Biodiversity Connectivity Measures – Concept Planning

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Presentation Content

1. Complexities in managing road projects
2. Stages of a road project
3. Considering biodiversity connectivity in a road project
4. The way forward – development of a standard approach

Wakehurst Parkway – our first experimental overpass - 1999

Complexities for a road project

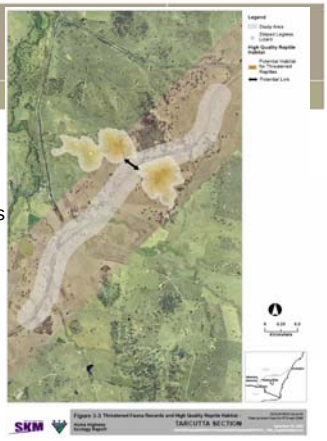
- Project Scope – size, shape, linearity
- Legislative and administrative issues
- Land Ownership
- Project timeframes
- Uncertainties around funding
- Knowledge about fauna movement and requirements for connectivity
- Roads as a barrier versus roads as a corridor
- Maintenance and on-going management

Example of a Large Project

Bonville upgrade – Pacific Highway near Coffs Harbour
Existing highway and upgrade through area of koala habitat

Example of Project in a cleared Landscape

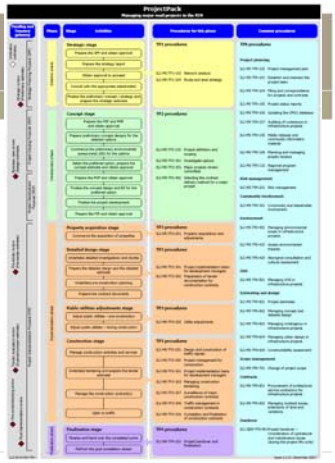
Hume Highway duplication near Tarcutta – potential habitat for Delmar impar (striped legless lizards)



Roadside Maintenance

Project Stages

Strategic
Concept
Detailed Design
Construction
Finalisation
Maintenance



Stages

- Strategic Stage
  - Project need
  - Possible funding sources
  - Decision to proceed to next stage

Stages

- Strategic Stage
- Concept Stage
  - Route and Corridor Selections
  - Preliminary Environmental Investigations
  - Concept design
  - Environmental assessment and approval
  - Environmental Studies

Stages

- Strategic Stage
- Concept Stage
- Design Stage
  - Detailed design of project
  - Design of culverts, bridges, crossing structures, underpasses, revegetation and landscape works

Stages

- Strategic Stage
- Concept Stage
- Design Stage
- Construction Stage
  - Environmental Management procedures
  - Managing Fauna on site

Stages

- Strategic Stage
- Concept Stage
- Design Stage
- Construction Stage
- Finalisation Stage
  - Project completion
  - Audit
  - Handover

Stages

- Strategic Stage
- Concept Stage
- Design Stage
- Construction Stage
- Finalisation Stage
- Maintenance Stage
  - Maintenance of the asset
  - Maintenance of connectivity

Why Does The RTA Invest In Connectivity Measures?

1. As part of the RTA's commitment to minimise the environmental impact of its work.
2. As a response to community expectations to provide safe crossing for fauna.
3. Because conditions of approval require connectivity measures to be implemented
4. Because we have successfully implemented mitigation measures on past projects.
5. Because it presents a design challenge and opportunity for innovation

When do we need to consider connectivity measures

- As early as possible in the project development process depending on scale and impact.
- For large projects with a significant connectivity impact – clear consideration needs to be made at the concept stage
- Large structures such as land bridges or measures such as wide vegetated medians will be costly, will influence land purchase and road design.
- Smaller measures such as landscaping treatments, fencing and design of features within culverts could be considered later at the design stage.

Newly constructed glider pole – Hume Highway

Land bridge – Bonville upgrade

Standard decision-making principles

Avoid
- Select road corridors that do not impact on connectivity

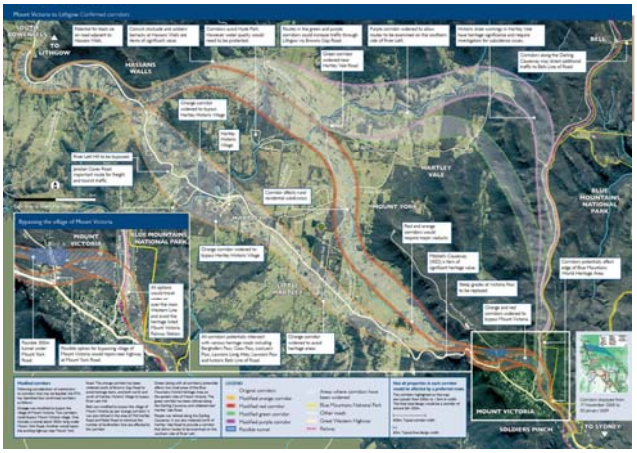
Minimise
- Select least connectivity impact
- Maintain landscape features that facilitate connectivity

Mitigate
- Crossing structures
- Landscaping

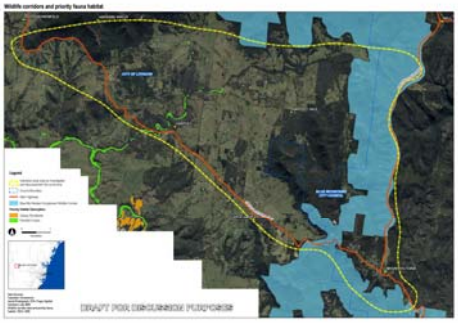
Offset
- Restore connectivity elsewhere in the landscape

