THE QUEENSLAND WET TROPICS:
A CASE STUDY IN BEST PRACTICE PLANNING THROUGH INTERDISCIPLINARY COLLABORATION

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ENVIRONMENT NORTH
ENVIRONMENTAL MANAGERS & PLANNERS

Bio

- Former (roads) engineer.
- Mid-life crisis – natural resource manager/environmental planner.
- Foot in both camps: integrator, generalist, champion?
- Infrastructure providers & regulators seem to have confidence in this approach.

Planner's Perspectives (1)

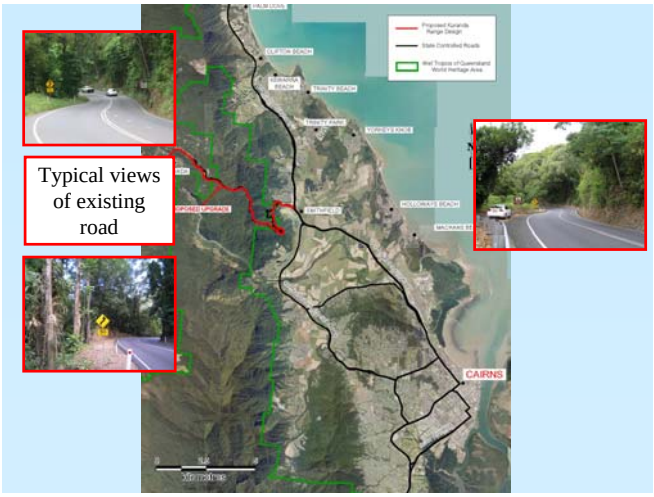
- The proponent's (e.g. Main Roads, Powerlink, private developers) needs:
  - Provision of essential community infrastructure.
  - Certainty regarding approvals.
  - Practical and affordable engineering solutions.
  - Certainty that road ecology works are effective and worth the effort.

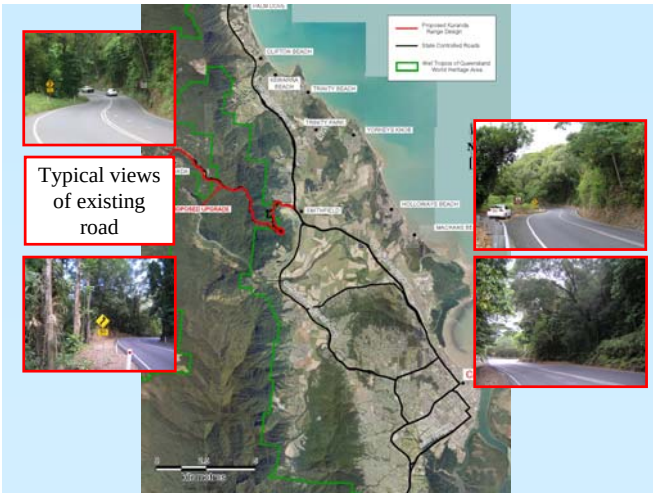
Planner's Perspectives (2)

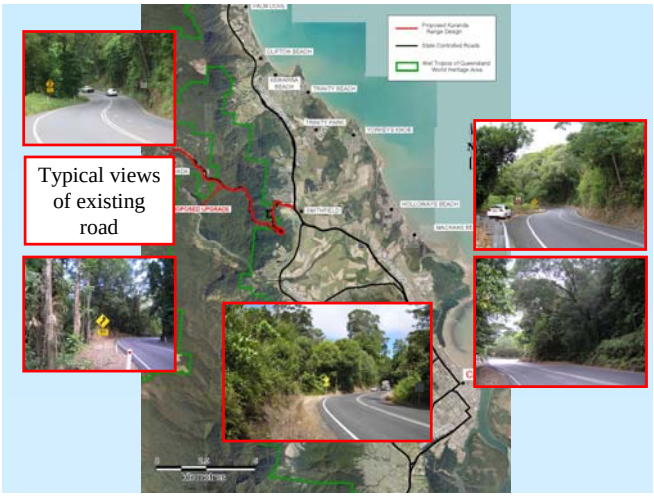
- The planner's needs:
  - Data-driven solutions (good science).
  - Integration of engineering and scientific principles.
  - No substitute for avoidance then mitigation then management of impacts.
  - Beware – one size does not fit all. Connectivity needs can vary.

