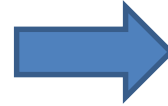


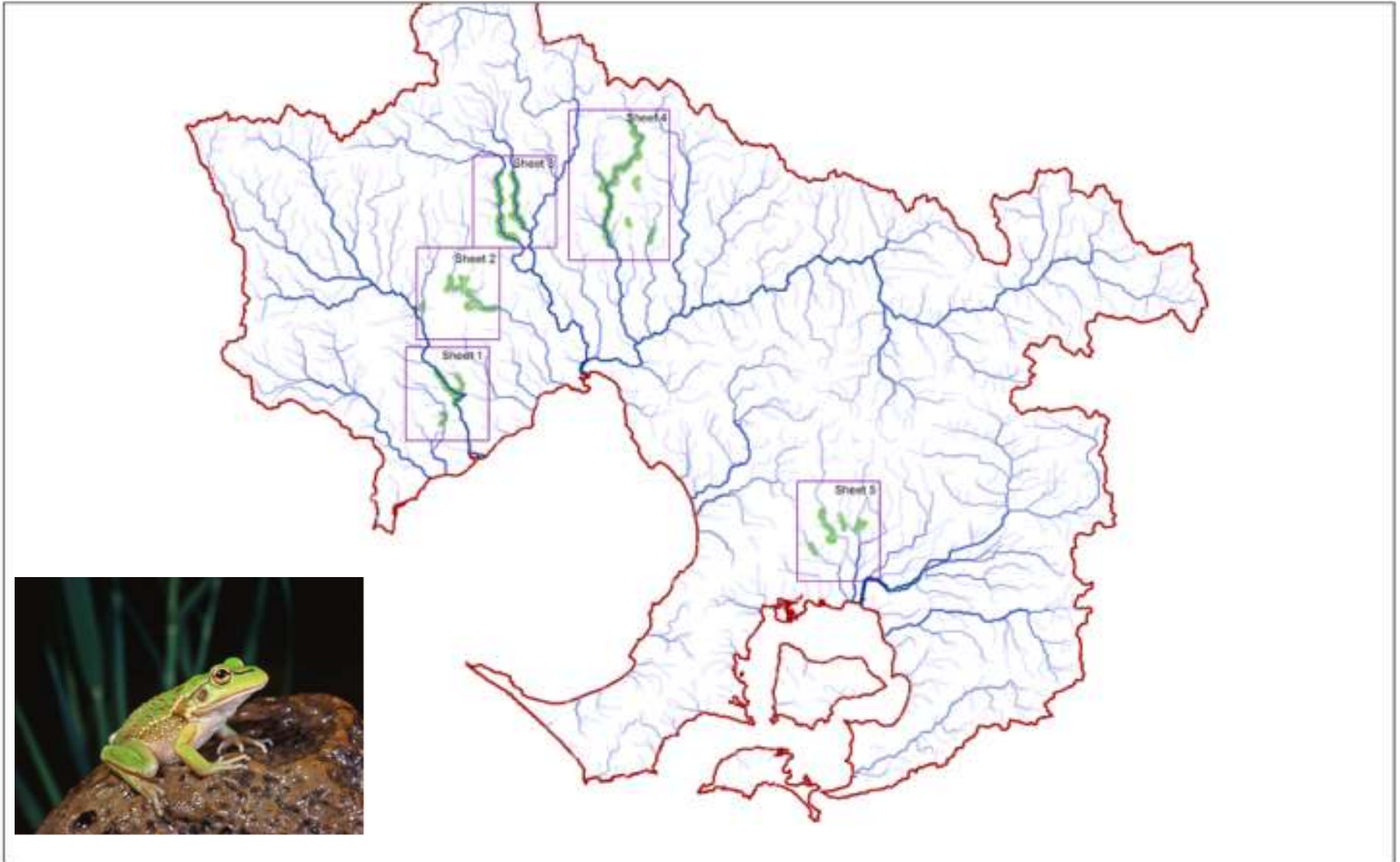
How did the frog cross the road?

