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# SUB-REGIONAL SPECIES STRATEGY FOR THE GROWLING GRASS FROG





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Cover photo: Aaron Organ, Ecology and Heritage Partners

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# 1. INTRODUCTION

This Sub-regional Species Strategy for the Growling Grass Frog has been prepared in response to obligations arising from the strategic assessment conducted under Part 10 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).<sup>1</sup>

The Melbourne Strategic Assessment evaluated the impacts of the State Government's program *Delivering Melbourne's newest sustainable communities* on matters of national environmental significance listed under the EPBC Act.

The program provides for urban development in four growth corridors within Melbourne's expanded 2010 Urban Growth Boundary and in 28 existing precincts within the 2005 Urban Growth Boundary. It also provides for the development of the Regional Rail Link (west of Werribee to Deer Park) and the Outer Metropolitan Ring Transport Corridor/E6 Road Reservation.

The Melbourne Strategic Assessment required the State Government to make commitments to the Commonwealth Government in relation to conservation outcomes and measures to protect matters of national environmental significance. These commitments are outlined in *Delivering Melbourne's newest sustainable communities: program report* (Victorian Government, 2009), and include the preparation of this strategy.

The requirement to prepare this strategy arises from the program report, which committed to:

*Sub-Regional Species Strategies will be prepared for some specific matters of national environmental significance such as the Growling Grass Frog, Southern Brown Bandicoot, and Golden Sun Moth. These strategies will inform the preparation of the Biodiversity Conservation Strategies by identifying important populations, areas to be retained (where known) as required by prescriptions and habitat links. They will influence negotiations and the design of precincts that will occur during the preparation of precinct structure plans, as required by the relevant prescriptions. Each Sub-Regional Strategy must be approved by the Commonwealth Government prior to the finalisation of the Biodiversity Conservation Strategy.*<sup>2</sup>

This strategy has been informed by detailed technical reports and associated recommendations for Growling Grass Frog conservation outlined in Ecology and Heritage Partners (2011a) and Biosis Research (2012). The implementation of this strategy will be drawn from these reports.

## 1.1 Purpose of the strategy

The purpose of this strategy is to:

- > Inform the Biodiversity Conservation Strategy and Growth Corridor Plans, which will inform the design of precincts during the precinct structure planning stage and the preparation and implementation of conservation management plans
- > Identify important populations of Growling Grass Frog, areas of habitat to be protected as required by the prescription and habitat corridors to provide connectivity between populations.

<sup>1</sup> The results of the Strategic Assessment are set out in the *Delivering Melbourne's Newest Sustainable Communities Strategic Impact Assessment Report* (DSE, 2009).

<sup>2</sup> Victorian Government 2009.

## 1.2 Scope of the strategy

This strategy sets out all the requirements for the Growling Grass Frog in the growth corridors to satisfy the commitments in the program report. The strategy is a key mechanism to deliver the conservation outcomes for Growling Grass Frog in the program report. These are:

- > Functioning sustainable populations of Growling Grass Frog with connectivity between populations
- > Protection and enhancement of important populations.

The strategy identifies land in the growth corridors that is suitable habitat for the Growling Grass Frog, and designates this land into two categories:

- > Habitat that will be protected and managed for the conservation of the Growling Grass Frog (Category 1 habitat)
- > Habitat that can be cleared for urban development, but for which compensatory habitat is required (Category 2 habitat).

The protection and management of Category 1 habitat will achieve the conservation outcomes for the Growling Grass Frog, and will satisfy the protection requirements of the prescription (see Appendix 1). No additional land in the area covered by this strategy will therefore be required to be protected for the Growling Grass Frog, including at the precinct structure planning stage.

This strategy provides direction about the design and management of Category 1 areas for Growling Grass Frog, including guidance on the preparation of conservation management plans.

The strategy also sets out the survey, compensatory habitat provisions, and/or salvage and translocation requirements that apply to Category 2 habitat, which must be implemented at the precinct structure planning stage. Surveys will only be required to determine salvage or translocation requirements for Growling Grass Frog from within urban development areas. The conservation measures in this strategy will be funded using a cost recovery model (see section 2.3.8).

## 1.3 Area covered by the strategy

The program, as defined in the program report, means the Urban Growth Boundary Review for Melbourne for the development of land, including associated transport infrastructure, within the following areas:

- > Investigation areas for the expansion of the 2005 Urban Growth Boundary
- > Areas inside the 2005 Urban Growth Boundary for which a planning scheme amendment to introduce a precinct structure plan had not commenced as at 26 May 2009 (the existing 28 precincts)
- > Areas in the Outer Metropolitan Ring Transport Corridor/E6 Road Reservation and the Regional Rail Link corridor between west of Werribee and Deer Park (section 2).

This strategy applies to:

- > The four growth corridors within the expanded 2010 Urban Growth Boundary given effect by Planning Scheme Amendment VC68. These are:
  - Western growth corridor – Melton and Wyndham
  - North-western growth corridor – Sunbury
  - Northern growth corridor – Hume, Whittlesea and Mitchell
  - South-eastern growth corridor – Casey and Cardinia
- > The existing 28 precincts within the 2005 Urban Growth Boundary for which a planning scheme amendment to introduce a precinct structure plan is approved **after** 1 March 2012, as well as the Truganina Employment Area.
- > The Outer Metropolitan Ring Transport Corridor/E6 Road Reservation.

This strategy does not apply to the Regional Rail Link corridor between west of Werribee and Deer Park (section 2). The strategy also does not apply to the existing 28 precincts within the 2005 Urban Growth Boundary for which a planning scheme amendment to introduce a precinct structure plan is approved **prior** to 1 March 2012, except for the Truganina Employment Area.

Of the existing 28 precincts (as defined in the program report) the following 16 are covered by the strategy:

- > Beaconsfield
- > Berwick Waterways
- > Botanic Ridge
- > Casey Central Town Centre
- > C21 Business Park
- > Hampton Park
- > Greenvale Activity Centre (A4)
- > Greenvale North (R1)
- > Mickleham Employment Area North (E2)
- > Mickleham Employment Area South (E3)
- > Officer Employment Area
- > Pakenham Employment Area (Stage 1)
- > Pakenham Employment Area (Stage 2)
- > Truganina Employment Area
- > Werribee Technology Park
- > Wyndham Vale.

In addition, part of Greenvale South (R3) is also covered by the strategy.

## 1.4 Development and consultation

Under the program report, the Department of Environment and Primary Industries (DEPI) formerly the Department of Sustainability and Environment (DSE) is the lead agency for the preparation of this strategy.

DSE engaged a consultant in 2010 to prepare a technical report that informed the initial development of this strategy (Ecology and Heritage Partners 2011a).

Technical workshops were held during February and March 2010 to assist and guide the work of Ecology and Heritage Partners. The workshops involved a range of frog experts and conservation planners, DSE staff, other consultants and academics.

An agency working group has been actively involved in the implementation planning for this strategy, and its connection to the growth corridor planning process. This group includes the Growth Areas Authority, State Department of Planning and Community Development, State Department of Transport, and State Department of Treasury and Finance.

A public consultation process was run in November and December 2011, with submissions sought on the draft strategy for Growling Grass Frog, related draft Biodiversity Conservation Strategy and other sub-regional species strategies, and draft Growth Corridor Plans. The final strategy was informed by submissions received during this process.

The draft strategy committed to further investigating and refining the indicative boundaries of Category 1 habitat corridors before finalisation.

DSE engaged a consultant to undertake a finer scale analysis of the indicative habitat corridors and to document corridor boundaries along different streams.

The corridors were refined based on the best available ecological knowledge of the Growling Grass Frog and a range of principles and criteria, including hydrological considerations. This work focused on the ecological requirements of the species and the identification of known (or potential) metapopulations, while identifying other areas where reductions to the indicative width of the Category 1 corridors in the draft strategy could be made without undermining the strategy's objectives (Biosis Research 2012).

This process started with an expert technical workshop in December 2012 to update scientific information and share recent research. The technical report produced as a result of this process (Biosis Research 2012) was a key input in the finalisation of this strategy. This report provides a detailed description of the methodology used to finalise corridor boundary recommendations.

## 2. STATUTORY CONTEXT

The Growling Grass Frog is listed as 'Endangered' in Victoria (DSE, 2007) and 'Vulnerable' nationally under the EPBC Act (DEWHA 2009). Growling Grass Frog is also listed as a threatened taxon under the Victorian *Flora and Fauna Guarantee Act 1988*. A draft Flora and Fauna Guarantee Action Statement (Robertson 2003) and a draft National Recovery Plan (Clemann and Gillespie 2010) have been developed for the Growling Grass Frog.

