# 3. PREFERRED PLANNING FOR MITIGATION MEASURES

# 3 PREFERRED PLANNING FOR MITIGATION MEASURES

Definitions and detailed descriptions of the fauna mitigation structures mentioned are detailed in Section 6: Measures to Achieve Fauna Sensitive Roads.

## *3.1 Concepts*

### 3.1.1 Habitat/population connectivity versus reducing fauna mortality

Measures to protect fauna and to reduce habitat/population fragmentation in the vicinity of road infrastructure can be divided into two groups (Figure 3.1.1):

- Those which directly reduce fragmentation. These measures provide links between habitats severed by the infrastructure such as fauna connectivity structures (for example, overpasses, underpasses and so on).
- Those which aim to reduce or eliminate the impact of road traffic on fauna populations.

In practice, there may not be a clear distinction between the two functions of these mitigation measures. For example, fauna exclusion fencing may reduce fauna mortality on roads but it can act negatively by severing links between habitat areas.

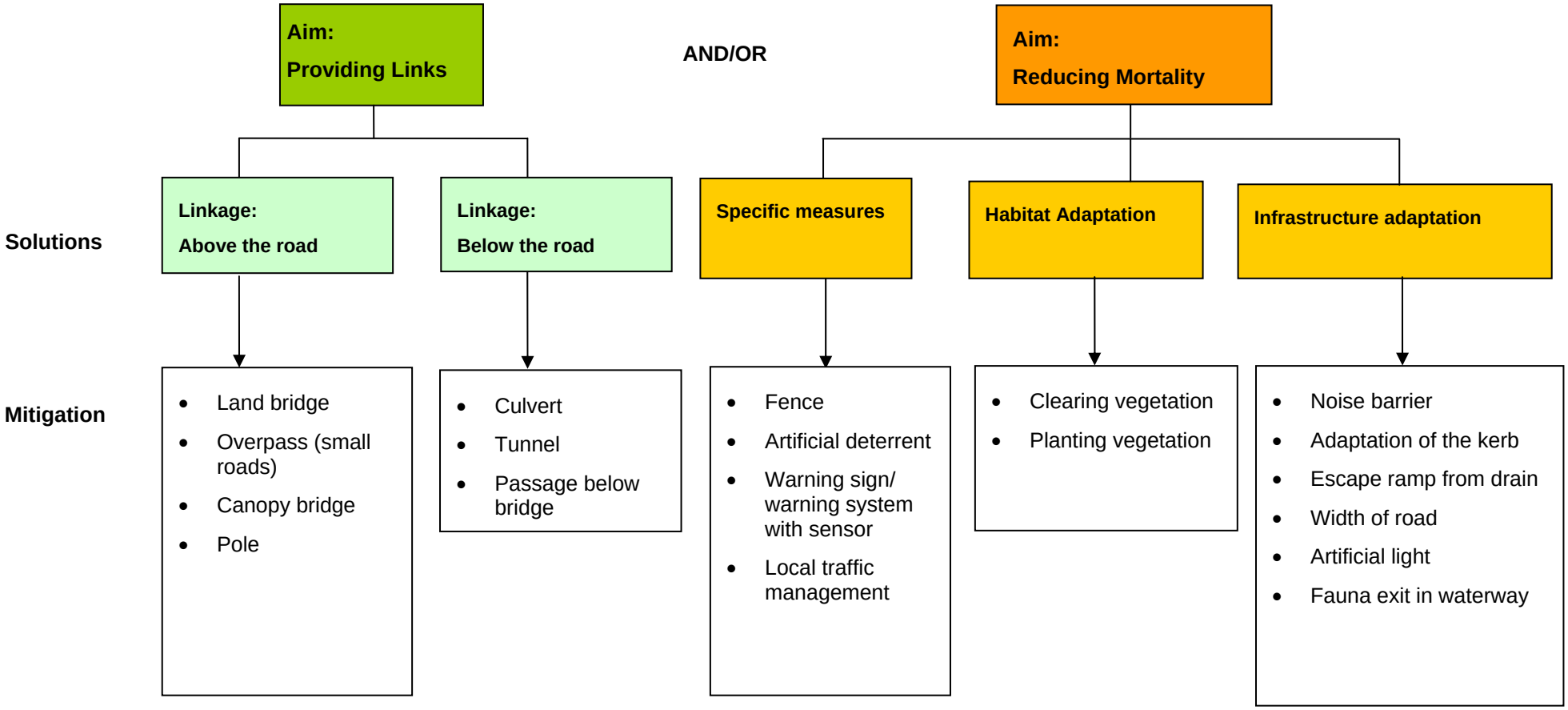
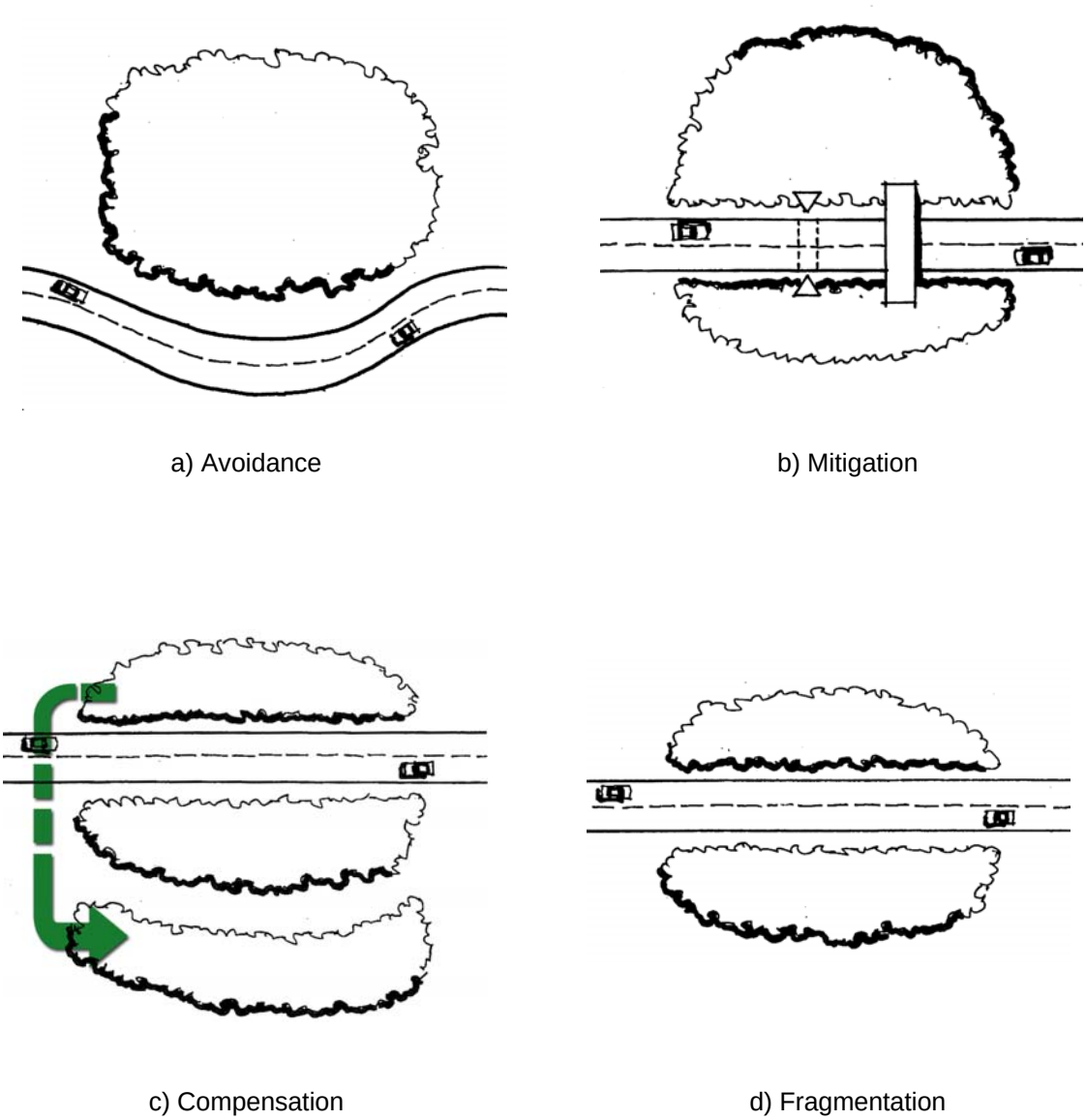



***Figure 3.1.1 Types of measures to mitigate habitat fragmentation and reduce animal mortality (adapted from Iuell et al. 2003).***

### 3.1.2 Avoiding habitat and population fragmentation

The following principles can be applied to both new and existing roads. For existing roads the principles can be adopted during repair and/or maintenance. Adjacent existing land use and future development should be considered as this may severely reduce the efficacy of any mitigation or compensatory measures (Figure 3.1.2).