# Urbanisation and GGF Populations

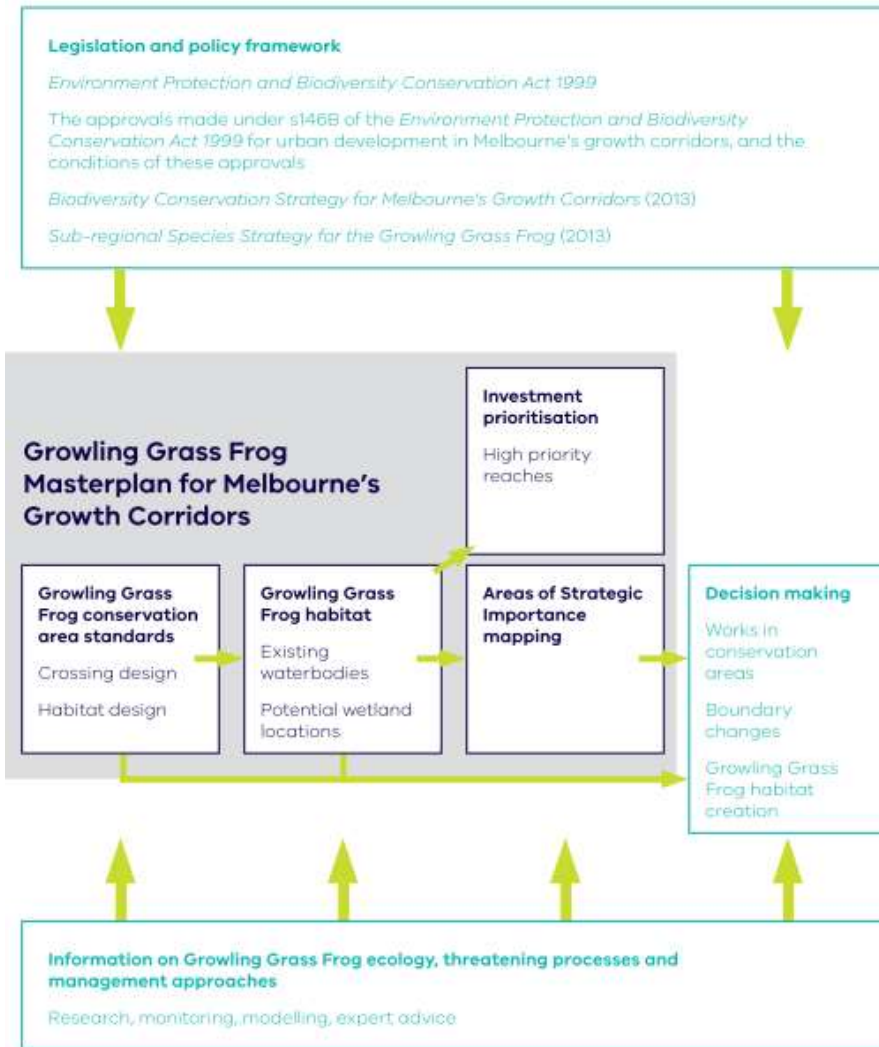


(photo: Kathy Preece)

# Melbourne Growth Planning & GGF Corridors



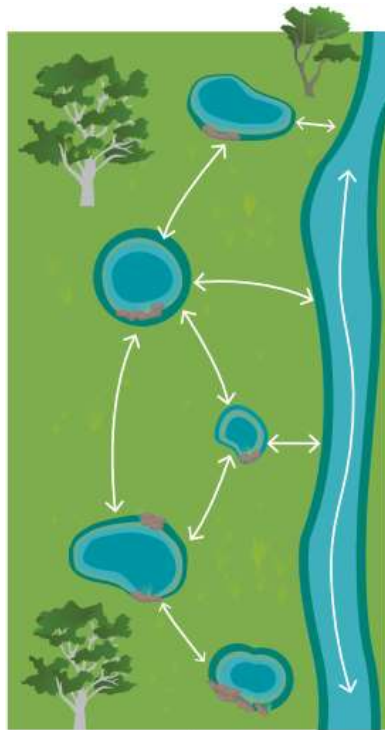
# Growing Grass Frog Masterplan



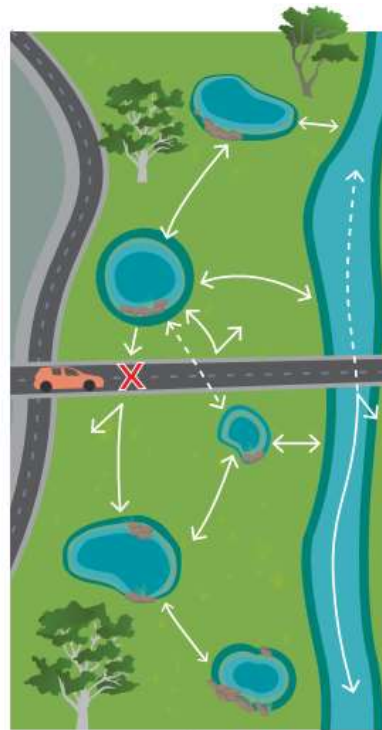
(image: Growing Grass Frog Masterplan for Melbourne's Growth Corridors - DELWP)

