is problematic as they will be effectively surrounded by development and dispersal opportunities are restricted. Hence relocation to alternative preferred habitat is the only long term option for the site.

3.4.2 Habitat Creation

Given that suitable Growling Grass Frog habitat is proposed to be removed, a series of artificial waterbodies (wetlands) will be created in the south-western portion of the study area, immediately adjacent to Ararat Creek.

The proposed wetlands will need to be designed specifically as habitat for Growling Grass Frog and protected from untreated stormwater emanating from the construction works (in the short term) and the course operations areas in the longer term. An Erosion and Sedimentation Plan will be prepared prior to development, and will be implemented through each stage of the development, including construction of any buildings post-development of the racecourse.

As a minimum the same area of waterbodies will be created as those proposed to be removed (i.e. 0.47 ha). The frontage onto Ararat Creek is approximately 750 metres. It is proposed that between four and six ponds, spaced approximately 80-100 metres apart be located up to 150 metres of the existing creekline. Additional wetlands will be located further east by approximately 20 or 30 metres, to intercept and treat the surface drainage waters from the proposed development. These wetlands must be sized and designed so as to ensure that best practice stormwater quality treatment standards are achieved before the waters are spilled into the habitat ponds during higher rainfall events.

The eastern-most ponds will be designed to retain some water year-round, which is consistent with the three key habitat farm dams identified within the study area. These will be paramount for the survival of the population of the species in the event of ongoing prolonged drought conditions.

Rocks which are excavated (or imported) and woody debris from trees which are felled (or imported) will be placed in the vicinity of the proposed wetlands. This “habitat enrichment” is important for providing shelter for frogs and also providing habitat for prey items. They may also assist with reducing flow rates into the wetlands, and therefore sedimentation.

Created wetlands will include the following habitat features:

- A diversity of emergent (excluding *Typha* spp.), submerged and floating (particularly *Potamogeton* spp.) vegetation will be planted in wetlands and frog ponds, while dense areas of low growing shrubs, sedges and grasses will be planted around the perimeter of wetlands. A species list of preferred plants is provided as Appendix 1.
- Terrestrial shelter in the form of rock piles, rock mattresses and logs will be used, and will cover approximately 30-40% of the total area around the banks of the wetlands. The spaces between refugia and their orientation will vary to optimise habitat variability;

- Where possible, selected larger concave shaped rocks (300 – 750 millimetres in size) will be placed along wetland banks;
- A density of at least six semi aquatic and terrestrial plants per square metre and three plants per square metre for aquatic species will be employed;
- Trees and/or large shrubs will not be planted densely within 20 metres of the habitat wetland banks as this may shade out wetlands, thus potentially rendering them unsuitable for Growling Grass Frog.
- Use of water-sources that provide adequate water quality for the species, in regard to turbidity, nitrate and phosphorus levels and salinity;
- Protective netting will be installed over aquatic plants, particularly immediately after planting to prevent damage by waterfowl. Once vegetation is established netting will be progressively removed;
- Provision of a range of edge habitats;
- Wetlands and frog ponds will be surrounded by a terrestrial buffer of at least ten metres in which there is no development, mowing, slashing or use of herbicides and pesticides, but which may be landscaped with indigenous grasses, herbaceous species and low shrubby vegetation (but no trees);
- Water will be secured to ensure that the established plants survive, and to seasonally fill the ponds if necessary;
- All wetlands and frog ponds must retain some permanent water, and be constructed up to 2 metres in depth;
- No access tracks, roads, houses and other infrastructure will be located near created wetlands, and there will be no barriers to dispersal between the ponds and Ararat Creek (e.g. fencing perpendicular to corridor direction); and,
- Wetlands will be kept free of predatory fish such as Plague Minnow and non-native fish such as Redfin. The ongoing monitoring program (Appendix 2) will identify invaded ponds and subsequently instruct managers that draining is required.