Case Study 1: Kuranda Range Road Upgrade

A:
Location
& Context







A: WHY THIS PROJECT?

- INCREASE ROAD CAPACITY
  - Predicted growth – 4% pa

Congestion and Traffic Mix

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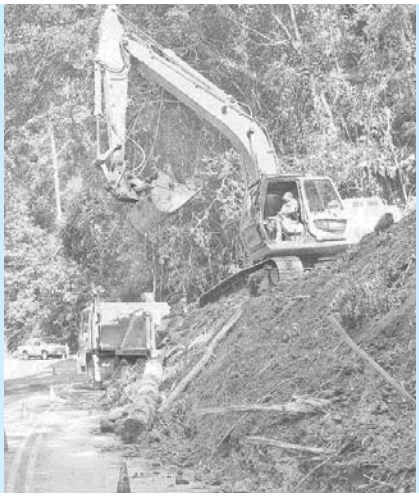
- SAFETY & RELIABILITY
  - High accident rate; frequent closures



A: WHY THIS PROJECT?

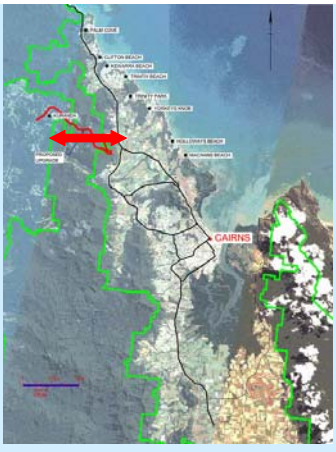
- INCREASE ROAD CAPACITY
  - Predicted growth – 2.5% to 4%
- SAFETY & RELIABILITY
  - High accident rate; frequent closures
- FREIGHT EFFICIENT VEHICLES
  - 25m B-doubles and 36.5m B-triple

B: Technical challenges (1)

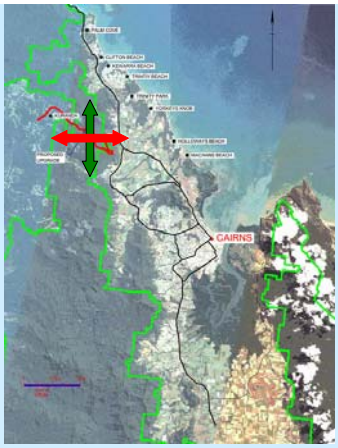
- Working in the Wet Tropics of Queensland World Heritage Area,
- strict environmental protection legislation (national and state):
  - *EPBC Act 1999* (Cwlth)
  - *Wet Tropics Management Plan 1998* (Qld)

B: Technical challenges (2)

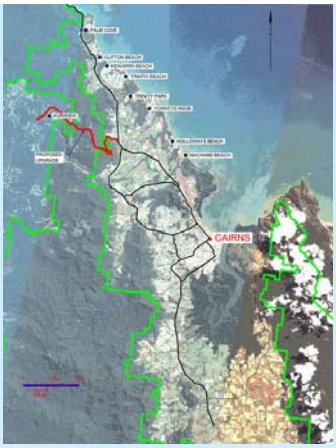
- steep and rugged terrain,
- known stability problems,
- tropical climate.



Regionally important road …



Regionally important road and biodiversity corridors

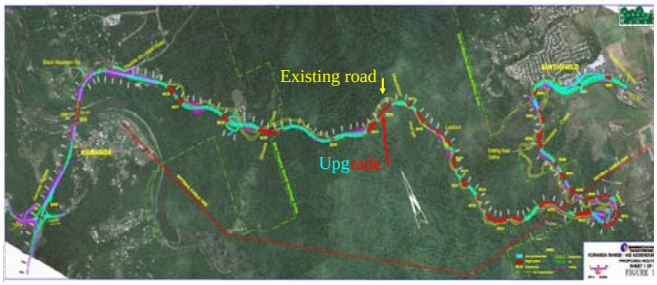


Regionally important competition issues …

Locally important watercourses

High current levels of roadkill

The Project



The Project

Typical road on structure

Assessing no net adverse impacts on integrity…

- Canopy connectivity
- Surface connectivity for large animals
- Surface connectivity for small animals
- Aquatic connectivity
- Area of clearing
- Length of edge
- Slope disturbance
- Penetration of edge effects
- Visual dominance and scenic alteration
- Presentation of World Heritage Values