# The Issue – “Roads and GGF Don’t Mix”

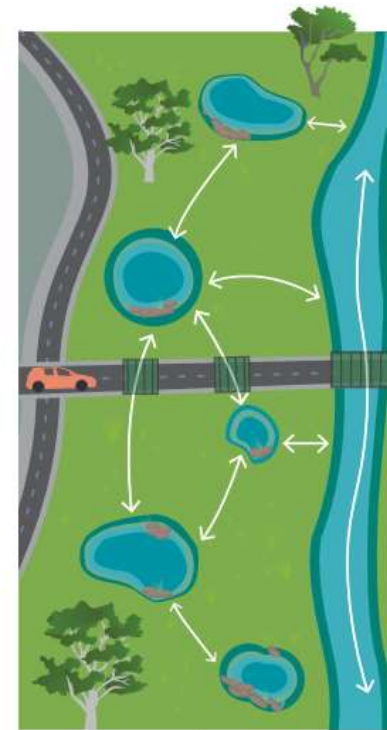
- Roads are known to impact GGF as follows:
  - Modification to habitat
  - Roadkill
  - As a barrier to movement (fragmentation of populations)



No Road



Road with  
no passage



Road with  
passage

# The Objective

- The strategy to mitigate the barrier effect of roads on GGF involve
  - locating roads to avoid important areas of habitat
  - the development of standards for GGF passage structures

## **“The role of the standards”**

*The standards for GGF crossings have been developed for 2 and 4 lane roads.*

*DELWP will apply these standards within, and on the boundary of, GGF conservation areas to:*

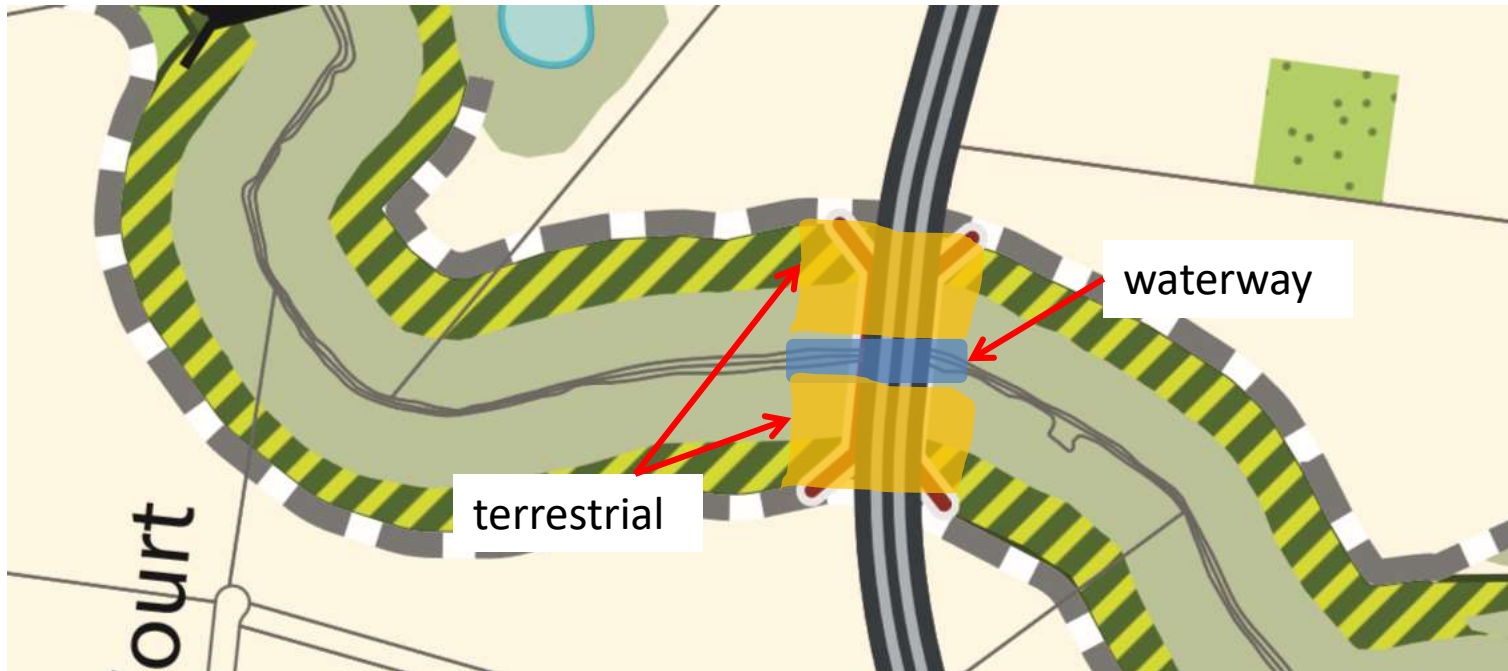
- *the preparation of Conservation Area Concept Plans (CACP)/ Precinct Structure Plans (PSP);*
- *the assessment of infrastructure proposals; and*
- *compliance.*