3.4.3 Mitigation Measures

There are several measures that will be incorporated into the proposed development design to reduce potential adverse impacts that may result from proposed racecourse development. Measures that will be adopted at the pre-construction phase of the development include:

- Retention of *in situ* farm dams and local drainage catchments for as long as practicable;

- Creation of wetlands which provide preferred habitat specifically designed for GGF as soon as practicable, in advance (e.g. at least one year) of the proposed racecourse development;
- Use of development design and construction techniques which recognise and respond to the habitat requirements for the species;
- Prior to disturbance of suitable habitat for the species undertake pre-construction surveys by a suitably qualified herpetologist so that any resident frogs can be salvaged and translocated to the proposed wetlands (see below);
- Provision and retention of continuous linear dispersal corridors, allowing frogs to disperse along waterway habitats;
- Establishment of a suitable buffer distance between wetlands and development areas (not less than 25 m);
- Appropriate signage around wetland perimeter fencing to discourage/prevent accidental entry by construction personnel and machinery;
- Development and implementation of an Erosion and Sediment Control Plan (i.e. a Site EMP in accordance with the EPA Victoria Guidelines); and,
- Development and implementation of a Weed Management Plan.

3.4.4 Frog Salvage and Translocation

A list of the requirements as part of salvage and translocation is provided below.

Salvage requirements

Any frogs encountered during salvage operations will need to be removed and released at the established habitat wetlands.

Salvage measures will be undertaken by a qualified zoologist experienced with these requirements. It will be undertaken by two zoologists over three days and nights and in accordance with the following:

- Salvage will be undertaken during the species' active period (typically between October and March). Where possible, it should be the night before disturbance, as a longer intervening period may allow frogs to move back into the farm dams;
- Tadpole salvage will also be undertaken if the drainage/pumping of any waterbodies is carried out where Growling Grass Frog has been identified as occupying the site;

- Footwear will be washed in disinfectant at the beginning and end of each salvage period to prevent the introduction and/or spread of any diseases;
- A suitably qualified herpetologist/zoologist will be present at all times during the initial soil disturbance in areas where salvage is required. However, if this is not possible contractors will be required to contact a nominated person immediately should any frogs be located, and cease works immediately, until the nominated person is present on site to supervise further works in the immediate area;
- Contractors will be made fully aware of the appearance of (and call sound) of Growling Grass Frog, and in the event that a zoologist is not available, any specimens will be stored in an appropriate container and kept in a cool place out of direct sunlight until a qualified herpetologist/zoologist arrives; and,
- Salvage procedures will be conducted in accordance with the hygiene protocol for the control of disease in frogs (NPWS 2001).

Translocation Protocol

The chosen translocation site is to be within the proposed habitat wetlands which will be established as soon as practicable but preferably 1 year prior to commencement of major racecourse earthworks construction. During that time, it is hoped that Growling Grass Frog will disperse into this preferred created habitat over time without the need for active translocation.

In the event that this doesn't occur, the following requirements will be undertaken prior to and during translocation:

- Frog translocation will be undertaken by a qualified zoologist experienced with these operations;
- Prior to the release of the frog(s) morphological data including body size, sex and reproductive condition will be recorded for all frogs captured;
- Frogs will be released at night into favourable micro-habitats such as areas containing rocks or dense vegetation around the perimeter of a waterbody where there is sufficient cover;
- Frogs will be translocated immediately after capture;
- Translocation will consider the potential spread of diseases (chytrid fungus), and impacts on Growling Grass Frog and other frog populations at translocation sites;
- Any visibly sick or dying specimens will not be translocated and will be kept for further analysis to determine if infected with chytrid fungus; and,

- The success or failure of frog translocation will be documented/reviewed and submitted to DEWHA and DSE for review.

3.4.5 Required Approvals

Management authorisation to ‘live capture’, collect and relocate Growling Grass Frog under the *Wildlife Act 1975* for the racecourse development project needs to be granted.

3.5 Racecourse Construction Phase

The proposed habitat wetlands area will be managed primarily for conservation purposes. The area immediately surrounding these ponds will be revegetated, and weeds managed (Figure 2).

