# ENHANCING FAUNA CONNECTIVITY FOR ARBOREAL FAUNA TREENET 2019

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Rope Bridge Supplied by:
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**What's the problem and what are the range of solutions?**

Arboreal animals need trees for shelter, food and movement. They utilise trees wherever they occur across the planet, with a diverse group of wildlife including mammals, amphibians and reptiles that climb, crawl and glide within or between trees. Since trees are a critical resource, arboreal animals are directly affected by habitat loss.

Arboreal animals are also impacted by the barrier effect, when the size of the gap exceeds their willingness or capacity to cross, as well as significant rates of mortality due to wildlife-vehicle collision. Other impacts include habitat degradation due to weed invasion, noise, chemical and light pollution, as well as increased rates of predation. While the impacts of roads and traffic are highest along major roads, smaller roads and forest tracks also affect many species.

Globally, there are over 64 million km of roads, enough to circle the earth 83 times. In addition, the rate of expansion of roads, railways, powerlines, pipelines and irrigation canals are significant. Australia is currently in an infrastructure 'boom', with a vast number of linear infrastructure projects planned or underway. Invariably, most of these projects will require tree removal, with some involving the removal of many trees.

The highest priority in the planning and design of all infrastructure should be to avoid and minimise the amount of tree clearing. Large and hollow-bearing trees are especially important as they are keystone structures for wildlife and can be centuries old. Where tree removal is genuinely unavoidable, solutions to mitigate the barrier effect and wildlife mortality should be a significant consideration. These solutions, in decreasing order of priority or effectiveness are:

1) Maintain or restore canopy connectivity wherever possible including: above narrow roads, planting trees on land bridges above roads or under bridges if height and width dimensions allow.
2) If natural canopy connectivity can't be maintained, consider rope bridges and/or glider poles above or below roads.
3) Installation of low ledges or timber rails for fauna willing to traverse the ground, these can be installed in underpasses, such as culverts. There is an increased risk of predation if these are too low to the ground.

Single rope fauna bridge

Installation on the Hume Freeway

## Detailed design and landscape context considerations

Rope bridges and glider poles should be designed specifically for the target species considering capability and willingness to use different types of structures. While lots of evidence about preferences exist for species such as Squirrel Gliders, Sugar Gliders, Ringtail Possums, and Brushtail Possums, there is less information for the larger gliders (e.g. Greater Glider, Yellow-bellied Glider) and rarer species of possums. In contrast, almost no data exists on the preferred design of crossing structures for arboreal species of reptiles or amphibians.

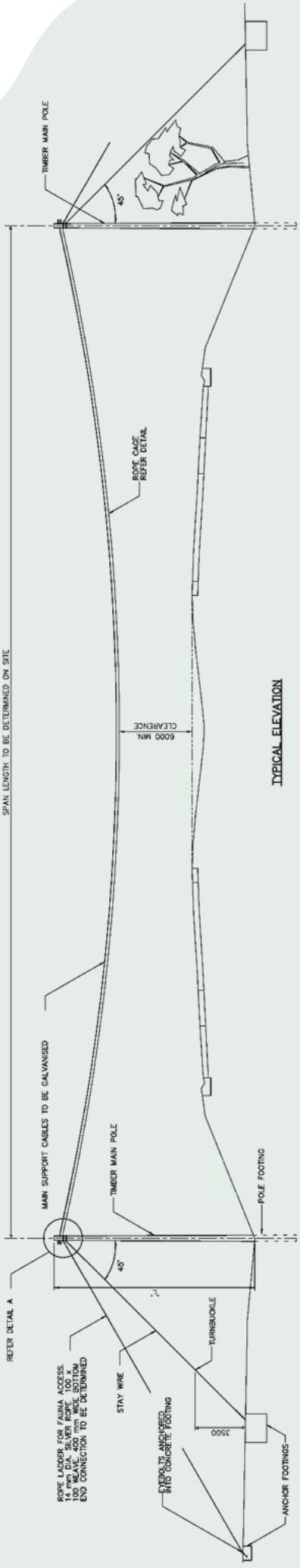
Some general rules of thumb apply:

1) Place crossing structures as close to the highest quality habitat for the target species as possible.
2) Alternatively, place crossing structures at locations where trees act as a natural funnel, and plant trees to create such a funnel where possible.
3) Ensure the crossings are as short as possible.
4) Predation of animals may occur on rope bridges and glider poles. Always include provisions to reduce the risk of predation by aerial predators, such as metal shields on the top of poles and escape pipes on the rope ladders and poles.
5) Always use rope ladders rather than single strands of rope as they are more stable and provide opportunity for animals to duck underneath and avoid predation by owls.
6) Calculate the height and spacing of glider poles using conservative glide angles and ensure the crossing can be achieved in both directions across the road.
7) Rope ladders should be connected with feeder ropes to 2-4 nearby trees. Where possible, run the ladder and feeder ropes through the tree canopy to improve access to the bridge.
8) Allow vegetation to grow next to, around and under glider poles and rope bridges. The more natural the structures, the better they are likely to function.

## Considerations for Installation into Trees

When planning installation of rope bridges, the following should be considered to determine if installation directly to the tree is appropriate:

1) What species of trees exist within the patch, what is their relative wood strength and decay rate?
2) What are the new forces being introduced laterally on the branch or stem proposed for use?
3) Conduct a general visual tree assessment, are there any defects, decay, cavities or splits?
4) Is further investigation required, aerial inspections or decay testing, tomography such as Arbotom?




5) What is the life expectancy of the tree considering its species versus the design life of the bridge?
6) Compare the tree to engineered structures, treated pine or hardwood power poles?
7) Conduct a risk assessment, what happen if it fails?

If the answers to these questions bring the decision to install the bridge directly into the tree into doubt, consider whether additional bracing, other engineering solutions or a standalone pole near the tree are more appropriate.

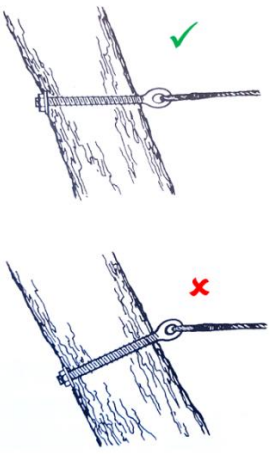
If it's a large civil project, get some project engineers involved and look for a lateral solution.

**Installation of rope bridges**

Most rope bridges above roads are attached to specifically installed treated timber poles because the load can be calculated and the pole rated and engineered. Similarly, the testing and maintenance of standard timber poles is routine for road agencies and power companies.

However, there are situations where rope bridges can be attached to trees, such as when the span is short, trees are large and strong, or when rope ladders go under road-bridges and there is no risk of collapse onto the road surface. In these circumstances, connecting to existing trees is not only possible, but may be more effective than attaching to poles because it is directly connected to the taget species' habitat.

Connection of the rope bridge to the tree must follow best practice for installation of cable bracing. For some trees, the installation of threaded rods in the tree will not be acceptable to stakeholders. In this circumstance it is sometimes possible to use Yale or Cobra style bracing, depending on the minimum sag required.