# The Process for Developing “The Standards”

- Phase 1 – design principles and concepts
  - Literature review, both national and international
  - Identify the main types of GGF waterway based on physical, hydrological and ecological features.
  - Outline the effect that existing crossing designs have on GGF movement.
  - Identify appropriate design principles and attributes for crossing structures.
  - Recommend design concepts and associated mitigation measures
  - Consult with DELWP's GGF Technical Advisory Group (TAG).
  
- Phase 2 – design standards and drawings
  - Schematic guidelines for a subset of the design concepts ("typologies")
  - Engineering review and input to design standards
  - Drawings to demonstrate the application of the design standards

# The Key Components of a GGF Crossing

- There are 2 key components associated with a road crossing a GGF corridor
  - The waterway component of the corridor
  - The terrestrial component of the corridor





# Traditional Culver Crossing



(photo: Peter Robertson)

# Connectivity Standard

- Fragmentation of GGF populations is the major impact caused by a road
- Dispersal is essential for metapopulations to persist in the long term
- For this to be possible adequate habitat connectivity must be maintained

*Connectivity is defined here as the proportion of the length of the roadway (plan view length) providing passage opportunities for GGF.*

- The exact proportion of connectivity for GGF is unknown.
- However, the more opportunities there are for GGF to successfully pass under roads, the more likely the success.
- Limited international research suggests that the maximum acceptable distance between openings is 50 m

