



Transport
Roads & Maritime
Services

WIDENED MEDIAN ASSESSMENT SUPPLEMENTARY REPORT

Oxley Highway to Kundabung

SEPTEMBER 2014



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Attachment A Final Design Plans Barrys Creek Twin Bridges

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Widened Median Assessment Supplementary Report	Final	DP&I	09/09/14

1 Introduction

The Oxley Highway to Kempsey Pacific Highway upgrade project (the project) was approved on 8 February 2012 by the Minister for Planning and Infrastructure subject to a number of conditions being met. Minister's Conditions of Approval B4 and B5 require Roads and Maritime Services to investigate the provision of widened medians as an alternative to the provision of glider poles and rope bridges to facilitate the movement of gliders across the project at a number of locations.

A Widened Median Assessment (the Assessment) was submitted to the Department of Planning and Infrastructure (DP&I) on 27 September 2013. The assessment concluded that a widened median is feasible at a location referred to as Cairncross 1, but not at the other locations investigated. In a letter dated 19 November 2013, the DP&I stated that there was no objection to the conclusion of the Assessment, but that the Assessment did not satisfy the requirements of MCoA B4 and B5. A report was submitted to DP&E addressing these requirements on 11 February 2014. DP&E indicated satisfaction of this report for the Kundabung to Kempsey stage of the project on 11 April 2014, but noted that additional information was required for the Oxley Highway to Kundabung (OH2Ku) stage once detailed design was complete.

As such, this supplementary report addresses the matters outlined by the DP&I for the Oxley Highway to Kundabung stage, which are:

- The final locations of any rope and/or glider poles (and justification of these locations) required to supplement natural gliding distances within the Cairncross 1 location, and proposed in lieu of widened medians at the Ballengarra 1b and Maria River locations.
- Where glider pole distances greater than 22m are proposed, the supplementary report must demonstrate that these poles will be effective in promoting glider crossings (ie that they can be safely used). An example of success should be provided. Note: This information was provided in the Kundabung to Kempsey report, and has been subsequently included, unchanged in this report.
- Where the justification for the 10.6m clearance for the rope bridge relies on the use of this clearance in other Pacific Highway projects, the report must demonstrate the success or otherwise of rope bridges at this height on other Pacific Highway projects. Note: This information was provided in the Kundabung to Kempsey report, and has been subsequently included, unchanged in this report.
- Provision of final design details of the combined fauna crossing at the Barrys Creek twin bridges, including the justification of the retention (or otherwise) of vegetation between the bridges and the final location of fauna furniture.

2 DP&I comments

2.1 Locations of rope crossings and/ or glider poles

The approximate locations, heights and span/ glide distances of the rope crossings and glider poles for OH2Ku are detailed in Table 1 and Table 2. These dimensions may be subject to minor changes on the ground, in consultation with the Project Ecologist and EPA, to optimise the locations with respect to adjacent, retained vegetation.

Table 1 Dimensions of rope crossings within the OH2Ku stage of the project

Location (NB, SB) (ch)	Min. pole heights (NB, SB) (m)	Span distance (m)
9365, 9375	10.9, 13.6	45.3
11355, 11325	7.6, 9.8	65.7

Location (NB, SB) (ch)	Min. pole heights (NB, SB) (m)	Span distance (m)
11830, 11795	10.6, 13.0	49.7
12030, 11970	13.7, 13.4	53.3
22920, 22890	14.7, 9.1	55.8
23295, 23250	12.9, 6.1	54.6
23600, 23560	8.3, 6.5	61.3
23680, 23640	13.3, 13.1	46.6

Table 2 Dimensions of glider poles within the OH2Ku stage of the project

Location (ch)	Min. pole heights (m) (NB, median, SB)	Glide distances (NB – M, M – SB) (m)
9010	18.50, 19.00, 18.50	26, 21
10765	-, 17.25, 18.50	-, 25
10910	-, 18.50, 19.75	-, 26
11245	18.50, 17.25, -	24, -
11240	-, 18.50, 18.50	-, 24

- indicates poles located within the Cairncross widened median, hence why only two poles are required.

Potential glider pole and rope bridge locations were initially identified in Section 6.4.16 of *Upgrading the Pacific Highway – Oxley Highway to Kempsey Environmental Assessment* (Project EA) (GHD 2010). During detailed design, a desktop analysis of mapped habitat types, mapped fauna corridors, vegetation communities and drainage lines was undertaken to confirm the identified locations were suitable. Broad locations for glider poles and rope bridges were developed in consultation with the EPA in July 2013 and further developed during site visits in September 2013. All rope bridges and glider poles will be optimised during detailed design in consultation with the Project Ecologist and EPA based on the location of suitable glide trees within close proximity to the arboreal crossing locations.

2.2 Glider pole distances

As identified in Section 2.1, the glide distances in the OH2Ku stage of works will marginally exceed 22m at five locations. Despite this, the Widened Median Report discussed recorded glide averages and maximums for several gliders, including the Yellow-bellied Glider and Squirrel Glider. These glide distances are summarised in Table 3.