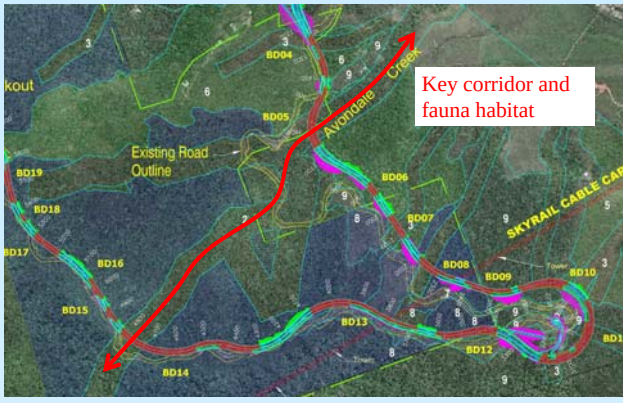
Assessing no net adverse impacts ...

Canopy connectivity
Surface connectivity for large animals
Surface connectivity for small animals
Aquatic connectivity
Area of clearing
Length of edge
Slope disturbance
Penetration of edge effects
Visual dominance and scenic alteration
Presentation of World Heritage Values

Need data! > Research

> Miriam

Mapping fauna habitat and movement needs …



Fauna connectivity initiatives

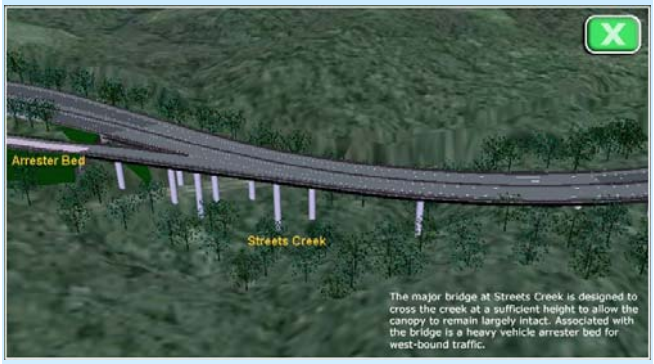
Bridge Solutions:

- Fauna connectivity under bridges
- "top down" construction at key locations
- Consider microclimate

1: Avondale Creek Bridge

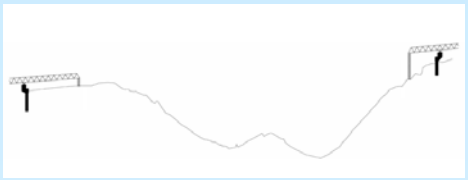
2: Bridge over north/south ridge

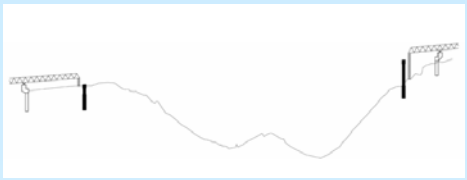
3: Streets Creek Bridge

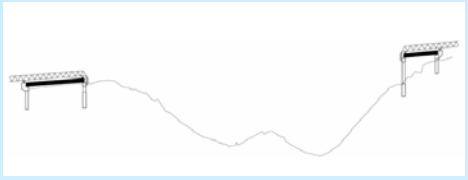


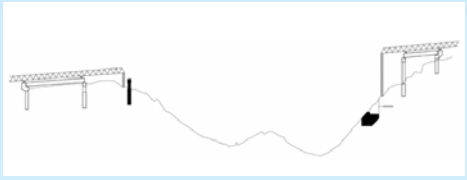
Construction techniques to protect habitat