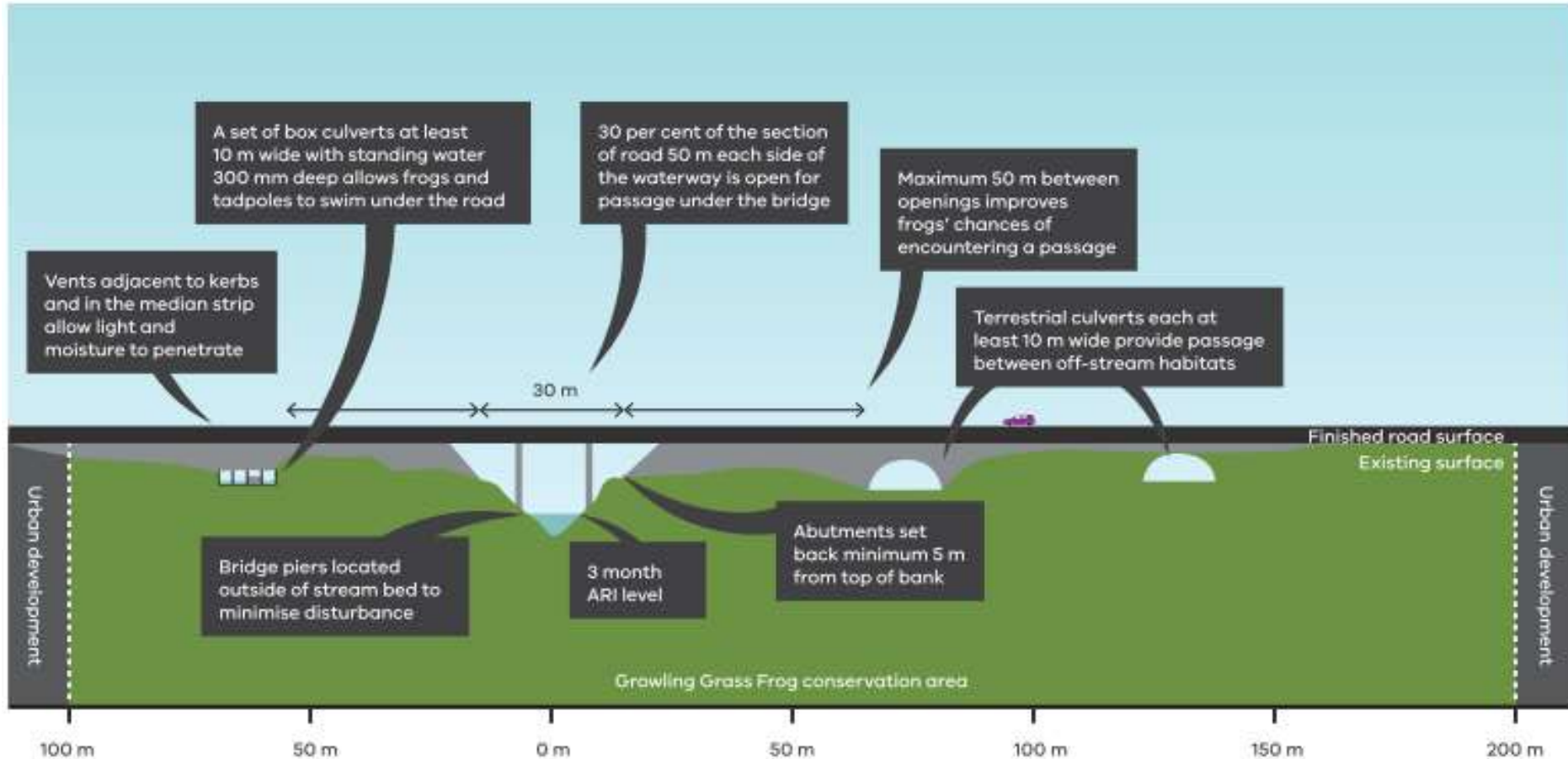
# Crossing requirements

- Limit the number of crossings
- Avoid areas of Strategic Importance



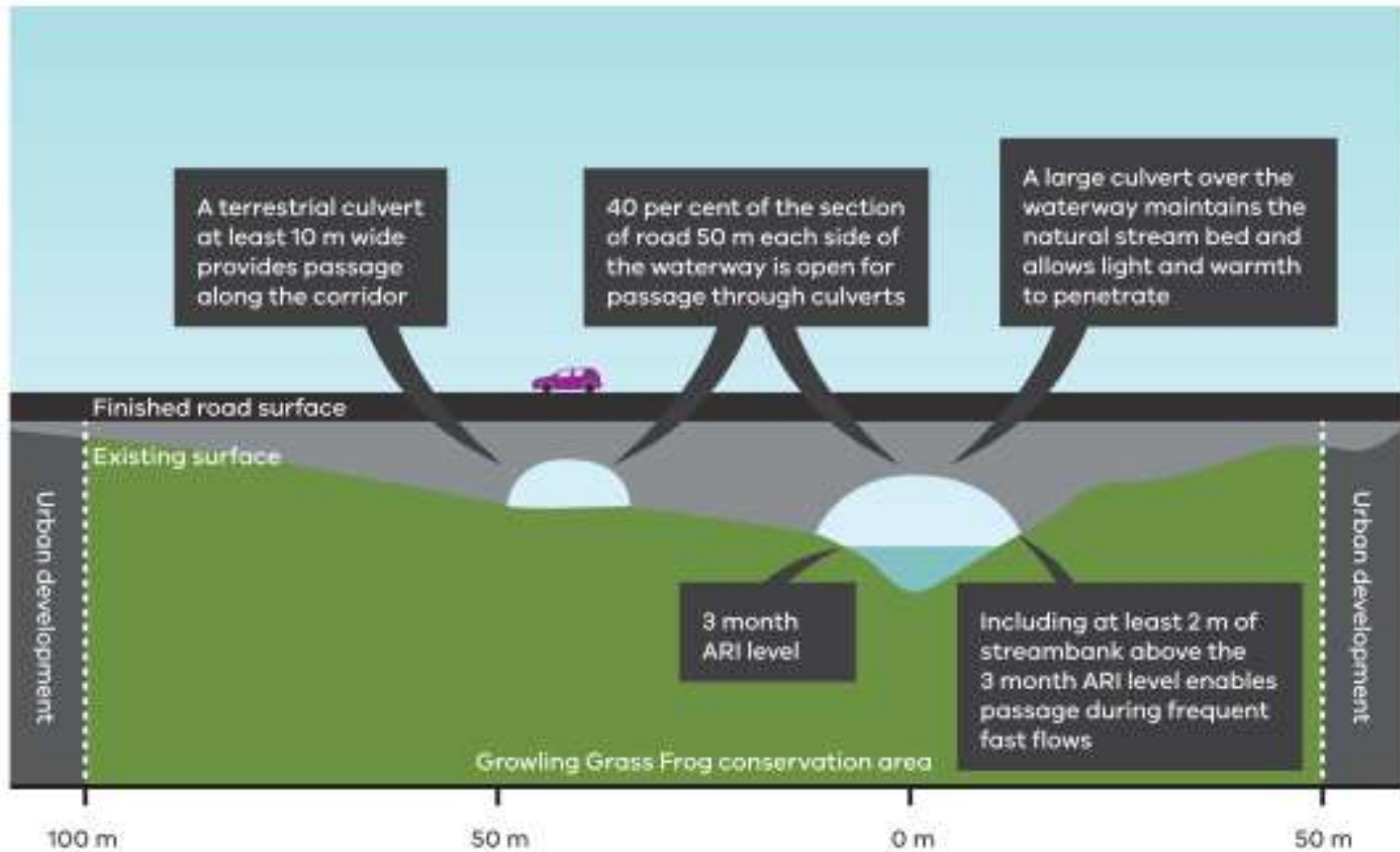
- Construct wide openings over waterways
- Provide terrestrial culverts to facilitate movement between off-stream habitats