### 2.1 Commonwealth legislation

The EPBC Act is the Commonwealth Government's principal environmental legislation and provides for the protection of matters of national environmental significance. The Act requires any proposals likely to have a significant impact on matters of national environmental significance (e.g. listed threatened species) to be approved by the Commonwealth Environment Minister.

Under section 146 of the EPBC Act, the Commonwealth Environment Minister may agree to undertake a strategic assessment of the impacts of actions delivered under a policy, plan or program on these matters.

The *Delivering Melbourne's Newest Sustainable Communities Strategic Impact Assessment Report* (DSE, 2009) evaluated the impacts of the State Government's Urban Growth Boundary Review for Melbourne program on species and ecological communities listed under the EPBC Act, as well as on Ramsar-listed wetlands.

The Commonwealth Environment Minister endorsed the program, as set out in the program report, in February 2010. The endorsement of the program under Part 10 of the EPBC Act was a necessary step prior to any approval by the Minister of 'actions' or 'classes of actions' forming part of the program in accordance with section 146B of the EPBC Act.

Actions affecting matters of national environmental significance cannot be done until an approval is granted by the Commonwealth Environment Minister. Any approved action must occur in accordance with the endorsed program and conditions set by the Minister.



Photo: Dr Geoff Heard, University of Melbourne

To date, the Commonwealth Minister has approved two classes of actions under the endorsed program: Regional Rail Link corridor between west of Werribee and Deer Park (section 2) and development within the existing 28 precincts within the 2005 Urban Growth Boundary.

Under the normal Part 9 approval process of the EPBC Act, the Commonwealth Government would typically expect known breeding habitat for the Growling Grass Frog and dispersal corridors between breeding habitat to be avoided and protected from development, and may also seek to protect dispersal corridors that connect potential habitat if this forms part of a link to breeding habitat. The Commonwealth Government would not approve developments with unacceptable impacts and no compensation is payable for loss of development potential in these cases.

Removal of such habitat, which is consistent with the definition of an important population as defined by the Commonwealth (see section 3.2) in most cases would be considered a significant impact under the EPBC Act and would likely have some type of restriction placed by the Commonwealth Government on the amount that could be cleared. Compensatory habitat would be required for any such areas permitted to be cleared. Compensatory habitat would also be required for removal of other suitable habitat as defined in this document.

## 2.1.1 Program report

The program report is the primary statutory document associated with the Melbourne Strategic Assessment. It contains binding commitments on the part of the State Government to the Commonwealth Government.

The commitments in the program report include a requirement to establish planning mechanisms for implementing the various aspects of the program. This includes preparing a Biodiversity Conservation Strategy for the growth corridors and sub-regional species strategies to inform the preparation of Growth Corridor Plans and precinct structure plans.

The program report also identifies the conservation outcomes to be achieved for each matter of national environmental significance and the mechanisms for how these outcomes will be delivered. This strategy plays a key role in delivering the outcomes for the Growling Grass Frog.

The program report outlines the steps for implementing the program, including the logic and relationship between the key statutory documents. This strategy is a requirement of Stage 2 of the program's implementation process (see Diagram 1).

## 2.2 State legislation

The *Planning and Environment Act 1987* (P&E Act) is the primary legislation for regulating the program in Victoria. The P&E Act provides for the preparation of a comprehensive set of provisions and policies for planning schemes, which regulate the use and development of land in Victoria.

The key state legislation that will apply at each stage of implementing the program is identified in section 4 of the program report. Other legislation may be triggered, depending on the nature of land use activity occurring (e.g. extractive industry and utilities). The program report also details the relevant planning policy mechanisms triggered by the legislation.

## 2.3 Planning policy framework

### 2.3.1 Growth Corridor Plans

Growth Corridor Plans (GAA 2012) (formerly referred to as Growth Area Framework Plans) have been prepared by the GAA in conjunction with DPCD, DSE and with the involvement of other State Government departments and agencies and the growth corridor councils. These plans guide the creation of new communities within the growth corridors in accordance with the State Planning Policy Framework.

The plans set out the regional framework for the preparation of precinct structure plans within the growth corridors and show broad land use patterns, proposed transport networks, regional open space, important waterways and areas of environmental sensitivity.

The Growth Corridor Plans have been informed by this strategy and the Biodiversity Conservation Strategy (DEPI, 2013). The plans require approval by the State Minister for Planning.

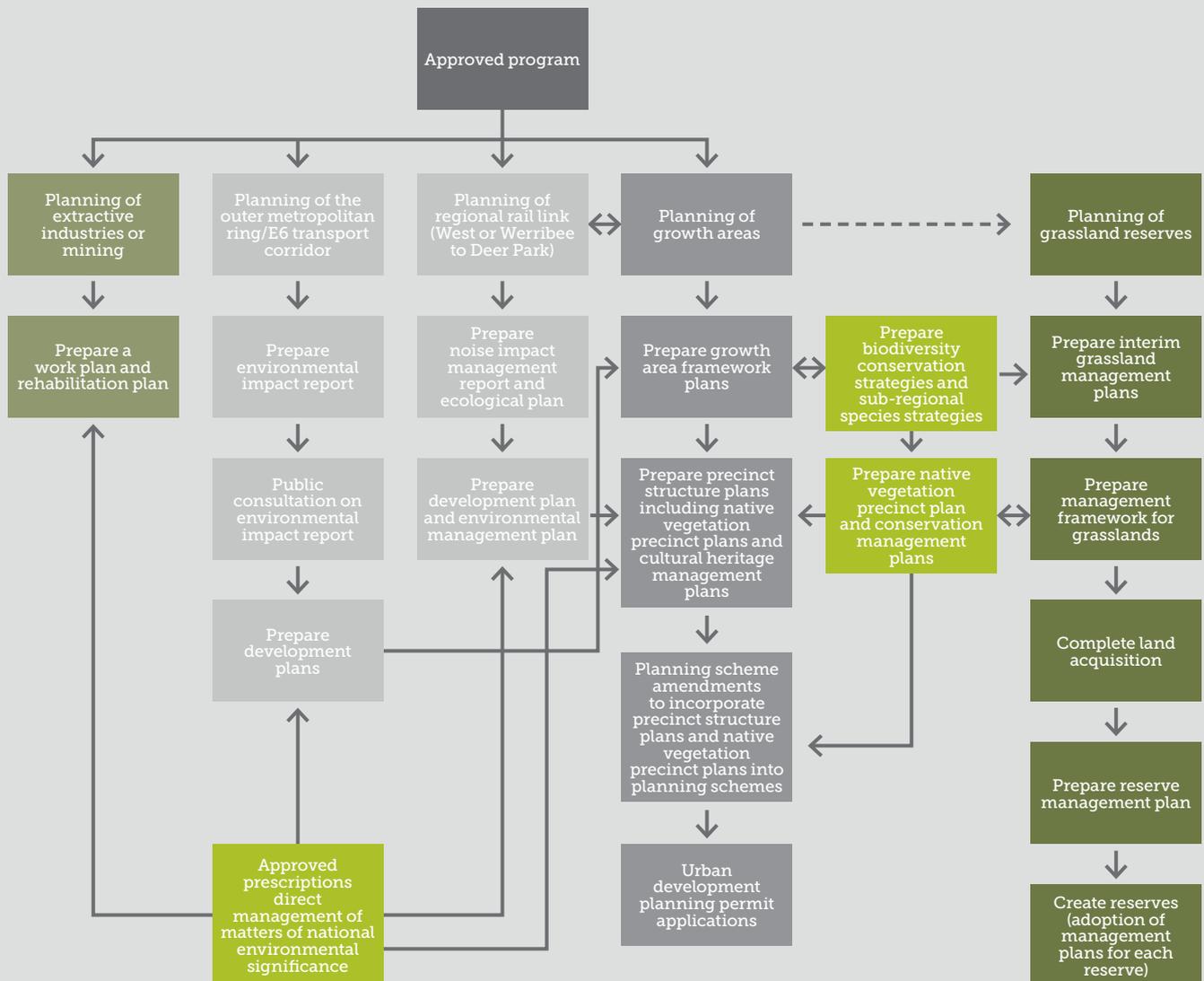
### 2.3.2 Biodiversity Conservation Strategy

The Biodiversity Conservation Strategy (DEPI, 2013) sets out all the requirements for matters of national environmental significance and state significance in the growth corridors to satisfy commitments made to the Commonwealth Government in the program report.

The purpose of the Biodiversity Conservation Strategy is:

- > Inform and guide the preparation of the Growth Corridor Plans
- > Outline how the conservation outcomes for matters of national environmental significance in the program report will be achieved spatially within the growth corridors and how impacts on these matters will be mitigated
- > Identify the land within the growth corridors that is required to be protected due to the sub-regional species strategies and the prescriptions for matters of national environmental significance
- > Identify how areas set aside for conservation will be managed
- > Outline how mitigation measures will be implemented.