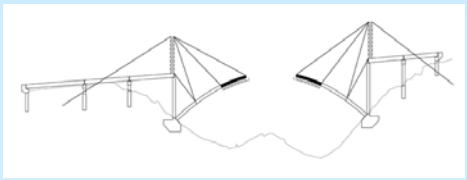
- Arch construction …

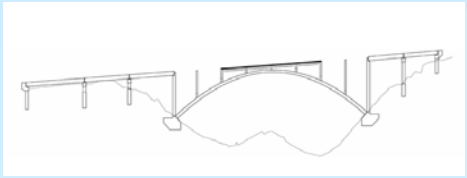


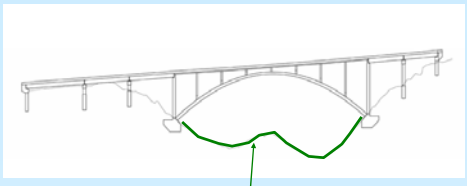












Little interference
with natural surface

Road Ecology Research

- Protect values by design,
- Protect values by management.

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Detailed design & management strategies

– informed by road ecology research

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- Cost:
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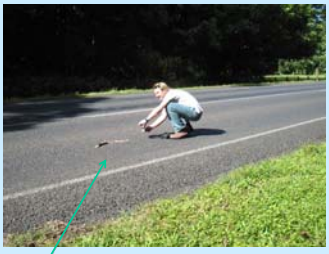
- most projects already completed, and
- some >2008/09 wet season.

CRC Research

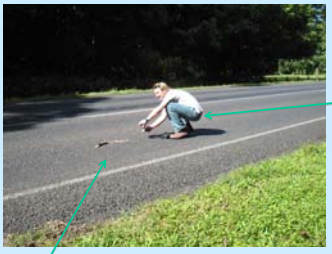
Project	Team Leader
1 Roadkill and connectivity	Miriam Goosem
2 Noise penetration and impacts	Greg Dawe
3 Headlight disturbance	Robyn Wilson
4 Canopy bridges over wide roads	Robyn Wilson
5 Rehabilitation of cuttings and embankments	Nigel Tucker
6 Microclimate under bridges	Steve Turton
7 Removing pollutants	Bernd Lottermoser

CRC Research
1: Roadkill & Connectivity

- Tasks:
  - Weekly records of killed animals
  - Plot locations
  - Investigate effects of traffic, seasonality
  - Compare with 1989 research
- Outcomes:
  - Recommend locations of fauna underpasses and overpasses
  - Design “Fence & Funnel” strategy

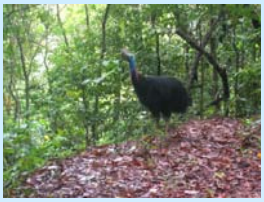


Current roadkill



Future roadkill?

Current roadkill

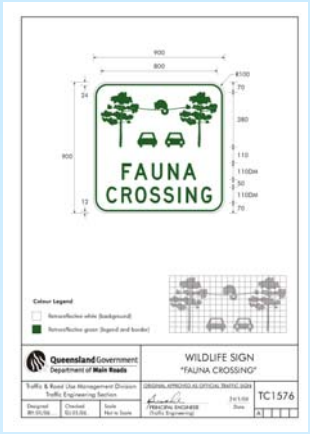


CRC Research
2: Canopy Bridges

- Tasks:
  - Investigate suitability of rope bridges over wide roads (Palmerston Hwy)
  - Monitor changes to home ranges of target fauna
- Outcomes:
  - Input into design of "Fence & Funnel" strategy

Palmerston Highway
Canopy Bridges

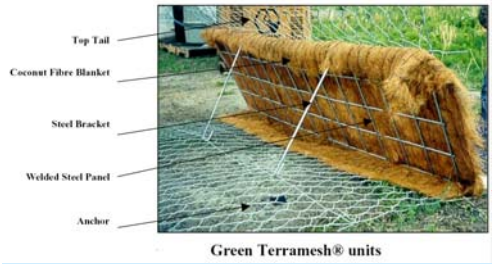
Green Ringtail Possum on canopy bridge 19 April 2007