Considering connectivity during route selection

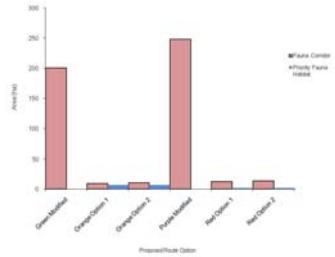
- Ecological Connectivity is one of the criteria used to analysis route options
- Connectivity is one of the ecological issues considered
- Ecology is one of the environmental issues to be considered
- Environment is one of the key decision–making criteria along with cost, performance, safety and social impacts
  - Connectivity is also a social criteria



Including consideration of connectivity



Comparing route options quantitatively



- Figure 3-8: Summary of area of mapped Priority Fauna Habitat and Blue Mountains Western Escarpment Corridor (DECC 2005) within each corridor

Multi-ecological criteria analysis – an example

- Table 3-3: Summary of the potential impacts for each of the identified conservation value criteria

	Conservation Value Vegetation		Conservation Value Fauna Habitat		Conservation Value Flora Habitat		Priority fauna habitat and corridors		
Corridor	Very High	High	Very High	High	Very High	High	Habitat	Corridors	Total
Purple Modified	167	92	273	216	154	130	0.44	248	1330.44
Green Modified	131	123	258	147	137	139	0.51	201	1136.51
Orange Option 1	203	55	141	267	93	52	7	9	767
Orange Option 2	205	54	137	206	90	49	7	11	759
Red Option 1	84	71	160	88	91	73	12	2	581
Red Option 2	84	70	155	85	88	68	13	2	565

Environmental Assessment

Consider regulatory requirements for assessment

Identify existing ecological values:

- •Vegetation communities
- •Flora and Fauna presence and habitat
- •Important movement corridors

Consider impacts of project on connectivity

- •Which species impact – any threatened species involved
- •Undertake significance tests

Propose mitigation strategies

- •Identify key crossing zones
- •Identify strategies to minimise impact and maintain connectivity
- •Propose possible mitigation measures – vegetation planting, fencing bridges, culverts, overpasses, underpasses etc. considering benefit of structure and any costs both to road design, road safety and road maintenance.

Project Conditions of Approval

Example 1:

•The design of any fauna or waterway crossings must be undertaken in consultation with DEC and DPI as relevant.

Example 2:

•Crossing structures must be provided that provide safe passage for xx sp. And xx sp across both carriageways at locations identified in the Environmental Assessment

•Vegetated medians must be provided at Chainage xx to xx

•At least one fauna crossing must be outside of a riparian area

•Expert advice is to be provided on need, location and number of aerial crossing structures for squirrel gliders

•Final proposed structures to be submitted to DECC and DoP before commencement of construction

Developing a connectivity strategy (source: Manly Daily 2006)

Matters to consider in developing a connectivity strategy

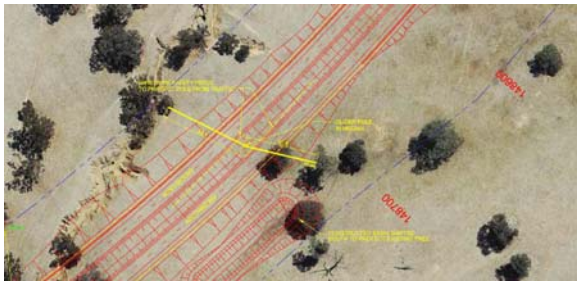
- Can proposed drainage structures or other elements of the road design be used to facilitate crossing?
- Can all targeted fauna groups be accommodated?
- Does the site allow construction of suitable measures including fencing?
- Is the cost of the measure consistent with its connectivity benefit and impact of the project?
- Is the site location connected to other vegetation at local or landscape scale?
- Can the site be accessed for necessary maintenance?

Design, Construct and Maintain structures

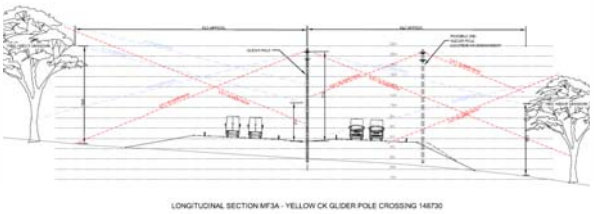
Engineering design
- Stability, Safety integration into road design
- Costing and sourcing materials
- Use of Standard designs
- Site and fauna management during construction.

Long term protection of key connectivity features (eg roadside trees)
- Recording in roadside corridor database for future reference
- Monitoring effectiveness of structures
- Maintaining structures – fencing, blockages of underpasses
- Maintaining soft measures – revegetation works

Incorporating crossing structure into road design



Design diagram for glider poles



Glider Poles immediately after construction

Towards a Standard Approach

We don't need fixed design criteria i.e 10 underpasses per km that include 4 pieces of fauna furniture – that assumes we:

- know the requirements for fauna
- the project and site constraints and opportunities are the same

We do need:

- A consensus as to the measures that work and should be applied and those that don't work or are of limited value
- An agreed approach for considering fauna crossing requirements in linear infrastructure projects
- Opportunities to develop better approaches through innovation and responses to research.

Fish Passage requirements