**Diagram 1:** Process for Stage 2 of the Program – Implementation  
(Victorian Government, 2009)



The Biodiversity Conservation Strategy identifies land within the growth corridors that cannot be cleared for urban development and will be protected and managed for conservation, and land that can be cleared. No additional land will be required to be protected during the precinct structure planning stage in the area covered by the strategy.

The Biodiversity Conservation Strategy has applied the protection requirements of the sub-regional species strategies to identify the land that is required to be protected for conservation. The implementation of the Biodiversity Conservation Strategy will therefore satisfy the protection requirements of this strategy.



Photo: Dr Geoff Heard, University of Melbourne

### 2.3.3 Precinct structure plans

Precinct structure plans set out the future structure of a suburb, detailing the location of housing, activity centres, community facilities, local transport networks, open space and areas of biodiversity value. The precinct structure planning process applies to land within the growth corridors and the existing 28 precincts within the 2005 Urban Growth Boundary.

The plans must be prepared in accordance with the Growth Corridor Plans and the Precinct Structure Planning Guidelines (GAA 2009). These guidelines provide guidance on the assessment, protection and management of biodiversity values within the precinct and identify outputs that must be produced, including a native vegetation precinct plan.

Precinct structure plans must be prepared and approved by the State Minister for Planning and incorporated into the relevant planning scheme before urban development can proceed (some exceptions apply). Once a plan has been incorporated into the relevant planning scheme, planning permits can be granted by the relevant authority (usually council) for urban development.

### 2.3.4 Planning permits

A planning permit is a legal document that gives permission for a use or development on a particular parcel of land under a planning scheme. The permit includes written conditions that must be satisfied in carrying out an approved use or development. The conservation outcomes in the program report may be given effect by the precinct structure plan informing the conditions of development and subdivision permits.

A planning permit is required for the removal of native vegetation unless an exemption applies. The Victorian Native Vegetation Management Framework (DNRE, 2002) is a relevant decision guideline when assessing any proposal to remove native vegetation.

### 2.3.5 Native vegetation precinct plans

Native vegetation precinct plans set out the requirements for the protection and removal of native vegetation within a precinct. In the case of the growth corridors, the plans are a tool used to protect Commonwealth listed ecological communities.

The plans must be prepared for each precinct within the growth corridors and the existing 28 precincts in accordance with Clause 52.16 of local planning schemes. The plans are prepared using native vegetation assessment and mapping to standards specified by DEPI.

Native vegetation precinct plans must be prepared based on the time-stamping maps and dataset (see DEPI, 2013), which will cover all native vegetation patches within the precinct, and will be supplemented by surveys of individual trees only.

The plans are incorporated into the relevant local planning scheme. The plans are prepared in accordance with DSE's Biodiversity Precinct Structure Planning Kit,<sup>3</sup> and in accordance with the program report, must be consistent with the prescriptions.

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<sup>3</sup> The Biodiversity Precinct Structure Planning Kit provides direction on the type, detail and format of information to be provided in precinct structure plans in the form of mandatory templates. The kit specifies the state and Commonwealth governments' requirements to meet the standards and commitments in the program report. The kit is consistent with the Native Vegetation Management Framework. The kit will be reviewed periodically by DEPI and the GAA as planning processes are refined during the development of precinct structure plans and where necessary will be updated to reflect the new requirements and processes in the Biodiversity Conservation Strategy.

### 2.3.6 Conservation management plans

Conservation management plans outline how matters of national environmental significance and state significance will be protected and managed within a precinct and must be prepared where there are important populations or habitats of threatened species within the growth corridors that require particular management.

The plans are prepared as part of the precinct structure planning process. They will be prepared by DEPI in consultation with the landholder and relevant authorities as appropriate.

Conservation management plans will inform detailed management plans that will be prepared for individual properties within the Category 1 areas when land is secured for conservation. Management plans are explained in more detail in the Biodiversity Conservation Strategy (DEPI, 2013).

### 2.3.7 Prescriptions

The program report committed to preparing prescriptions for matters of national environmental significance. Impacts on matters of national environmental significance are not permitted until prescriptions for those matters have been approved by the Commonwealth Government.

The prescriptions establish requirements for the identification and protection of habitat for matters of national environmental significance, which influences the design of precincts during the preparation of precinct structure plans. The prescriptions also identify how impacts on these matters are to be mitigated, including through the provision of offsets (or compensatory habitat), translocation, and the implementation of a conservation management plan.

Prescriptions are required to be approved by the Commonwealth Environment Minister. The Minister approved prescriptions for most relevant matters of national environmental significance in 2010. These are:

- > Natural Temperate Grassland
- > Grassy Eucalypt Woodland
- > Golden Sun Moth
- > Striped Legless Lizard
- > Growling Grass Frog
- > Southern Brown Bandicoot
- > Matted Flax-lily
- > Spiny Rice-flower
- > Migratory species.

The program report allows the existing prescriptions to be revised in certain circumstances.

This strategy is consistent with and incorporates the requirements of the prescription for Growling Grass Frog. The implementation of this strategy will satisfy the requirements of the prescription and is designed to deliver the conservation outcomes for the species identified in the program report.

Once approved this strategy replaces the approved prescription for Growling Grass Frog within the growth corridors including the existing 28 precincts for which a planning scheme amendment to introduce a precinct structure plan is not approved prior to 1 March 2012.

### 2.3.8 Funding of the conservation measures

The conservation measures in this strategy will be funded using a cost recovery model. The model will establish the fees that will be collected from developers and used to mitigate the impacts of urban development on Growling Grass Frog habitat in the area covered by this strategy.

The cost recovery model has been developed in accordance with the State Government's Cost Recovery Guidelines and rules regarding competition policy.

DEPI will publish a document describing the cost recovery model and detailing the fee structure and prices. The document will explain the principles underpinning the model and the method for setting the fees. It will set out the governance, accountability and transparency measures that will be established to administer the fees and manage risks, and describe the method for reviewing the fees over time.

The fees will be governed through a specific trust that will include a requirement for regular reporting on income and expenditure and the results of independent audits.

## 3. AREAS REQUIRED FOR CONSERVATION

### 3.1 Ecology of Growling Grass Frog

Growling Grass Frog is known to occur in each of the four growth corridors, primarily along the major waterways together with several off-stream water bodies located within the vicinity of these waterways and some more remote wetlands and farm dams. The technical report (Ecology and Heritage Partners 2011a) summarised current knowledge in relation to the ecology and distribution of the Growling Grass Frog. Key points are listed below.

- > Although formerly widely distributed across south eastern Australia, including Tasmania the species has declined markedly across much of its former range particularly over the past two decades.
- > This species is largely associated with permanent or semi-permanent still or slow flowing water bodies. There is a strong correlation between the presence of the species and key vegetation attributes, particularly a diversity of emergent, submerged and floating vegetation. An important habitat requirement for Growling Grass Frog is an 'open' terrestrial habitat immediately adjacent to water bodies.

- > Populations are structured as metapopulations (a group of spatially separated interacting populations), demonstrating spatially clustered patterns of wetland occupancy, where movement between water bodies occurs as habitat conditions change over time, that is, when water bodies dry out or flood.
- > Water bodies that are located within close proximity of each other are more likely to support a population of Growling Grass Frog compared with isolated sites. Frogs have been recorded moving up to one kilometre in one night.
- > Dispersal is thought to occur primarily along drainage lines or other low-lying areas between water bodies, and unhindered movement between and within water bodies is considered important for population viability.
- > Water quality is important for successful breeding and larval development. It is likely that Growling Grass Frog tadpoles are sensitive to some horticultural chemicals, such as fertilizers and pesticides.
- > Habitat fragmentation and the loss of dispersal corridors are increasingly important causes of declines in amphibian populations that have been extensively studied.
- > Plague Minnow *Gambusia holbrooki* is known to eat the eggs and tadpoles of Growling Grass Frog and has been implicated in the decline of other members of the Bell Frog complex. Hence many waterways which contain this fish, such as those within Melbourne, are not conducive to breeding, with the species relying on off-line water bodies, particularly those within 300 m of larger waterways.

Areas occupied by the Growling Grass Frog in the growth corridors support several permanent water bodies with suitable microhabitat features (such as emergent, submergent and floating vegetation), which are important for ongoing dispersal, breeding and recruitment.

Adjoining terrestrial environments also support essential habitat for non breeding activity such as movement, foraging, over-wintering and shelter. Many of the permanent and ephemeral waterways also provide linkages to other suitable sites across the landscape.