CRC Research
3: Rehabilitation & Restoration

- Tasks:
  - Trial native plants for use in rehabilitating existing road, embankments and cuttings
  - Investigate planting of Green Terramesh & Gabions
- Outcomes:
  - Restoration Strategy (seed procurement, road rehabilitation and drainage works, planting, construction, and maintenance)

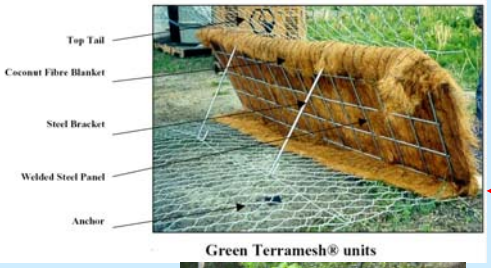
1: Green Terramesh ®



Green Terramesh® units

1: Green Terramesh ®

←Construction details



Green Terramesh® units

1: Green Terramesh ®

←Construction details

←Kuranda field trial

2: Planted Gabions

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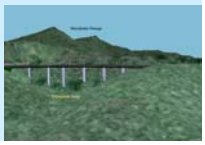
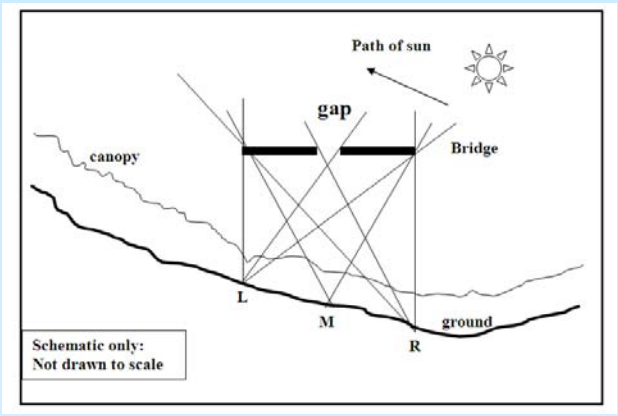
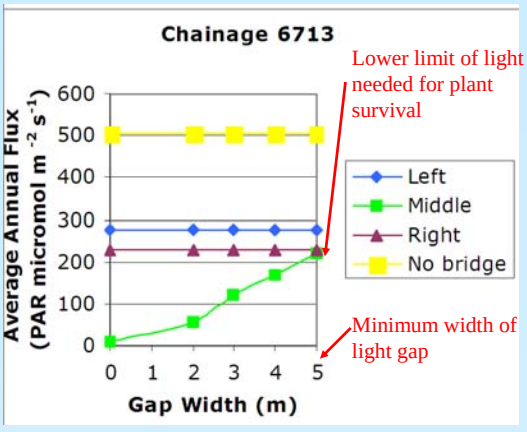
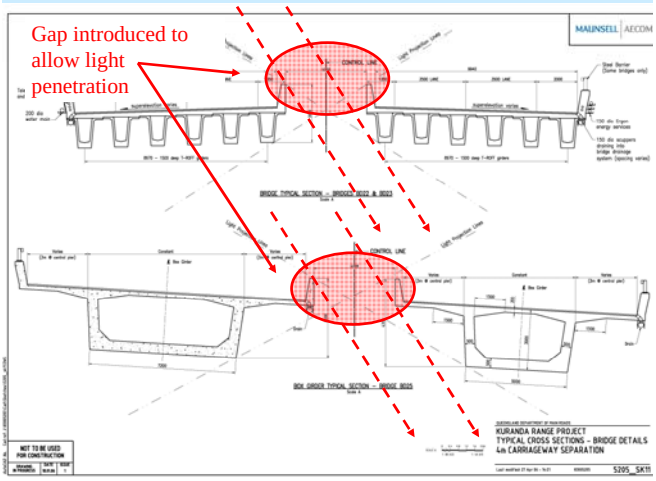
CRC Research
4: Microclimate under Bridges