# Bridge Crossing



(image: Grawling Grass Frog Crossing Standards - DELWP)

# Culvert / Arch Crossing



(image: Growling Grass Frog Crossing Standards - DELWP)

# Micro-climate vents



(photo: Kathy Preece)

# Culvert / Arch Crossing - attributes

Attribute	Design standard	Rationale
<b>Configuration</b>	Maximum distance between passages of 50 metres.	To ensure that Growling Grass Frogs moving through the landscape can easily encounter the passages under roads.
<b>Substrate</b>	Preferably natural surface.  Concrete with a smooth base may be acceptable in some circumstances, for example permanently inundated box culverts.	To provide relatively natural conditions and minimise obstacles that may impede direct movement.
<b>Dimensions – all culverts</b>	Straight and as wide and short as possible.  Entrance as close to the road edge as possible.	To minimise the distance that needs to be traversed, reduce the difference in climate between inside and outside the culvert and provide a sight line to the end.
<b>Dimensions of waterway culverts</b>	An opening that is at least the width of the 3 month ARI flow plus a minimum of 2 metres (horizontally) each side of the waterway.  Minimum airspace of 600 mm for any culvert across a waterway that will be inundated during baseflow conditions.	To enable passage along the stream bank in frequent flow conditions.  To try to maintain climatic equilibrium between the inside and outside environments; allow water conveyance and allow frogs to breathe while in the culvert.

# Culvert / Arch Crossing - attributes

Attribute	Design standard	Rationale
<b>Dimensions of terrestrial culverts</b>	<p>Each arched culvert or set of multiple box culverts is to provide a horizontal opening of at least 10 metres.</p> <p>Permanently inundated culverts must contain standing water approximately 300 mm deep. A supply of suitable water (for example treated stormwater) must be identified as part of the design.</p> <p>Culverts for infrastructure that is level with terrestrial habitat must have bases dug in below natural surface if required.</p>	<p>To provide opportunity for Growling Grass Frog to find passages, and to try to maintain climatic equilibrium between the inside and outside environments.</p> <p>A maximum transition grade of 1 in 10 to the culvert invert must be incorporated in the design.</p>
<b>Light and moisture</b>	<p>Install microclimate vents that:</p> <ol style="list-style-type: none"> <li>1. Have footprint of at least 1 metre x 1 metre and preferably much larger.</li> <li>2. Are placed adjacent to the kerb and channel on either side of a two lane road.</li> <li>3. Have an additional vent in the central median for larger roads so that there is no more than 10 metres between vents.</li> <li>4. Consist of a "grated lid" with a 500 mm concrete surround that falls towards the grate.</li> </ol>	<p>To allow light and moisture to penetrate the culvert, to try to maintain climatic equilibrium between the inside and outside environments.</p>



# Hopefully.....



(photo: Kathy Preece)