Photo: Aaron Organ, Ecology and Heritage Partners

### 3.2 Important populations within the growth corridors

Consistent with the prescription, this strategy is focussed on the long-term protection of important populations and associated habitats. 'Important population' is defined as:

*Much of the habitat for Growling Grass Frog has been isolated or fragmented, restricting the opportunity for important population processes such as dispersal and colonisation. As such, any viable population is considered to be an important population for the persistence and recovery of the species.*

*For this species, a viable population is one which is not isolated from other populations or water bodies, such that it has the opportunity to interact with other nearby populations or has the ability to establish new populations when water bodies fill and become available. Interaction with nearby populations and colonisation of newly available water bodies occurs via the dispersal of individual frogs across suitable movement habitat.*

*In addition, a population of Growling Grass Frog could be considered an important population if it is near the limit of the species range for example, small isolated populations in South Australia, is well-studied or has a history of monitoring, and hence provides opportunity for greater understanding of the species through the collection of long-term data. (DEWHA 2009)*

In the context of this strategy, and based on the definition in the EPBC Act Policy Statement (DEWHA 2009), important populations are currently known to occur in association with the following streams:

- > Merri, Darebin and Kalkallo Creeks, and their tributaries
- > Kororoit Creek, lower Skeleton Creek, sections of Werribee River, and their tributaries
- > Jacksons and Emu Creeks, and their tributaries
- > Within the Casey-Cardinia growth corridor principally along the southern parts of Cardinia Creek and Clyde Creek.

### 3.3 Suitable habitat within the growth corridors

Habitat was assessed throughout the growth corridors as described in Ecology and Heritage Partners (2011a and b). This included assessment of more than 200 water bodies to complement the extensive Growling Grass Frog surveys undertaken as part of this and other projects (Ecology and Heritage Partners 2011a and b).

Each water body was assigned to one of three habitat classes based on the habitat preferences of the frog (Hamer and Organ 2008; Heard and Scroggie, 2010), as follows:

- > High quality habitat: Areas that currently contain, or are highly likely to contain important habitat attributes required by the species for breeding as well as foraging and dispersal (e.g. permanent or semi-permanent, extensive aquatic vegetation, high water quality, connected to other occupied sites, absence or low densities of predatory fish, high cover of terrestrial refuge sites)
- > Moderate quality habitat: Habitat that supports one or more key habitat characteristics outlined above, but not all (for example site may be important for dispersal or foraging but not breeding)
- > Low quality habitat: Sites that are unlikely to be used by Growling Grass Frog for breeding and of low importance for dispersal due to one or more of the following: absence or lack of aquatic vegetation, low water quality, presence of predatory fish, or lack or low cover of terrestrial refuge sites.

To supplement this habitat assessment a wetness habitat connectivity model was developed by DSE for use in the project. The model provides a representation of landscape permeability and predicts landscape occupancy by Growling Grass Frog, or where the species has the highest potential to occur. This is particularly useful in areas where there are few or no documented records of Growling Grass Frog (Ecology and Heritage Partners 2011a).

This enabled the overall extent of suitable habitat to be mapped across the growth corridors. The definition of suitable habitat is based on the following criteria:

- > Growling Grass Frog has previously been recorded at the site, or is likely to use the site in the future as it is connected to other suitable sites in the local area (i.e. no apparent barriers to movement between sites), and:
  - The site is known to, or is likely to support key habitat characteristics for Growling Grass Frog, and/or
  - The area has a (modelled) moderate to high wetness habitat connectivity.

'Suitable habitat' generally includes high and medium quality habitat described above, and in some cases low quality habitat where this is part of functional connectivity, particularly between known and likely breeding locations. Suitable habitat is represented by Category 1 and Category 2 habitat in Ecology and Heritage Partners (2011a).

This strategy and the supporting technical information (Ecology and Heritage Partners 2011a) documented about 18,060 hectares of suitable Growling Grass Frog habitat in the growth corridors within the expanded 2010 Urban Growth Boundary and the existing 28 precincts<sup>4</sup>. Much of this habitat, about 7,630 hectares, occurs within non-urban areas, including about 2,800 hectares protected as a result of Rural Conservation Zoning through Planning Scheme Amendment VC68. Approximately 10,400 hectares of this habitat occurs within the Urban Growth Zone (including about 1,600 hectares within the 28 precincts).

The general distribution of suitable habitat is shown in Figures 1a to 1d. However the Category 2 area shown in this strategy has been slightly reduced from that of Ecology and Heritage Partners (2011a) to indicate precisely which areas will trigger a compensatory habitat requirement, as described in section 3.4.2. These Category 2 areas avoid any overlap with mapped terrestrial native vegetation (as defined by the time-stamping dataset).

### 3.4 Areas required for conservation

In order to achieve the objectives of this strategy and the conservation outcomes of the program report, it is important that sites that currently support or have the potential to support viable populations of Growling Grass Frog in the future are protected and secured.

Growling Grass Frog populations and habitats within and outside the growth corridors need to be protected and managed on a landscape level and also on a patch or population level, where frogs have the capacity to move within and between sites. The greatest opportunity to achieve this outcome is by protecting key waterways with large buffers that allow for protection and creation of additional breeding habitat with sufficient area for foraging and dispersal between sites. Although the larger waterways themselves are important, it is also vital to protect free standing water bodies in the vicinity (i.e. within 300 m) of these waterways wherever practicable as it is typically these water bodies, and not the creeks themselves, within which Growling Grass Frog breed.

This strategy achieves these outcomes by identifying and mapping habitat to be protected for conservation purposes within the growth corridors. These are referred to as Category 1 protection areas and represent the areas of habitat of the highest strategic conservation significance. These areas are all based on important populations as defined under the EPBC Act.

Category 2 habitat areas are also of high conservation significance but will be able to be cleared as long as compensatory habitat is provided elsewhere.

Category 1 and 2 areas are shown in Figures 1a to 1d.

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<sup>4</sup> Precincts that are effectively complete were not included in these figures.

### 3.4.1 Category 1 protection areas

Category 1 protection areas are shown in Figures 1a to 1d and Figures 2a to 2i. The conservation area numbers in Figures 2a to 2i refer to the numbers specified in the Biodiversity Conservation Strategy. Category 1 protection areas are areas of suitable habitat that must be protected and enhanced to ensure the long-term viability of important populations of Growling Grass Frog within the growth corridors.

Consistent with the Biodiversity Conservation Strategy (DEPI, 2013), final boundaries of these protected habitat areas may change slightly to deal with local site conditions during the precinct structure planning process. Any variations must not reduce the total area of the Growling Grass Frog corridor within the relevant precinct or have any detrimental effect on the functioning of the corridor for the Growling Grass Frog, and must be to the satisfaction of DEPI.

Depending on the size and importance of the waterway, Category 1 protection areas generally include a buffer of 50 m to 200 m on each side of the waterway (i.e. a habitat corridor of up to 400 m wide along the waterway). Indicative boundaries of these areas were provided in the draft strategy, and have been refined and finalised based on further detailed analysis including a technical report by Biosis Research (2012) (refer section 1.4).

The approach adopted in this strategy is to identify the most important sites along the key waterways for the conservation of Growling Grass Frog, and determine a minimum requirement along intervening stretches of waterways to enable functional connectivity for the species.

Important sites are based on metapopulation nodes and are located within the important waterways identified in Ecology and Heritage Partners (2011a). These metapopulation nodes include obvious clusters of Growling Grass Frog records (where known) and the full extent of associated habitat along and adjacent to streams to a distance of 200 m (more in rare instances) either side of the stream. This envelope encompasses the majority of known Growling Grass Frog populations along these streams together with important off stream water bodies and an associated buffer (generally 100 m).

The area also provides adequate physical space and topographic variation to enable the construction of compensatory habitat (frog ponds) within the node.

In some cases, for example where population data was limited or lacking but high quality habitat was present, additional work was undertaken to identify areas where frog wetland creation could occur. This assisted further in defining metapopulation nodes. The methodology for this is described in Biosis Research (2012).

Metapopulation nodes are identified on the Merri, Kororoit, Emu, Jacksons and Cardinia Creeks and the Werribee River. The boundaries of these areas identified as metapopulation nodes are generally consistent with those recommended in Ecology and Heritage Partners (2011a). Metapopulation nodes appear as wider sections of Category 1 habitat corridors on Figures 1a to 1d and figures 2a to 2i.

For intervening areas of Category 1 habitat between metapopulation nodes on these major streams, a minimum corridor width of 100 m each side of the stream was used. The rationale for setting 100 m as the minimum in these areas was based on the following principles.