The following will be undertaken during racecourse construction to ensure that this is achieved:

- Access will not be permitted into the wetland area by racecourse construction personnel under any circumstances;
- Litter will be placed in rubbish bins located at least 100 metres away from the wetlands;
- Sediment control measures will be maintained at all times in accordance with an Erosion and Sediment Control Plan (which is likely to be required for the entire study area and will be part of the overall Environmental Management Plan);
- All personnel entering the construction site will be inducted on the appearance, and actions that are to be implemented in the event that a Growling Grass Frog is recorded, or injured;
- Temporary high visibility fencing will be installed around the wetlands area during construction within the study area. This will include star pickets approximately 10 metres apart, and two rows of orange high visibility tape. It will be maintained by the Site Manager of nominated individual for the duration of the construction.
- Signage will be erected at the wetland area warning personnel that this is a “no-go area” and that it is managed for conservation purposes. This signage is to be left up indefinitely (refer to Appendix 3); and,
- Weed management and revegetation works will also be undertaken throughout the construction phase of the project. Again, these will be prescribed in plans prior to construction. It is possible that some of the vegetation offsets required for permitted vegetation clearance of remnant vegetation may be achieved within the wetland area.

3.6 Post-Construction Phase: Ongoing Management and Monitoring

3.6.1 Habitat Management and Maintenance

Ongoing maintenance of newly created wetlands, in particular the maintenance of aquatic vegetation diversity and structure, and the provision of terrestrial habitats will be undertaken to ensure that the habitat wetlands area and the creek corridor remain suitable for Growling Grass Frog in the future.

The following will need to be considered as part of habitat maintenance in the future:

- If necessary, additional plants will be planted to ensure that waterways and terrestrial habitats remain suitable;
- Additional refuge sites will be provided if it is considered during site monitoring that the area of shelter is insufficient;
- Where possible, weeds will be controlled by hand or with the use of manual implements. Alternatively, a frog sensitive herbicide (non-residual herbicide) will be selectively used. The use of other herbicides or pesticides within, or in close proximity to waterways, shelter sites and likely dispersal areas will be prohibited; and,
- In the unlikely event of construction material and other unwanted materials used for revegetation works (e.g. plastic, polystyrene) are observed within the proposed wetland area, it will be removed.

3.6.2 Surface Water Overflow Management

A drainage line runs north-south through the study area, and generally slopes towards the south and west, to Ararat Creek. It is anticipated that surface water which flows over the study area will continue to flow to the south and towards Ararat Creek in the south-west. Engineering associated with the development of the study area is expected to maintain this slope and therefore proposed wetlands will be fed by this water.

Created wetlands are proposed to treat the water and improve its quality, and then discharge into Ararat Creek during high rainfall events. Melbourne Water regularly incorporates such stormwater treatment wetlands into urban and peri-urban developments. Melbourne Water (2009) provides guidelines to developers in the recently published 'Constructed Wetland Systems Design Guidelines for Developers' which is designed to assist with protecting the health of receiving waterways and reducing pollutant levels during construction (Melbourne Water 2009).

3.6.3 Water Quality Monitoring and Management

Based on known information of water quality tolerances and preferences by Growling Grass Frog, the species requires waterbodies containing low levels of nitrates, nitrides and phosphates (Ashworth 1998; Organ 2002; 2003). Water quality is particularly important for larval development and recruitment. For example, waterways containing low levels of

pollutants and turbidity are more likely to lead to higher survivorship of tadpoles and a greater recruitment of metamorphs (juveniles) (Organ 2003).

Ambient water quality monitoring (i.e. nutrient level and turbidity) will be undertaken during autumn and spring within the waterbodies (at the same time as the monitoring of revegetation) for a period of three years after the wetlands have been inundated, revegetation has been completed and the ponds contain permanent water. Targeted storm event water quality monitoring will also be carried out in the treatment wetlands during the major earthworks and building construction periods.

3.6.4 Pest Animal Management

Foxes and cats are known to prey upon Growling Grass Frog. However, it is considered impractical to implement a fox or cat management program for the study area. Firstly, the development is not residential and cats are therefore not likely to be introduced into the study area. Furthermore, decreasing numbers of foxes and cats within the vicinity of the study area is unlikely to assist in the long term.