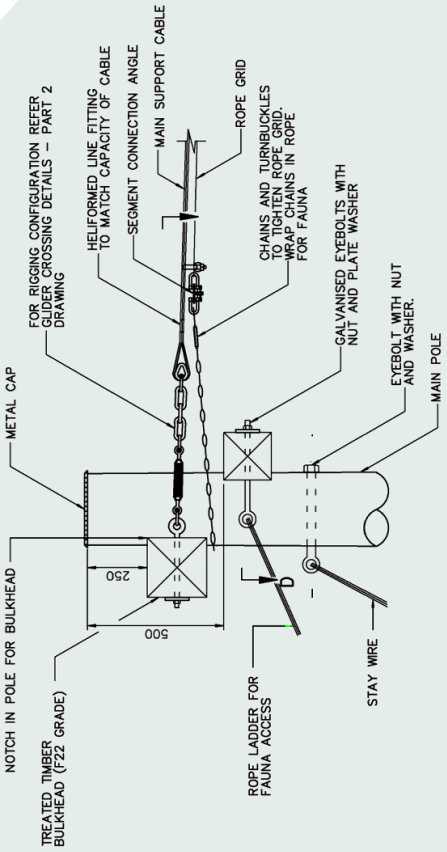


Threaded bolt example

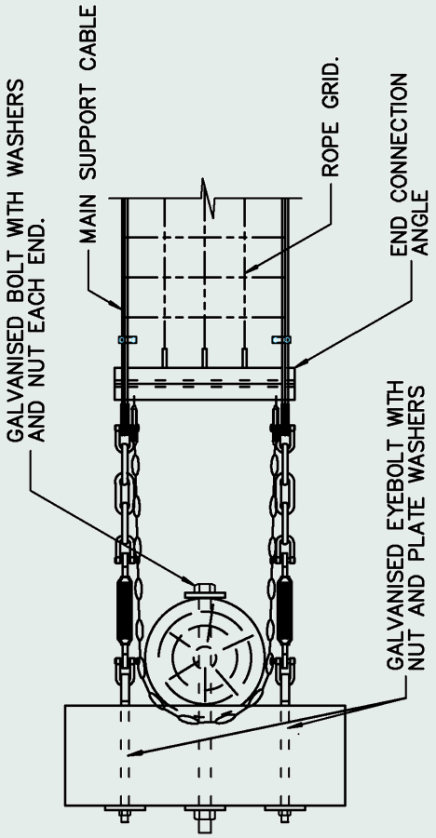
**Habitat Augmentation**

The ecological value of the fauna bridges can be enhanced by coupling them with nest boxes, log-hollows (see over page) and/or chainsaw-carved tree hollow installations.

These structures provide shelter and nesting resources for arboreal mammals and can easily be mounted at the same time as the fauna bridge is installed.




Termination hardware




Carved log hollow

## Further Reading

Van der Ree, R., Smith, D. J. & Grilo, C., 2015, *Handbook of Road Ecology*, John Wiley & Sons, Ltd

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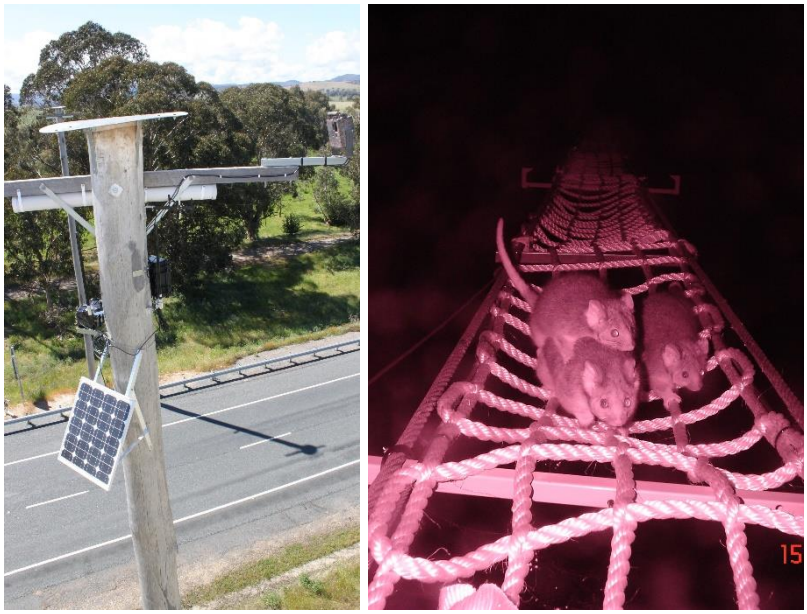

Glider pole setup