1. Sufficient habitat must be provided to facilitate movement of frogs between metapopulation nodes. A corridor 100 m wide in most cases allows sufficient space for the construction of compensatory offset wetlands (frog ponds) of a suitable size, with a minimum 50 m setback from development to act as 'stepping stones' between metapopulation nodes.
2. The Growling Grass Frog is a highly aquatic species that carries out most of its activity in or immediately adjacent to inundated areas. For example, of 187 nocturnally active Growling Grass Frogs observed by Heard *et al.* (2008), 91% were either in water or within 5 m of the water line.
3. While the extent to which the species uses terrestrial areas is poorly known, the terrestrial zone within 100 m of creeks and other waterbodies appears to be particularly important for Growling Grass Frog (Heard *et al.* 2008; Wassens 2008).
4. A metapopulation viability analysis undertaken for three Growling Grass Frog metapopulations within the northern growth corridor showed that extinction probabilities for these metapopulations were much higher for corridors less than 200 m wide (i.e. 100 m either side of a stream) (Heard and McCarthy 2012).

The proposed 'stepping stone' wetlands between metapopulation nodes will augment the function of the streams themselves in aiding dispersal movements.

This type of frog pond need not be large (typically 1,500 – 3,000 square metres) and their hydroperiod can vary, i.e. some will be permanent and some will be seasonal, although they will be designed to act as breeding habitat where possible, even if temporarily. In some cases, the corridor has been widened to allow for the construction of stepping stone wetlands where local topography and hydrology required additional space to do this, including consideration of adequate catchment area and buffer requirements. Potential locations of stepping stone wetlands, based on Biosis Research (2012) are shown in Figures 2a to 2i.

Table 1 in Biosis Research (2012) provides a detailed justification for the inclusion of each area of Category 1 habitat within the Urban Growth Boundary.

Remaining streams within the growth corridors (e.g. Darebin, Edgars, Clyde, and tributaries of larger streams), while supporting Growling Grass Frog populations, vary in their significance to the species from a strategic conservation perspective. Along these streams the revised minimum corridor widths vary from 50 to 100 m either side of the waterway. This is generally consistent with Ecology and Heritage Partners (2011a). However, each stream has been analysed in more detail using the methods described in Biosis Research (2012). As a result, the corridor was expanded where it was deemed appropriate and practical to retain existing offline water bodies that could be enhanced to provide habitat for Growling Grass Frog. The corridors were also expanded in areas where it was most appropriate to construct compensatory offline habitat. In these instances, sufficient space was allowed for a minimum 50 m buffer around constructed habitat.

Several small ephemeral streams in the western growth corridor have been determined to be unsuitable as Category 1 habitat. These waterways have been changed from Category 1 to Category 2. These streams, which were identified in the draft strategy as being of lower habitat quality, were nonetheless envisaged as being potentially able to provide Growling Grass Frog habitat in conjunction with the eventual drainage scheme and an enhanced hydrological regime. In some cases (e.g. Davis Creek) this appears to be the case. However for streams such as Skeleton, Dry and parts of Lollipop Creeks, the hydrological analysis undertaken as part of the Biosis Research (2012) study now indicates that the drainage scheme is unlikely to provide sufficient opportunities for the habitat creation that was envisaged in the draft strategy, and lack of nearby source populations makes colonisation of created habitat unlikely.

Although a strategic approach has been used to determine the extent and location of Category 1 habitat, the process has necessarily intersected with the more detailed planning process being undertaken concurrently for several relevant precincts. In some cases these precinct structure plans were well advanced (e.g. Rockbank, Lockerbie) in the design of the urban form and its relationship to areas identified for the protection of Growling Grass Frog. Hence, some changes to the general advice provided by Biosis Research (2012) were made in this strategy in relation to the Merri and Kororoit Creeks in order to maximise planning outcomes for these precincts, and the broader Growth Corridor Plan (e.g. Lockerbie town centre).

The Category 1 protection areas are considered sufficient to:

- > Protect much of the existing core habitat areas of the important populations (metapopulation nodes) and enhance it through improved management
- > Create extensive new areas of habitat consisting of a network of frog ponds (constructed wetlands) planted with indigenous vegetation and interspersed with grassed or treed areas
- > Include sufficient areas above the Urban Floodway Zone where large off-stream water bodies can be created to provide for breeding
- > Enable other uses such as stormwater treatment and passive recreation to occur while preserving conservation objectives.

The vast majority of areas to be protected (Figures 1a to 1d) are located within existing areas of Rural Conservation Zone and Urban Floodway Zone designated through Planning Scheme Amendment VC68.

However, 358 hectares of Urban Growth Zone are also proposed for protection within the expanded 2010 Urban Growth Boundary where this occurs on the key waterways. A further 337 hectares is identified for protection within the existing 28 precincts. The area of land to be protected in Category 1 areas, and the habitat to be removed that needs a compensatory habitat requirement are provided in Table 1 and shown in Figures 1a to 1d.

Note that in Table 1, the total area of suitable habitat (mapped in Ecology and Heritage Partners 2011a) is slightly larger than the combined total of Category 1 (protection) and Category 2 (habitat requiring compensatory habitat) shown in this strategy.

**Table 1.** Area (hectares) of land to be protected for Growling Grass Frog in the growth corridors

Zone	Total area of suitable habitat in growth corridors including 28 precincts (hectares)	Area of habitat to be protected (Category 1 areas) (hectares)		Area of habitat that could be removed; requires compensatory habitat (Category 2 areas) (hectares)	
		Expanded growth corridors	28 precincts	Expanded growth corridors	28 precincts
Urban Growth Zone	10,427	342	301	8,001	1,373
Urban Floodway Zone	1,158	277	0	770	4
Rural Conservation Zone	2,801	1,437	0	1,045	0
Farming Zone	1,276	84	7	1,033	35
Other	2,396	458	14	1,139	573
<b>TOTAL</b>	<b>18,058</b>	<b>2,598</b>	<b>323</b>	<b>9,374 minimum (UGZ only)*</b>	

\* See section 3.4.2 for explanation

There are two key effects of designating Category 1 areas.

Firstly, Category 1 areas will be excluded from urban development and will be protected and managed for Growling Grass Frog conservation in perpetuity. The final boundaries of these protected habitat areas may change slightly to deal with local site conditions during the precinct structure planning process. Any variations must not reduce the total area of the Growling Grass Frog corridor within the relevant precinct or have any detrimental effect on the functioning of the corridor for the Growling Grass Frog, and must be to the satisfaction of DEPI.

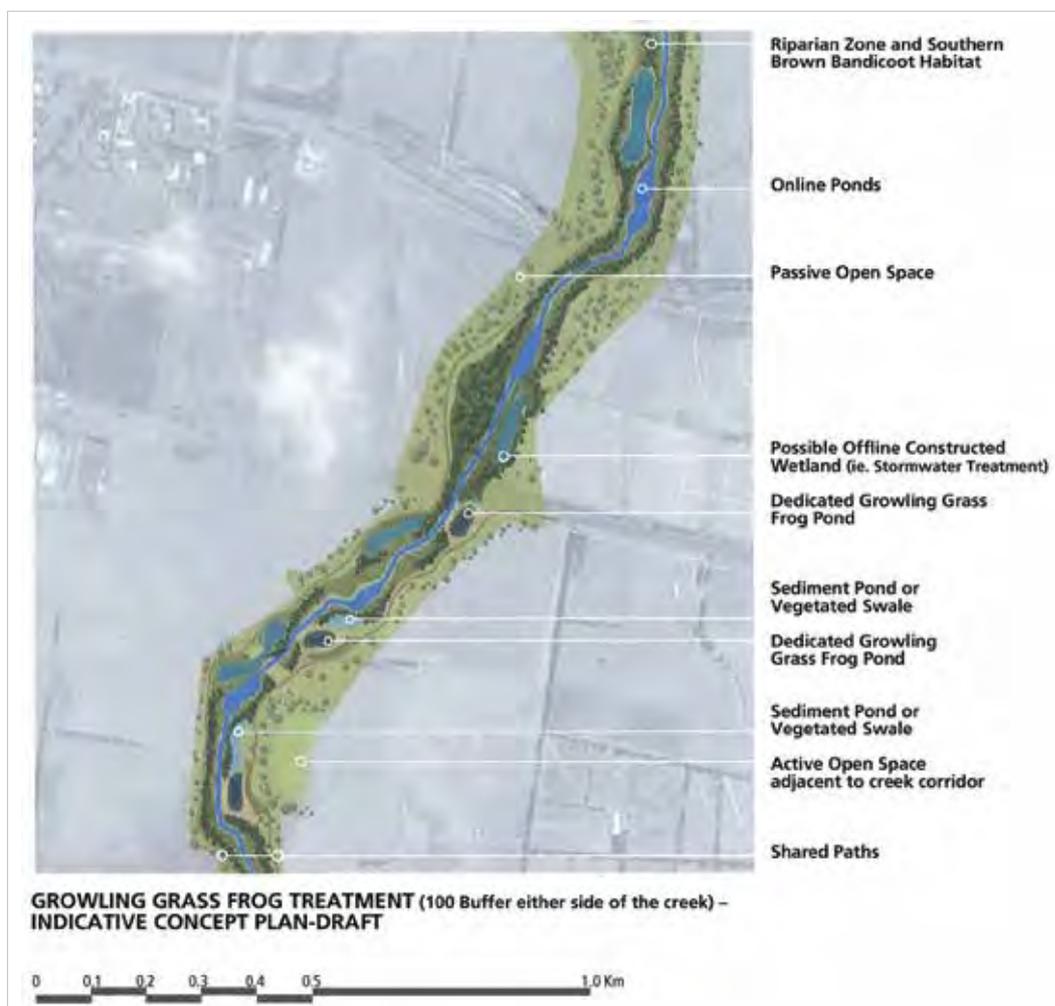
Secondly, a hydrological regime beneficial to both the waterway and to the long-term use of these areas by Growling Grass Frog within Category 1 habitat will need to be achieved. This may affect the type of stormwater and other hydrological management (including water quality standards) proposed for the precinct and other upstream areas. This is discussed further in section 3.5.