Introduced fish, particularly Eastern Gambusia *Gambusia holbrooki* and Goldfish, are known to predate upon the larvae of Growling Grass Frogs, amongst other frogs. Monitoring for predatory species will be undertaken annually post-construction. In the unlikely event that these species are introduced into the proposed wetlands, Council will be notified, and these species will be removed by draining the wetlands and allowing the waterbodies to dry out completely.

3.6.5 Population and Habitat Monitoring

The success in maintaining a viable population of Growling Grass Frog within the study area depends on the establishing, and maintaining high quality habitat for the species. This includes revegetation, provision of shelter, water levels and quality, and exclusion of predatory fauna. Each of these has been recommended, however, the effectiveness needs to be monitored in order to ensure that efforts to retain this species within the study area are sufficient.

At least two days of diurnal survey and three days of nocturnal surveys will be conducted over the breeding period (i.e. between September and March) to determine the presence and population size for the Growling Grass Frog within the study area for a period of three years post-construction. Minimum survey effort includes:

- During diurnal surveys observers will walk along the banks of waterways and around the perimeter of waterbodies to locate frogs basking on vegetation and/or to listen for frogs entering the water when alarmed;
- Nocturnal monitoring will be conducted on still nights when air temperatures are above 13°C, preferably within 24 hours of rain;

- An initial period of five minutes will be spent recording any calling frogs (all species) in and adjacent to waterways;
- Surveyors will search ground-level habitat including surface rocks, underneath hard litter, and at the base of vegetation for frogs;
- Experienced personnel will use 30-50 watt 12 volt hand-held spotlights to locate calling males on floating vegetation in the waterbody and around the perimeter of waterways. This technique is known to be reliable as the eyes of frogs will often reflect light back allowing them to be located; and,
- Morphological data including sex, body size, weight and reproductive condition will be recorded for all frogs captured.

Several site-specific habitat variables will also be assessed during the monitoring period, specifically:

- Wetland depth, flow, permanency and water quality/chemistry;
- Availability and suitability of shelter and over-wintering sites;
- Vegetation diversity, structure, composition and percentage of cover;
- Presence of introduced fish, particularly *Gambusia holbrooki* and Goldfish; and,
- Presence of pollutants, rubbish and other threatening processes.

A photographic reference will be taken at a number of waterways at key locations so that comparisons of habitat conditions can be made over time.

Measures to reduce the possible spread of infectious pathogens will be implemented in accordance with standards described by the New South Wales National Parks and Wildlife Service (NPWS 2001). For instance, as a minimum all equipment and footwear will be treated with an appropriate biodegradable disinfectant (i.e. diluted bleach) prior to surveys, while sick or visibly distressed frogs will be taken from the study area for further analysis.

Commercially-available, collapsible bait-traps constructed of nylon netting will be baited with meat or florescent glow sticks, and then set at the completion of each spotlight survey, in an effort to capture tadpoles at predetermined locations. At least two traps will be set at each wetland for a minimum of two nights over the breeding period of Growling Grass Frog. Traps will be suspended (use of floats) so that at least part of the trap emerges above water-level, allowing tadpoles to breathe. Traps will then be retrieved the following morning, and checked for tadpoles and predatory fish.

All tadpoles caught will be identified to species level, counted and released. Alternatively, dip nests will be used to sample for tadpoles at, or in the vicinity of sites where calling males are identified.

Finally, active searching for metamorphs (around the perimeter of waterways) will be conducted between December and February at sites where breeding activity is observed and/or tadpoles caught.

Results and records of the reporting will be provided to Council annually for a period of three years post-construction.

3.7 Responsibilities for Management

3.7.1 Key Responsibilities

In summary, the Pakenham Racing Club will be responsible for commissioning the following actions:

- Ensuring appropriate salvage and translocation measures are undertaken by a qualified zoologist should the species be identified within the study area during the construction or use of the proposed development.
- Ensuring appropriate maintenance, monitoring and surveys are conducted by a qualified zoologist in accordance with this report (see Appendix 2) and recorded, in relation to:
 - Water Quality;
 - Surveys for predatory fish;
 - Growling Grass Frog population monitoring;
 - Habitat monitoring and wetland manipulation;
 - Providing an annual summary of the results of frog surveys and water quality monitoring to Council for a period of three years post construction, possibly longer if required.
- Informing the Commonwealth Environment Minister of any significant change to the approved plans; and,
- Revising the CMP when significant additional information becomes available (i.e. the species is detected at additional locations within the study area). This can include information from site inspections, maintenance and monitoring activities. A revision to the CMP will update the existing CMP through a supplementary plan or addendum.