- Avoid habitat fragmentation. This is the preferred option.
- Where habitat avoidance is impossible or impractical, consider fauna mitigation measures.
- Where mitigation is insufficient or significant residual impacts remain, consider compensation.



a) Avoidance

b) Mitigation

c) Compensation

d) Fragmentation

***Figure 3.1.2 Representation of a) avoidance, b) mitigation, c) compensation and d) fragmentation (adapted from Iuell et al. 2003).***

### 3.1.3 Specific measures versus modified structures

- Structures can either be:
  - Designed solely for fauna passage, where human access is prohibited; or
  - Built for people or drainage and modified to allow fauna passage.
- It is important to note that the modification of existing structures to reduce the barrier effect and increase the permeability of road infrastructure to fauna may, in specific environments, be more appropriate and a cheaper option than building dedicated fauna mitigation structures (Iuell *et al.* 2003) (Figure 3.1.3).

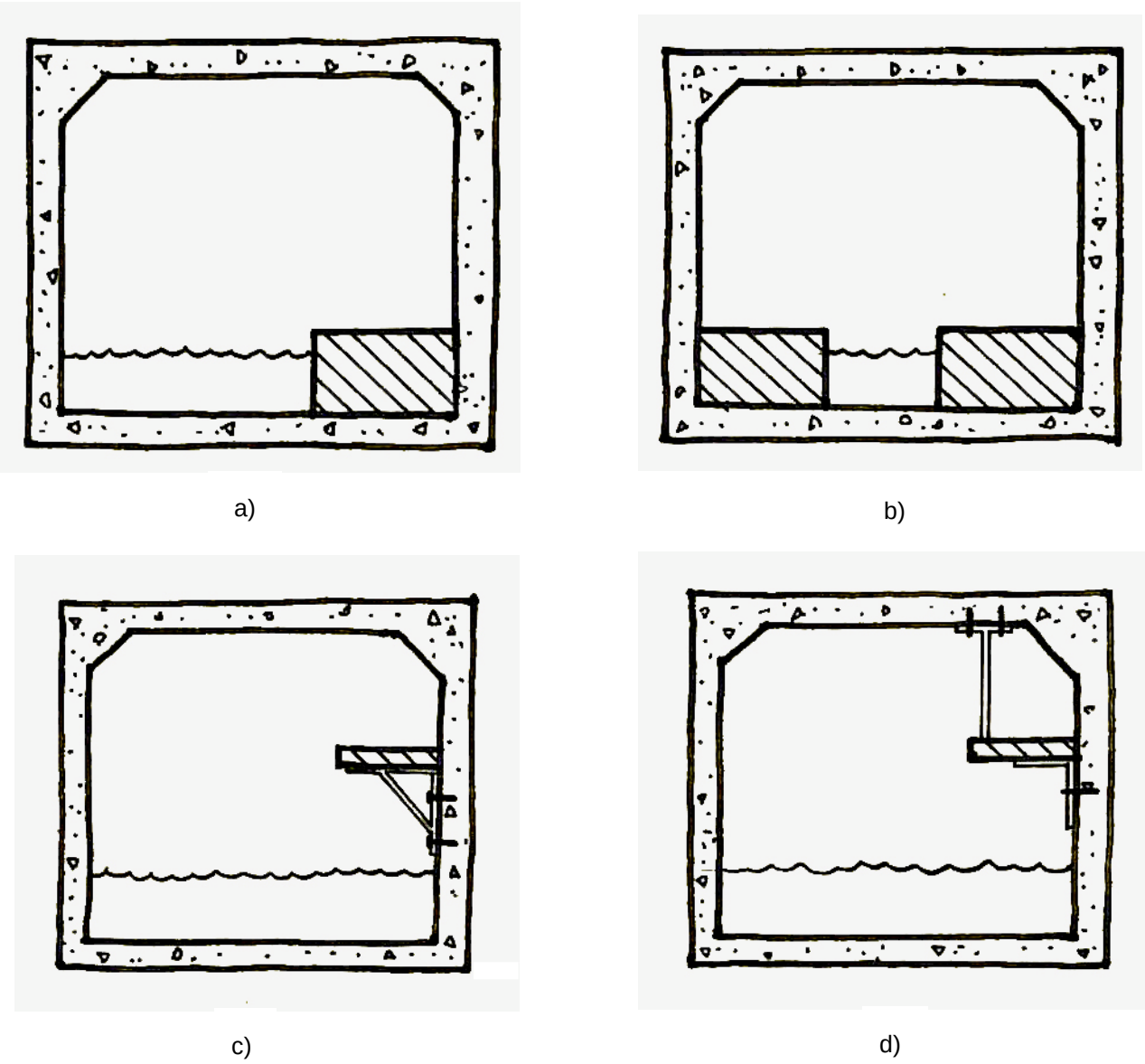



***Figure 3.1.3 Retrofit of existing box culverts with ledges to provide dry fauna passage.***

### 3.1.4 Fauna passage as part of a general landscape permeability concept

- Landscape permeability is the degree to which fauna are capable of moving through the landscape (Suter et al. 2007).
- Purpose built fauna passage structures and other structures adapted to increase the movement of animals across road infrastructure should not be considered in isolation (Bank et al. 2002; Iuell et al. 2003; van der Ree et al. 2007).