The detailed design of Category 1 areas will be provided in management plans and an overall masterplanning process that DEPI will lead for all the Category 1 areas (see section 3.5).

The Growling Grass Frog buffer areas need to include a dedicated habitat and corridor function as the priority. However, there is ample scope to also include passive and some active open space uses within the wider buffer areas (i.e. within the 100 m and 200 m buffers on either side of the waterway). Parts of these Category 1 areas will therefore be incorporated into the Integrated Open Space Networks for the growth corridors.

The Category 1 areas will include extensive areas of habitat including a network of frog ponds (constructed wetlands). These will be planted with indigenous aquatic and amphibious vegetation and will be interspersed with grassed and treed areas. Whilst some frog ponds and their buffers will be 'off-limits' to the public, in most situations there will be opportunity to include visitation and viewing areas, with sensitively designed boardwalks etc. Dispersal of frogs between wetlands will be achieved by including grassy (mown and some unmown) areas. Mown areas and intervening stands of trees and other indigenous revegetation will be appropriate for passive recreation. Bicycle and walking trails throughout the network of frog ponds and terrestrial areas will be compatible with the overall objectives but need to be sensitively designed and located.

**Figure 3.** Buffer treatment example



A conceptual design of how a Category 1 area may look in terms of frog pond spacing, stormwater treatment and open space uses is shown in Figure 3.

Standards will be developed by DEPI, in conjunction with Melbourne Water and other stakeholders, for frog pond construction, management and integration with stormwater systems, including water quality standards. All frog ponds within Category 1 areas, and relevant stormwater systems delivering water to frog ponds, will be required to adhere to these standards.

The protection and management of Category 1 areas will be funded by the fees collected from developers to mitigate impacts on Growling Grass Frog habitat in the area covered by this strategy (see section 2.3.8).

It should be noted that the maps in Figures 1a to 1d and in the accompanying technical report (Ecology and Heritage Partners 2011a) identify Category 1 corridors extending beyond the growth corridors into areas of urban Melbourne and also beyond Melbourne into rural areas (including into the Western Grassland Reserves). These are indicative, as in many cases areas outside the growth corridors have not been surveyed for Growling Grass Frog. However, they do provide additional context for the protection works in the growth corridors.

Category 1 corridors outside the growth corridors do not convey any protection or management obligations on landowners and participation in any conservation programs for these areas will be undertaken on a voluntary basis. Nonetheless, these corridors should be used to guide the conservation of Growling Grass Frog outside the growth corridors through the protection and enhancement of habitat where relevant (e.g. to inform the design of any voluntary incentive schemes for biodiversity conservation).



PHOTO: Aaron Organ, Ecology and Heritage Partners and

### 3.4.2 Category 2: other suitable habitat

Category 2 areas are shown in Figures 1a to 1d. These are areas of other suitable habitat that can be cleared for urban development, but for which compensatory habitat must be provided elsewhere. All compensatory habitat must be located within Category 1 areas.

Category 2 areas have been mapped based on a combination of:

- > Other known breeding sites
- > Other waterways and wetlands providing suitable habitat
- > Terrestrial habitat providing connectivity between wetlands and ultimately to likely breeding habitat.

Category 2 habitat has been defined based on the areas that the Commonwealth Government would typically require to be protected or for which offsets (or compensatory habitat) would be required (DEWHA 2009). However, Category 2 areas have excluded areas mapped as native vegetation, as these areas incur a different set of offset and compensatory habitat obligations as described in the Biodiversity Conservation Strategy (DEPI, 2013).

Recent research has shown that the chance of vacant or new wetlands being colonised by Growling Grass Frog is determined overwhelmingly by the presence and proximity of other occupied wetlands within a one kilometre radius (Heard and Scroggie 2010). This rule has not been applied to the definition of suitable habitat that requires offsets given the narrower interpretation in DEWHA (2009). However this emphasises the fact that urbanisation of the growth corridors will remove large areas of land that would have represented potential opportunities for dispersal and colonisation, particularly during favourable conditions.

Table 1 presents the total area of Category 1 or 2 habitat within the expanded growth corridors and within the existing 28 precincts (that are not yet complete).

All land mapped as Category 1 or 2 habitat in this strategy will invoke a compensatory habitat fee if cleared or impacted (see section 2.3.8). This fee will cover the cost of securing and managing the Category 1 areas for Growling Grass Frog.

Given the extent and timing of rezoning of land identified within the Growth Corridor Plans the total amount of Category 2 habitat that will be cleared in the future is unknown. However as indicated in Table 1 the likely minimum amount, based on currently zoned UGZ is 9,374 hectares. The approximate maximum figure, assuming that areas of other land are eventually rezoned to UGZ, or have other permitted use or development, is likely to be much larger than this.

As a general principle, Category 2 areas should not where practicable be removed within a precinct until the Category 1 areas have been secured and new or enhanced habitat sufficiently established to be available for the species, including use by translocated frogs (where relevant).

This principle is intended to ensure a supply of habitat for the Growling Grass Frog and to include unoccupied suitable habitat that can be occupied as frogs move around and colonise new areas, particularly in wet years. An important point is that if Growling Grass Frogs are located and salvaged from Category 2 habitat to be destroyed, and translocation is to be attempted, that there is suitable Category 1 habitat ideally within or at least as close as possible to the precinct to receive translocated animals. Even if translocation is not attempted, this concept may still be important in some situations (e.g. within a metapopulation) to enable unassisted colonisation of secure habitat where Category 2 habitat is being drained. These principles indicate that where practicable, development should be staged to allow for creation and establishment of habitat (ideally for at least two to three years) prior to removal of habitat, and to the satisfaction of DEPI.

### 3.4.3 Outer Metropolitan Ring Transport Corridor: potential habitat linkage

The proposed crossing of the Deanside Wetlands by the Outer Metropolitan Ring Transport Corridor (OMR) (Figures 1a, 2a) will impact on the Growling Grass Frog Category 1 habitat that currently links the wetlands to the nearby Kororoit Creek. The OMR will be designed and constructed to minimise this impact, and as a minimum will include structures (e.g. culverts, bridges) and habitat areas (e.g. ponds) to facilitate ongoing movement through the area by Growling Grass Frog. These mitigation measures will be guided by best practice advice and techniques.

However, a residual impact will result and it is likely there will be significant barrier effects that result from the construction of this major transport corridor. This will reduce and potentially prevent the movement of frogs between Kororoit Creek and the Deanside Wetlands area to the west. Therefore provision for a habitat link has been made in the strategy. This is located on the western side of the OMR corridor (Figures 1a, 2a).

If the OMR results in the existing GGF habitat link between Deanside Wetland and the Kororoit Creek being severed or significantly compromised, then the alternative link must be secured and managed to mitigate the impact of the OMR and maintain a habitat link between the Deanside Wetlands and the Kororoit Creek. If the OMR is not constructed or not constructed at this location, then the metapopulation node at the Deanside Wetlands will continue to include the eastern wetland cell in the OMR footprint with connectivity to Kororoit Creek, as shown on Figures 1a and 2a.