3.7.2 Protocols to inform the Minister

Given that the proposed development will lead to the direct removal of suitable breeding habitat for Growling Grass Frog, the following protocols to inform the Commonwealth

Environment Minister of relevant issues, milestones and results of surveys and studies will be implemented to keep the Environment Minister informed:

- An annual summary of the results of frog surveys and water quality monitoring will be provided to the Minister for at least a period of three years post the new preferred habitat establishment works;
- A progress report will be provided to the Minister each year on the implementation of the CMP, noting any key issues and management responses;
- If the Pakenham Racing Club wishes to undertake any activity other than in accordance with the DEWHA approved plans, revised plans will be submitted for the Minister's approval. If the Minister approves a revised plan, the Pakenham Racing Club must implement that plan rather than the plan as originally approved;
- If, at any time after three years from the date of the DEWHA approval, the Minister notifies Pakenham Racing Club in writing that the Minister is not satisfied that there has been substantial commencement of construction of the action (the racecourse or the habitat wetlands), construction of the action must not thereafter be commenced; and,
- The Minister will be informed of any significant finding resulting from period surveys, and monitoring activities.

DSE will also be informed of relevant issues, milestones and results of surveys and studies and a copy of the progress report(s) will be submitted to the Department for comment/review.

4 CONCLUSION

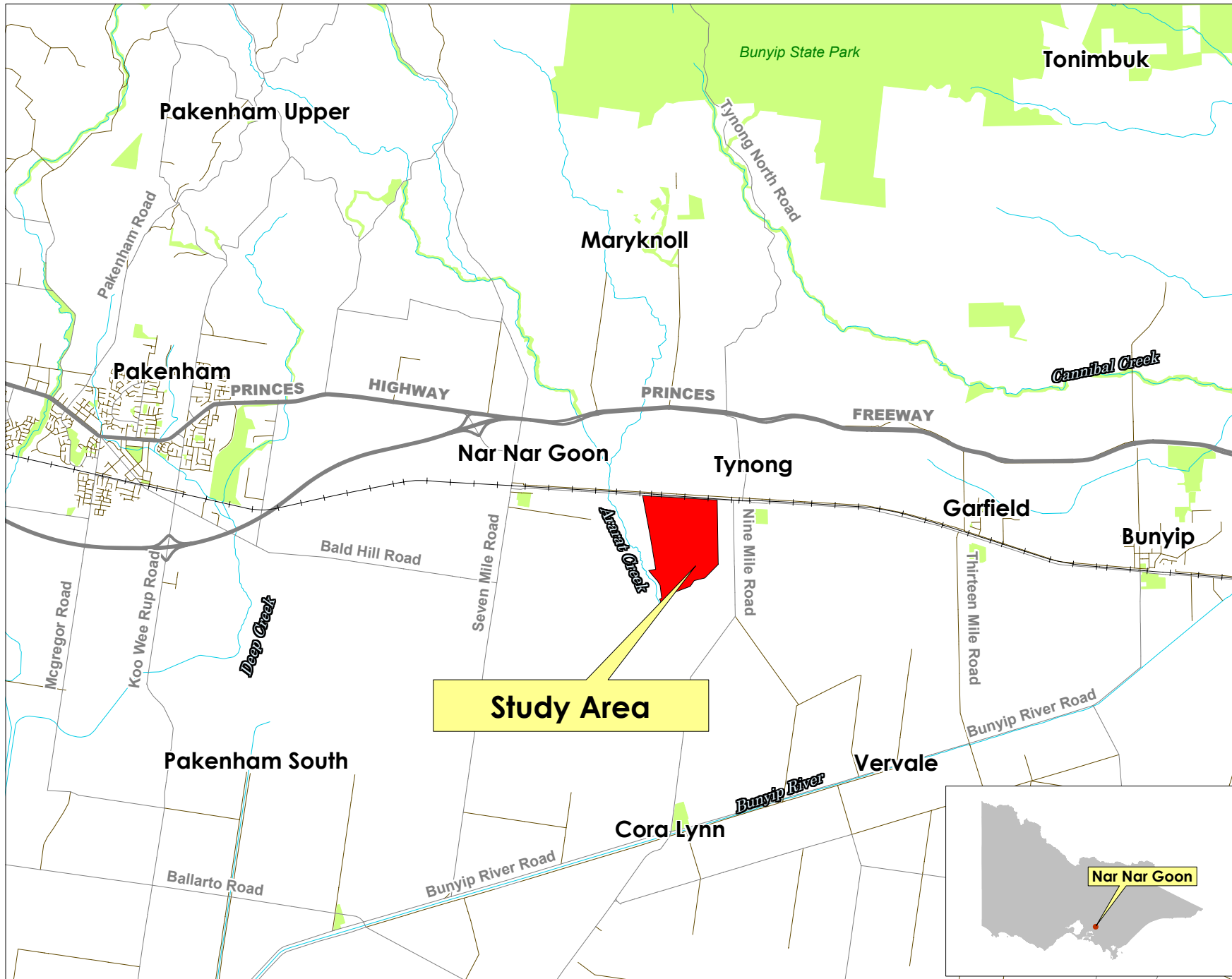
The Pakenham Racing Club is proposing to develop a racecourse at Nar Nar Goon. This requires the development of the majority of the study area. The primary objective of this plan is to provide protection and management measures to ensure that the proposed racecourse development does not have a significant impact on Growling Grass Frog, and to ensure that extant populations remain viable in the future. Principally, this will be done through establishment, and management of preferred habitat as a series of wetlands in the south-western portion of the study area adjacent to Ararat Creek. These will be established as soon as practicable, and it is hoped that Growling Grass Frog will naturally colonise these wetlands once established. In the event that Growling Grass Frog does not colonise constructed waterbodies, frogs will be physically translocated by a qualified ecologist/zoologist into suitable microhabitats at constructed waterbodies.