- Tasks:
  - Investigate light and moisture conditions under other bridges in the area
  - Undertake additional modeling to determine light needs under Kuranda Bridges
- Outcomes:
  - Recommendations for design (gaps for light, irrigation)









> Miriam

Case Study 2: Mission Beach Roads

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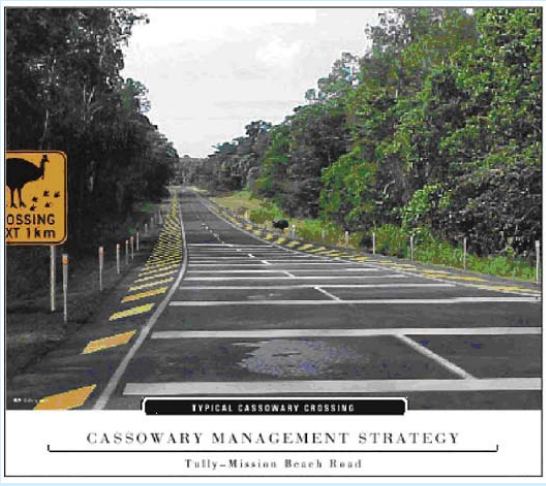


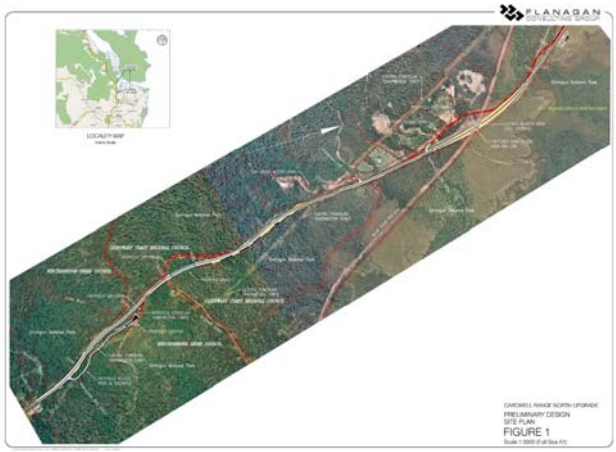
> Miriam

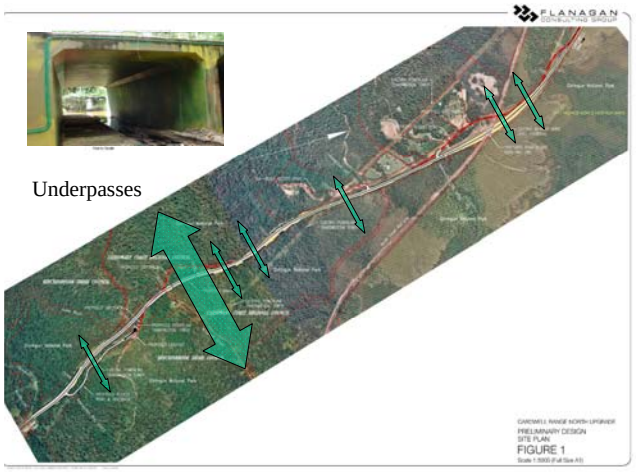
Case Study 3: Palmerston Highway

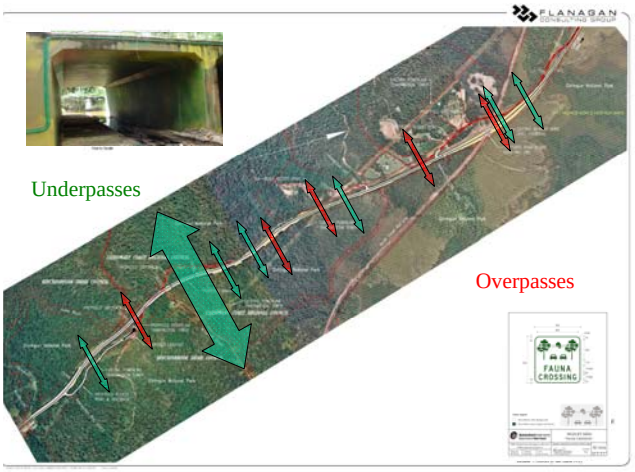

OVERSIZE

> Miriam

Case Study 4: Cardwell Range





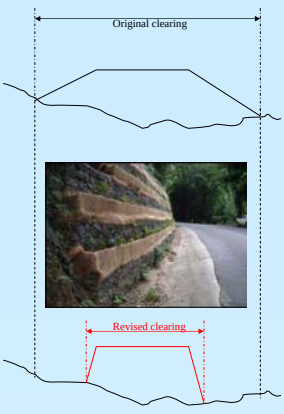


Fencing

Preserving habitat and reduce fragmentation by use of engineered fills

- Support embankments at steeper angles using gabion or green terramesh units.
- Vegetate the structures (habitat, visual).
- Achieve clearing and fragmentation reduction, improved stability and durability.

Support embankments at steeper angles



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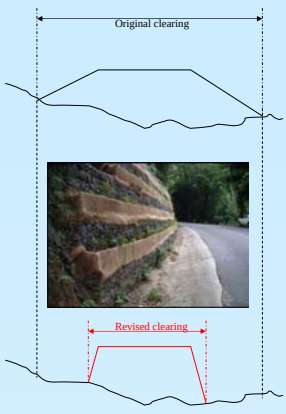


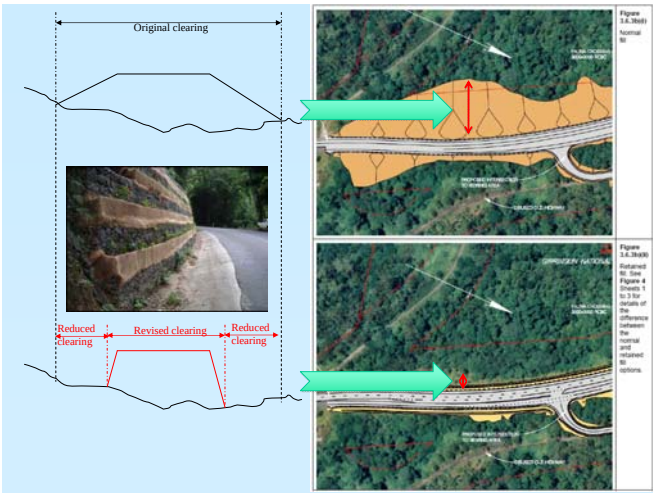
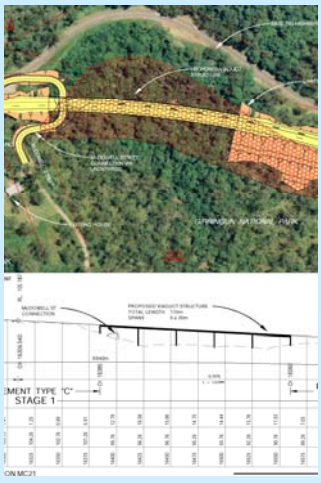


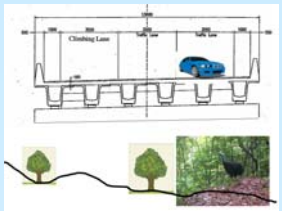
Plate 1. Planted gabion wall (Kuranda Range Road – August 2007). This image shows successful establishment of fern species.

Plate 2. Planted Green Terramesh® (Kuranda Range Road – August 2007). This image shows successful establishment of septic fig (*Ficus septica*). Bare patches have since been replanted and are thriving.

Preserving connectivity by use of road bridges and viaducts

- Separate roads and natural areas.
- Consider construction techniques to maintain habitat below.
- Consider viability of remaining vegetation (light, moisture).





Viaduct

> Nigel

Wrap up

- “Environmental design” – ecology is no less important than hydraulics or traffic capacity.
- Involve road ecologists throughout the project – conception, route selection, consideration of alternatives, preliminary and detailed design, investigations, construction, and post-construction.

Wrap up (2)

- Establish trust between road ecologists and engineering designers – fight the big battles first.
- Establish (and treasure!) collaborative relationships between regulators, designers, researchers and planners.
- Monitoring needs (including publishing etc. etc.)

Questions?