The potential habitat link is indicated with an arrow along the boundary of the OMR footprint on Figures 1a and 2a. The potential link has been assessed by Ecology and Heritage Partners (2011a) and by Biosis Research (2012). The link will be required to be 100 m in width and will likely include a constructed frog pond within the area (and possibly stormwater treatment areas as well). Although the detailed design of the OMR has not yet commenced, it is likely that a portion of the link will need to be located on adjacent private land to the west of the OMR (i.e. within the Rockbank precinct structure plan area). If land outside of the OMR/E6 Reservation is required, Vicroads will be required to secure the land via a legally binding arrangement with the landowner.

### 3.5 Management of retained (Category 1) areas

Category 1 areas will include extensive areas of managed habitat including a large network of frog ponds (constructed wetlands). These will be planted with indigenous aquatic and amphibious vegetation and will be interspersed with grassed and treed areas, following standards defined below. While some frog ponds will have restricted public access, in most situations there will be opportunity to have visitation and viewing areas, with sensitively designed boardwalks etc. Dispersal of frogs between wetlands will be achieved by including grassed (mown and some unmown) areas. Mown areas and intervening stands of trees and other indigenous revegetation will be appropriate for passive recreation. Bicycle and walking trails throughout the network of frog ponds and terrestrial areas will be compatible with the overall objectives but need to be sensitively designed and located.

It is important to note that the Category 1 area at the Lockerbie town centre has been significantly narrowed to meet state significant planning objectives. This section of Category 1 habitat must be carefully managed to ensure that the primary objective of Growling Grass Frog conservation is achieved. Areas such as this have a dual risk of having less land within the corridor to provide multiple uses and increased pressure from visitation due to it being within the town centre. Hence the narrower areas of the corridor, particularly close to the town centre, must not be used for passive open space unless it can be demonstrated that this can be achieved with no impact to the value of the area for Growling Grass Frog. The narrower sections of Category 1 habitat through the Lockerbie precinct may also require additional stepping stone wetlands to be created compared to other sections of Category 1 (between metapopulation nodes), and more intensive management regimes to facilitate the use of these areas as GGF movement corridors.

A three-stage approach of 1) protection 2) enhancement and 3) creation of habitats will be used as part of the prioritisation of conservation actions for Growling Grass Frog in the Category 1 areas. Habitat enhancement will be undertaken where Growling Grass Frog is known to occur, or at sites within the vicinity of occupied sites that have the greatest potential to contribute to the long-term viability of populations, particularly within metapopulation nodes.

Information pertaining to site-specific habitat improvement requirements will be provided in management plans associated with the permanent security of the land (e.g. on-title agreement, transfer to Crown).

DEPI will also prepare an overall implementation masterplan for the network of Category 1 habitat areas across Melbourne's growth corridors, focused primarily on metapopulation nodes. This will draw on the best available science to prioritise and optimise strategic management actions based on available resources, adaptive management principles and the results of monitoring. These management actions will supplement the actions specified in conservation management plans in the interim, and eventually will form the basis of detailed management plans for individual sites.

In developing the masterplan, the following approach will be followed:

- > There will be up to 400 dedicated Growling Grass Frog wetlands (frog ponds) created or enhanced within the urban growth corridors in Category 1 areas. This will include about 150–200 constructed frog ponds (the final number will depend on the size of the wetlands able to be constructed) and a large number of existing ephemeral, semi-permanent and permanent wetlands and stream pools that will be managed to retain values. This is based on wetlands being primarily clustered within metapopulation nodes, but also located about every 300 m to 700 m along intervening sections of the protection corridors consistent with Biosis Research (2012), which considered practical siting opportunities, hydrological constraints and the degree of existing suitable habitat within the waterway and corridor generally. The wetland locations in Biosis Research (2012) for sections of streams between metapopulation nodes will generally be followed in designating locations for the larger 'stepping stone' frog ponds, unless more detailed work (including masterplanning) reveals superior locations acceptable to DEPI. These indicative wetland locations are shown for sections between metapopulation nodes in Figures 2a to 2i. Additional generally smaller frog ponds will be created in these areas in addition to those recommended by Biosis Research where opportunities arise, based on more detailed site planning. Locations of wetlands within metapopulation nodes will be determined as part of overall masterplanning.

- > The size, spatial configuration and hydrology of dedicated Growling Grass Frog wetlands and associated riparian/waterway areas should generally be based on Guidelines for Management of Endangered Growling Grass Frog in Urbanised Landscapes (Heard and Scroggie 2010) and any additional guidance provided in this strategy. Most frog ponds will be at least 1,000 square metres in area however many will preferably be larger (e.g. 2,000–3,000 square metres) where opportunities exist.
- > Frog ponds must be designed and planted to ecological best practice standards, and to maximise habitat suitability for Growling Grass Frog. This will include appropriate zones of indigenous wetland vegetation and areas of open water. DEPI will prepare a standard for this that will draw on the supporting technical report to this strategy (Ecology and Heritage Partners 2011a) and more recent work by frog experts.
- > Stormwater wetlands that will be created for drainage purposes will often be located within Category 1 habitat areas in addition to dedicated Growling Grass Frog ponds, but only when these locations are consistent with the objectives and function of the Category 1 areas for Growling Grass Frog. These stormwater wetlands will be identified in the precinct structure plan, and where known will be factored into the masterplanning process. Stormwater wetlands are able to provide habitat for Growling Grass Frog, and should be designed to do so; however as predators (in particular Plague Minnow) are unable to be effectively managed in these systems, dedicated Growling Grass Frog wetlands are the primary mechanism for creating habitat.
- > In many cases stormwater wetlands will be critical components of systems to deliver water to constructed Growling Grass Frog ponds. Such integrated water systems are being developed for several precincts and will be tested for effectiveness (through monitoring). Integrated water systems including stormwater wetlands will be included in the overall management masterplanning and detailed in management plans for Category 1 areas. Stormwater systems delivering water to Growling Grass Frog ponds will be required to adhere to defined performance standards for water quality and quantity.
- > Specific guidelines for the management of predatory fish, particularly in integrated water systems, will be developed by DEPI and these will be reflected in management plans and overall management planning.
- > Terrestrial habitat for the species must be provided around each dedicated Growling Grass Frog wetland (frog pond), as described in DEWHA (2009). Dedicated Growling Grass Frog wetlands must have a high quality, densely planted indigenous revegetation area of at least 10 m (excluding trees). An additional 90 m of managed terrestrial buffer is required around each Growling Grass Frog wetland (subject to landform constraints and corridor width). This can be less intensively revegetated and in some cases will take the form of open grassland/pasture with sparse plantings.
- > The actual waterways will also be enhanced and replanted or regenerated to provide high quality indigenous revegetation in general to 30 m from the water's edge, and consistent with Melbourne Water standards.
- > The combination of dedicated frog ponds and managed buffers (100 m), and stormwater wetlands will generally occupy a large proportion of the Category 1 areas, although this may be less in steeply incised areas such as sections of Jacksons Creek. The addition of revegetated riparian areas and associated terrestrial buffers will occupy the majority of the remaining land within the Category 1 areas.
- > Monitoring including presence/ absence surveys (typically two nights' survey per year of each frog pond) must be undertaken. Monitoring will be for a ten year intensive survey period post construction. Ongoing monitoring after the ten year period will be undertaken by DEPI. Stormwater wetlands must also be monitored where they provide potential habitat for Growling Grass Frog, for example in smaller waterway corridors, however this will not convey any particular management obligation on these wetlands. DEPI will develop an overall monitoring protocol, consistent with the Monitoring and Reporting Framework to be prepared as a requirement of the program report (Victorian Government 2009), and to inform adaptive management as described in the Biodiversity Conservation Strategy (DEPI, 2013).

In addition to the management of existing habitat and the design and location of constructed frog ponds, the design and implementation of integrated water management systems (including stormwater management) within catchments connected to Category 1 waterways must aim to maintain or improve (to meet specific environmental objectives including those for Growling Grass Frog) stream hydrology as a primary objective. This will be important to provide for the long-term use of these areas by Growling Grass Frog, particularly for in-stream habitat and natural floodplain wetlands. This may affect the type of stormwater and other hydrological management proposed for the precinct, to ensure the requisite environmental flows are maintained or increased at certain times. This issue will be considered by Melbourne Water in consultation with DEPI, and reflected as appropriate in the local drainage schemes. It will also be included at the precinct structure planning stage through the integrated water management plan component.

Further guidance to inform integrated water management plans that deliver beneficial outcomes for Growling Grass Frog and riparian areas will be developed by DEPI in conjunction with Melbourne Water and the Growth Areas Authority.