Three additional plans will be required to provide preferred habitat in the long term. These include:

- A Revegetation Plan within the proposed wetlands and their surrounds (it is possible that vegetation offsets required for the loss of vegetation elsewhere on the site may be undertaken in the vicinity of the proposed wetlands);
- A Weed Management Plan which is to be prepared and implemented concurrently with the Revegetation Plan to manage current and future weeds; and,
- An Erosion and Sediment Control Plan designed to maintain water quality within the proposed wetlands.

Ongoing monitoring and reporting for a minimum period of three years is recommended within this report. This report is subject to regulatory approval, and is likely to require approval from Cardinia Shire Council, DSE, Melbourne Water and DEWHA. An EPBC Act referral will also need to be prepared given that the proposed development will lead to the direct removal of suitable habitat for Growling Grass Frog.

FIGURES



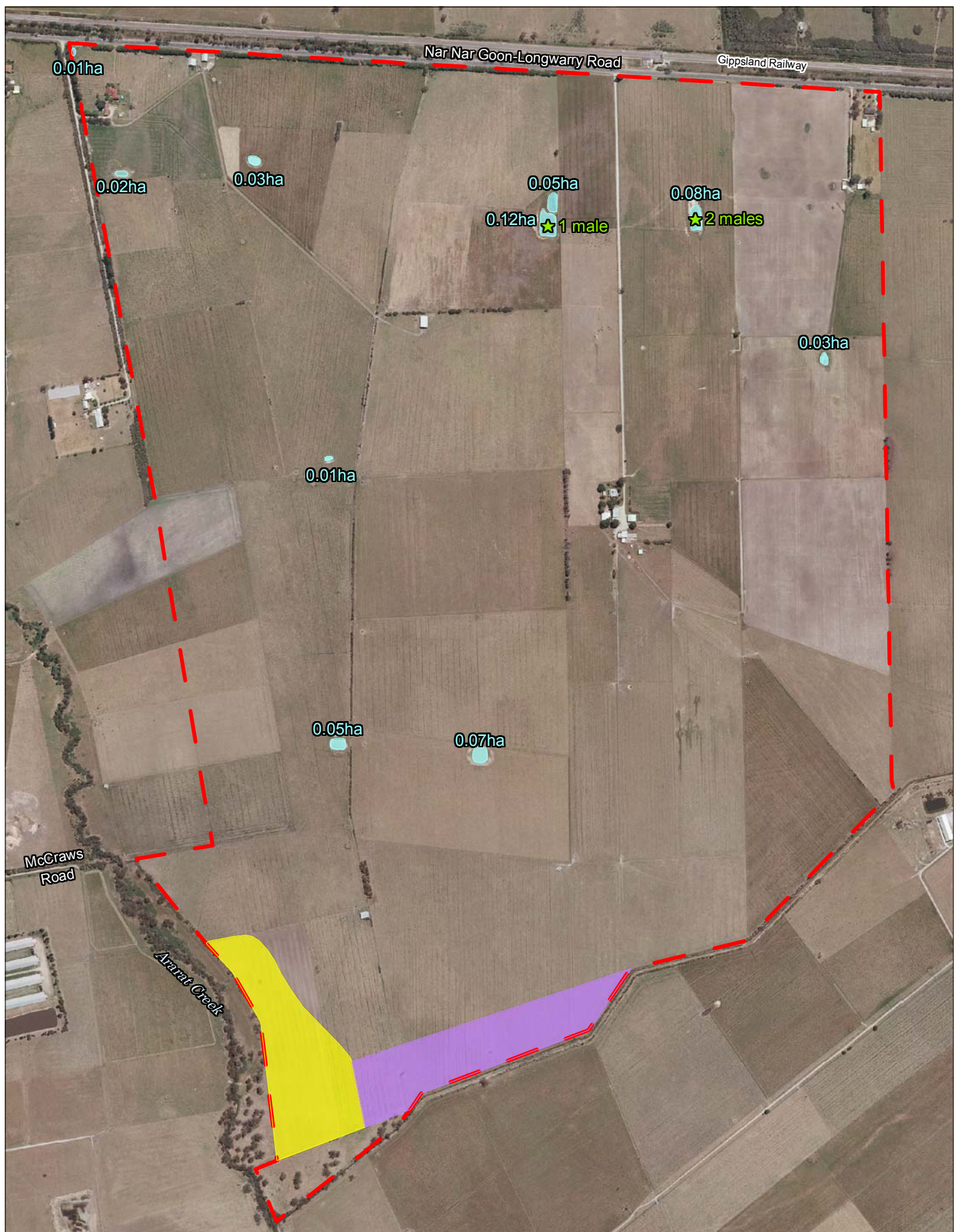
 Study area



Figure 1
Location of study area,
Nar Nar Goon Racecourse



EP Map Num: 1613 Fig 1
Issue Date: 23/10/2009



- ★ Growling Grass Frog record
- Existing farm dam
- Approximate location of proposed wetlands & revegetation area
- Approximate location of proposed stormwater treatment area