- Connectivity between habitats at a regional scale (at the minimum) should be considered, with particular regard for transport infrastructure, distribution of habitats and other potential barriers such as built-up areas.
- Fauna mitigation structures should maintain connectivity within and between fauna populations.

### *3.2 Choice of appropriate fauna mitigation measures*

- Selection of the most appropriate type of fauna connectivity structure requires consideration of:
  - Landscape/topography (local and regional);
  - Habitats affected;
  - Target species;
  - Risk identification;
  - Funding availability; and
  - Conservation importance.
- In general, mitigation measures become more elaborate the more important the area or corridor is to the target species (Figure 2.2.1).
- In practice, there is rarely one mitigation measure available to effectively mitigate impacts on fauna. Instead, a set of integrated measures is required to address identified issues at specific sites and for the road as a whole.
- A combination of mitigation measures suitable for different groups of animals will often be the best solution (Bank et al. 2002; Iuell et al. 2003; van der Ree et al. 2007).

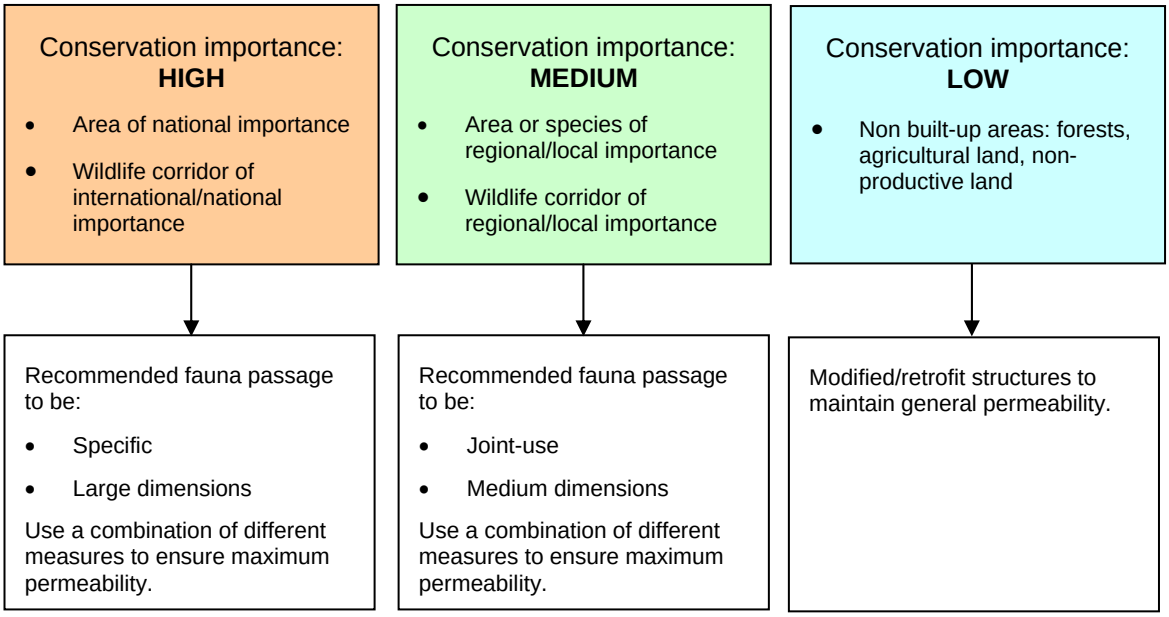



***Figure 3.2.1 The choice of different types of fauna passages is dependent upon the conservation importance of the area or corridor (adapted from Iuell et al. 2003).***