### 3.6 Survey and salvage and translocation requirements

Growling Grass Frog within Category 2 habitat to be removed may be translocated in some cases where there are appropriate locations (e.g. secure Growling Grass Frog habitat nearby) to receive animals and where disease and other risks are considered manageable. Salvage and/or translocation of other threatened herpetofauna (Swamp Skink, Glossy Grass Skink, Southern Toadlet) may be undertaken in conjunction with salvage and/or translocation of the Growling Grass Frog.

Landowners will be responsible for undertaking salvage and/or translocation where this is required. However, DEPI will undertake this work where landowners grant DEPI access to their land.

DEPI will develop a salvage and translocation protocol for Growling Grass Frog. Any salvage/translocation that occurs must be undertaken in accordance with the requirements of the protocol. The protocol will set out the requirements and obligations of landowners, DEPI staff and contractors (e.g. provision of access, timeframes).

DEPI will undertake surveys within and adjacent to Category 1 areas to inform the implementation and monitoring of this strategy.

Surveys, and any salvage and/or translocation required, will be funded by the fees collected from developers to mitigate impacts on Growling Grass Frog habitat in the area covered by the strategy (see section 2.3.8).



## 4. IMPLEMENTATION AND REVIEW

Several Government agencies will be involved in the implementation of this strategy, including DEPI, the Growth Areas Authority, Melbourne Water, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities, local councils, and private organisations such as land developers, consultancies and land management bodies and contractors.

The strategies and management requirements provided in this strategy may need to alter if new information becomes available or if management actions are considered inappropriate or inadequate for the long-term persistence of Growling Grass Frog. This will be included within the Monitoring and Reporting Framework to be developed as required by the program report (Victorian Government 2009), and will be based on adaptive management principles as described in the Biodiversity Conservation Strategy (DEPI, 2013).

The Victorian Planning Provisions and relevant planning schemes will be amended to require landowners to secure land within Category 1 areas. This requirement will be triggered when a landowner seeks a planning permit for subdivision or works permitted on a lot which includes a Category 1 area.

Land can be secured by entering into an on-title management agreement with DEPI under section 69 of the *Conservation Forests and Lands Act 1987* or, where the landowner prefers, by transferring land to the Crown where an appropriate public land manager is available. In some cases land may be acquired by another public authority, where this arrangement can meet the conservation protection and management requirements of the strategy.

It is preferable that Category 1 areas be vested in the Crown and/or managed by a public authority. Given the strong focus on waterways as the core of the protection corridors, the public land manager will generally be Melbourne Water.

Management plans will be prepared for Growling Grass Frog conservation areas that set out how these areas will be managed to conserve this species and identifying conservation objectives and management arrangements. Management plans are explained in more detail in the Biodiversity Conservation Strategy (DEPI, 2013).

The mechanisms for securing and managing land identified for conservation by this strategy are described in more detail in the Biodiversity Conservation Strategy (DEPI, 2013).

The protection and management of Category 1 areas will be funded by the fees collected from developers to mitigate impacts on Growling Grass Frog habitat in the area covered by the strategy (see section 2.3.8). All land mapped as Category 1 or 2 habitat in this strategy will invoke a compensatory habitat fee if cleared or impacted. Allocation of funds to management actions will be based on the overall implementation masterplan to be prepared by DEPI, however in the interim DEPI may contract works to be undertaken directly with landowners where this is consistent with the precinct structure planning process and conservation management plans.

The masterplan process will identify overall priorities for strategic management works such as wetland enhancement or wetland construction (frog ponds), based on scientific advice and following adaptive management principles (McCarthy and Possingham 2007, DSE, 2011). Implicit in this approach is that some waterways or sections of waterways will be targeted for management activities over other areas. This may include works outside but adjacent to the area covered by this strategy where these are important to achieve the strategy objectives.

The arrangements to secure compensatory habitat in the designated Category 1 areas with Melbourne Water, and the payment of fees, will be facilitated by DEPI. All compensatory habitat requirements will be accounted for by DEPI and reports made publicly available in conjunction with reporting of other offset requirements for the program.

**Table 2.** Funded implementation commitments in the Sub-regional Species Strategy for Growling Grass Frog

Commitment	Land affected	Mechanism	Performance measure	Completion
<b>Secure Category 1 corridors</b>	Land identified in Category 1 corridors in Figures 1a to 1d	Planning provision requiring land to be secured, or land voluntarily secured, by: <ul style="list-style-type: none"> <li>transfer of land to Crown, or</li> <li>s69 agreement signed between landowners and DEPI</li> </ul>	Land within Category 1 corridors either: <ul style="list-style-type: none"> <li>transferred to Crown, or</li> <li>subject to s69 agreement signed between landowners and DEPI</li> </ul>	Short to medium term (0–20 years)
<b>Ongoing management of Category 1 corridors</b>	Land identified in Category 1 corridors in Figures 1a to 1d	Masterplan for Category 1 areas in growth corridors  Management plans	Masterplan and management plans prepared in accordance with Sub-regional Species Strategy  Agreement between DEPI and public land manager to manage Category 1 corridors	Short to medium term (0–20 years)  Prepare masterplan by December 2015  Develop initial agreement between DEPI and public land manager by December 2013
<b>Surveys and translocation of Growling Grass Frog</b>	Wetlands/dams in Category 2 habitat in Figures 1a to 1d	Growling Grass Frog salvage and translocation protocol (to be prepared)	Surveys (and translocation where required) undertaken by DEPI prior to wetland destruction/drainage	Short to medium term (0–20 years)  Prepare salvage and translocation protocol by July 2013
<b>Monitoring and reporting of Growling Grass Frog within Category 1 corridors</b>	Land identified in Category 1 corridors in Figures 1a to 1d	Masterplan for growth corridors  Management plans	Surveys undertaken in accordance with Sub-regional Species Strategy and DEPI Monitoring protocol  Public reporting in accordance with Monitoring and Reporting Framework and Biodiversity Conservation Strategy	Short to medium term (0–20 years) (as Growling Grass Frog Category 1 corridors are secured)  Monitoring protocol prepared by December 2013 to support Monitoring and Reporting Framework

On land that is otherwise undevelopable, for example wholly within Rural Conservation Zone, the ultimate land management arrangements may vary. Fees collected for compensatory habitat from the relevant Urban Growth Zone land will be used to fund contracts with landowners to provide Growling Grass Frog habitat management (potentially in partnership with Melbourne Water where relevant), or similar arrangements depending on particular landowner circumstances. Transfer of land to the Crown will be encouraged where this suits landowner requirements.

The performance of this strategy in terms of achieving the intended outcomes and the approaches described in section 3 will be reviewed five years after its adoption and every 10 years following the first review. The reviews will be informed by the results of monitoring. If considered necessary, adjustments to the strategy will be identified during these reviews. Any adjustments would need to be to the satisfaction of the Commonwealth Government.

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Photo: Dr Geoff Heard, University of Melbourne

# APPENDIX 1

## Prescription for Growling Grass Frog

### Preamble

The following objectives should apply to management of Growling Grass Frog in relation to urban development planning:

- > Protect important Merri Creek population
- > Identify and protect other important populations including in the Pakenham area and south east growth corridor, and along Kororoit Creek
- > Retain, upgrade and connect or buffer some existing habitats within proposed precincts
- > Create new habitat within precincts
- > Manage hydrology and aquatic vegetation carefully to avoid the introduction of predatory fish
- > Monitor retained and new habitat, and adjust management accordingly.

### Detail

Precinct planning design should not commence until surveys to confirm the presence of suitable habitat and likely occurrence of Growling Grass Frog in an area are complete (irrespective of whether the species is actually detected). Surveys to be consistent with Biodiversity Precinct Planning Kit methodology.

A Growling Grass Frog conservation management plan (CMP) must be prepared for precincts (or other development areas included within the program) containing suitable habitat for Growling Grass Frog. The CMP must be prepared prior to exhibition of the precinct structure plan (PSP), or for developments not covered by a PSP, prior to approval of that development. The CMP must be to the satisfaction of the Department of Sustainability and Environment (DSE).

The CMP must demonstrate how, for an important population (or potentially important population) of Growling Grass Frog:

- > Habitat will be retained and/or created and managed with sufficient connectivity so the population can function over the long term. This may consider and include habitat both on and off-site but must not rely on translocation
- > Monitoring will be employed to determine effectiveness
- > Habitat and threatening processes will be appropriately managed in a way that is responsive to the results of monitoring
- > Actions relating to proposed development will be sequenced to ensure there is no net loss of habitat and local population.

The conservation management plan must be consistent with, and respond to, any relevant Sub-regional strategy for the Growling Grass Frog approved by DSE.

The determination of a practical management area and shape for areas retained for Growling Grass Frog habitat must be to DSE satisfaction.



Photo: Merri Creek, Ecology and Heritage Partners