0 100 200
Metres

Figure 2
Concept design for proposed wetlands,
Nar Nar Goon Racecourse

APPENDICES

Appendix 1 – Wetland Revegetation List

Species list of recommended plants for revegetation

Botanical Name	Common Name
* <i>Potamogeton ochreatus</i>	Blunt Pondweed
* <i>Eleocharis acuta</i>	Common Spike-sedge
* <i>Vallisneria americana</i>	Ribbon-weed
* <i>Triglochin procerum s.l.</i>	Water Ribbons
* <i>Ottelia ovalifolia</i>	Swamp Lily
# <i>Eleocharis sphacelata</i>	Tall Spike-sedge
<i>Melaleuca ericifolia</i>	Swamp Paperbark
<i>Poa labillardierei</i> var. <i>labillardierei</i>	Common Tussock-grass
<i>Lachnagrostis filiformis</i>	Common Blown-grass
<i>Calystegia sepium</i>	Large Bindweed
<i>Carex appressa</i>	Tall Sedge
<i>Carex fascicularis</i>	Tassel Sedge
<i>Epilobium billardierianum</i>	Smooth Willow-herb
<i>Juncus amabilis</i>	Hollow-rush
<i>Juncus gregiflorus</i>	Green Rush
<i>Juncus procerus</i>	Tall Rush
<i>Juncus sarophorus</i>	Broom Rush
<i>Urtica incisa</i>	Scrub Nettle
<i>Crassula helmsii</i>	Swamp Crassula
<i>Hydrocotyle sibthorpioides</i>	Shining Pennywort
<i>Carex gaudichaudiana</i>	Fen Sedge
<i>Persicaria praetermissa</i>	Spotted Knotweed
<i>Persicaria subsessilis</i>	Hairy Knotweed
<i>Ranunculus inundatus</i>	River Buttercup
<i>Alisma plantago-aquatica</i>	Water Plantain
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass
<i>Baumea articulate</i>	Jointed Twig-sedge
<i>Cladium procerum</i>	Leafy Twig-sedge
<i>Glyceria australis</i>	Australian Sweet-grass
<i>Lycopus australis</i>	Australian Gypsywort
<i>Lythrum salicina</i>	Small Loosestrife
<i>Myriophyllum crispatum</i>	Upright Water-milfoil
<i>Myriophyllum simulans</i>	Amphibious Water-milfoil
<i>Neopaxia australasica</i>	White Purslane
<i>Persicaria decipiens</i>	Slender Knotweed
<i>Ranunculus amphitrichus</i>	Running Marsh Flower
<i>Rumex bidens</i>	Mud Dock
<i>Schoenoplectus tabernaemontani</i>	River Club-sedge
<i>Villarsia reniformis</i>	Running Marsh Flower
<i>Myriophyllum caput-medusae</i>	Coarse Water-milfoil

* Indicates highly desirable vegetation for *L. raniformis*

Limit use of this species, as it may become invasive

Appendix 2 – Growling Grass Frog Monitoring Schedule

Monitoring requirement	Start time	Timing	Standards	Contingency Plan (if survey results are unsatisfactory)	Reporting
<i>L. raniformis</i> population and habitat monitoring.	The first breeding season after wetland construction.	Every year for at least three years after wetland construction. Surveys will be undertaken during the active season for the species (October to March).	Nocturnal frog surveys over two nights; diurnal habitat survey.	If habitat establishment is unsatisfactory refer to vegetation and water quality monitoring results and recommendations. Other issues (e.g. <i>Gambusia</i> infestation) refer to recommendations outlined in report.	Annual summary submitted to DEWHA. Progress report on the implementation of the CMP, noting any key issues and management responses submitted in the second and fourth years after construction.
Wetland vegetation monitoring (including weed monitoring).	One month after planting of wetland vegetation.	Every six months for four years after wetland construction.	Establishment of a diversity of emergent, submerged, fringing and floating vegetation. Absence of weeds and other invasive species e.g. <i>Phragmites australis</i> and <i>Typha</i> spp.	Dependent on survey results. Contingency plan may involve but is not limited to: weed removal; additional vegetation planting; increasing wetland water levels; identification and removal of pollution source.	Annual report submitted to DEWHA. Report can be submitted in conjunction with results from population and habitat monitoring.
Water quality monitoring.	One month after wetland construction.	Every three months for two years after wetland construction.	Low turbidity, moderate dissolved oxygen, low nutrient concentration, minimal toxicant concentration. Water quality must meet EPA SEPP objectives and ANZECC guidelines.	Dependent on survey results. Contingency plan may involve but is not limited to: increasing wetland water levels; identification and removal of pollution source; additional vegetation planting.	As above.

Appendix 3 - Example of Text for Signage

This is a conservation area for the nationally significant Growling Grass Frog. No unauthorised entry into this area is permitted. Strictly:

- No Public Access;
- No Access to Construction Personnel;
- No Vehicles or Machinery;
- No Motorbikes or Bicycles;
- No Pets.

Breach of this may result in prosecution or fines. For entry access or further information contact the Pakenham Racing Club on [insert phone number].

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