### *3.3 Planning and involvement*

Planning which involves fauna sensitive road design concepts will enable the adoption of best practice and in turn result in well conducted environmental assessment, design and likely an excellent overall environmental outcome. Most importantly, good quality environmental assessment will result in the installation of appropriate (both in terms of type and number) fauna mitigation measures.

Fauna sensitive road design goals for each project must be specific to the location, species of concern and nature of the issue. To achieve these goals, consider the following:

a) Early and continued involvement by environmental professionals so that:

- Potential ecological impacts can be identified as early as possible.
- Formal arrangements can be made to guarantee environmental staff are formally alerted and consulted at the concept stage of every road project (new and upgrades).
- Compliance with environmental objectives and conditions is ensured.

b) Investigating existing and future land use along and adjacent to the road project.

- Contact relevant local government councils, interested community groups and any other stakeholders to confirm current and future land use before undertaking design and construction of fauna connectivity mitigation measures.
- This will ensure the long-term success and viability of proposed fauna mitigation structures.

c) Desktop research

Review and evaluate the following to assist in the planning of fauna mitigation measures:

- Case studies from similar environments.
- Previous surveys of the ecosystem and associated fauna.
- Environmental assessment documentation.
- Roadkill surveys and databases.
- Main Roads' Road Corridor Environmental Assessment (RCEA) database.
- Government policy and legislation.

d) Ecological studies

- The implementation of adequate and applicable ecological baseline studies will enhance the effectiveness of mitigation works.
- Ensure appropriately qualified people are engaged to manage and carry out ecological studies. This will result in properly designed, meaningful and adequately funded studies.

e) Community engagement

- Follow relevant guidelines to ensure consultation is thorough. If consultation is poor the resulting issues may become time-consuming and less effective than if initial contact was undertaken.

### *3.4 SMART technique*

This technique has been widely employed, ranging from the dairy industry to human resource management, and recently to the mitigation of barrier effects on fauna species (van der Ree *et al.* 2007).

The following SMART objectives should be considered in planning future fauna impact mitigation measures:

**S**pecific

**M**easurable

**A**chievable

**R**ealistic

**T**imeframed

For example:

a) Identify the specific species of concern and the specific issues related to the road infrastructure (habitat degradation, fragmentation and so on).

- In more detail, the specific purpose of a fauna mitigation structure should be identified. For example:
  - Gene flow: if the structure is constructed to ensure gene flow, then the dispersal of one animal per generation may be sufficient.
  - Annual Migration: if the aim is to enable the annual migration of a certain species across road infrastructure, then multiple structures at frequent intervals may be required (van der Ree *et al.* 2007).

- The number and frequency of structures is dependent on the behaviour of the target species. To connect populations with a small home range, the structures must be constructed at a higher density, whereas if the species has a large home range, fewer but perhaps larger structures may be required.

b) Outline the ways each stage of the mitigation process is measurable.

c) Ensure each specific and measurable aim is achievable.

d) Ensure each specific and measurable aim is realistic.

e) Ensure each specific and measurable aim is timeframed so deadlines can be targeted and reached.

### *3.5 Integrated and holistic approach*

There are two aspects to achieving a holistic approach to fauna sensitive road design, namely: permeability and integration.

a) At a regional scale, fauna mitigation structures are required to maintain necessary contact within and between populations of animals (permeability concept). This concept emphasises the connectivity between habitats on a large scale and considers not only the transportation infrastructure, but the distribution of habitats and other potential barriers, such as built-up areas (PIARC 2007).

b) At a local scale, it is imperative that all fauna sensitive structures (overpasses, underpasses, signage, fencing, lighting and so on) are considered together. For example, fauna underpasses or overpasses should always be installed with appropriate fencing to guide animals towards them.

### *3.6 Key references*

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