Table 3 Average glide distances for threatened gliders identified within OH2K

Species	Average	Maximum
Squirrel Glider	30 – 35m (van der Ree and Bennet 2003) 20m with 13m trees, or 43m with 25m trees (Goldingay and Taylor 2009) 30 – 40m (van der Ree 2006)	70m (van der Ree <i>et al</i> cited in van der Ree <i>et al</i> 2010) 80m (GHD 2011a)
Yellow-bellied glider	Similar to the Squirrel glider, approx. 43m (R. Goldingay pers. comm. cited in Geolink 2012, Goldingay 2010)	30m (GHD 2011b)

The proposed glide distances for OH2Ku are all less than the average glide distances cited in the research summarised in Table 3.

In addition, glider pole heights have been calculated in accordance with the calculation in Section 3.4 of the Widened Median Report, based on the results of Goldingay and Taylor (2009), which determines the average glide distances for Squirrel Gliders. Research by

Goldingay (Goldingay pers. comm. Cited in Geolink 2012) suggests the glide characteristics of the Yellow-bellied Glider are likely to be similar to the Squirrel Glider. As such, the equation established from this research has been used to ensure glider poles are of sufficient height to facilitate safe use by a range of glider species.

Pacific Highway projects where gliders have been recorded gliding greater than 22m include Bonville Pacific Highway Upgrade. At this location, Sugar Gliders were recorded, through the use of radio trackers, gliding between 38 – 42m from trees 31 – 36m high.

2.3 Rope Bridge clearances

The 10.6m clearance required for rope bridges is based on providing adequate clearance above a tall heavy vehicle. Bridges on freeways need a minimum height clearance of 5.3 m, and the draft Roads and Maritime Wildlife Connectivity Guidelines, prepared in consultation with the EPA, Department of Primary Industries (DPI) (Fishing and Aquaculture), and the then Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), requires a 'minimum 6-12m (or more) above the ground for sufficient height above traffic and traffic noise'.

The 10.6 metre clearance is consistent with rope crossings constructed on other Pacific Highway projects, including:

- Kempsey Bypass (12m)
- Karuah to Bulahdelah (12.4m)
- Devils Pulpit (8.0m).

Monitoring of all fauna rope bridges for recent Pacific Highway projects is summarised in Table 4. These results demonstrate that confirmed and unconfirmed use has been recorded for rope bridges at various heights above the main carriageways.

Table 4 Fauna monitoring results for rope bridges

Project	Height above main carriageways (m)	Complete fauna crossing (unconfirmed complete crossing)
Glenugie	5.3	Squirrel Glider, Feathertail Glider
Bonville	7.5*	(Sugar Glider, Feathertail Glider)
Cooperook to Herons Creek	5.3	(Sugar Glider and/or Squirrel Glider)
Karuah Bypass	5.3	Squirrel Glider (Sugar Glider, Feathertail Glider)
Karuah to Bulahdelah Sections 2 & 3	12.4	(Feathertail Glider)

* above land bridge

2.4 Fauna Crossing at Barrys Creek

The final design drawings of Barrys Creek bridge including fauna furniture, have been prepared by Lend Lease Engineering, the design and construct contractor for the OH2Ku stage of the project. These designs have been included in Attachment A.

Vegetation will not remain between the Barrys Creek twin bridges following construction completion. This is due to the fact that the footprint of the existing culverts, to be removed as part of construction and replaced with twin bridges, sits almost entirely across the area that will form the gap between the two bridges (see Attachment A).

The area adjacent to the southbound bridge not within the footprint of the existing culverts is less than 2m wide. This area is dominated by lantana, and is required to be cleared as part of the construction staging for the works, and for safety requirements.

Despite this, Lend Lease Engineering is required to minimise the clearing of natural vegetation adjacent to the Barrys Creek twin bridges during construction.

In addition, Lend Lease Engineering must also ensure:

- Scour protection associated with the entries and exits to the Barrys Creek twin bridges accommodate and provide for the safe and effective passage of fauna, be constructed with the smallest reasonably possible rock size, be as level as possible and have minimal gaps between the rocks.
- Durable refuge poles / horizontal poles for koalas, and rocks and hollow logs for the spotted-tail quoll are installed along the Barrys Creek twin bridge underpasses. The refuge poles must be designed to provide safe refuge for fauna from predators and to encourage use of the underpasses by smaller fauna species. The structures must be upright. Forks must be installed at the top of refuge poles to provide a rest area for fauna.
- Durable refuge poles are provided outside of the Barrys Creek twin bridges, within 4 metres of the ends of the twin bridges.
- Vegetation planted or seeded within an approach to either an underpass or combined underpass and bridge:
 - does not obstruct access to the bridge;
 - is endemic and representative of the surrounding natural habitat;
 - is designed to attract native fauna species to the structure; and
 - does not obstruct the views through, or disguise, the entrance to the bridge.

3 References

Geolink (2012) *Devils Pulpit Pacific Highway Class A Upgrade – Rope Bridge Assessments for Target Glider Species at the Northern and Southern Vegetated Medians / Glider Crossings*. Prepared for John Holland. Dated 20 April 2012.

GHD (2010) *Pacific Highway Upgrade – Oxley Highway to Kempsey Environmental Assessment*. Prepared for NSW Roads and Traffic Authority. Dated September 2010.

GHD (2011a) *Pacific Highway Upgrade-Oxley Highway to Kempsey Supplementary Flora and Fauna Assessment*. Dated February 2011.

GHD (2011b) *Pacific Highway Upgrade – Oxley Highway to Kempsey; Median Widening Assessment – Preliminary Scoping Investigation*. Prepared for NSW Roads and Traffic Authority. Dated February 2011.

Taylor BD, Goldingay RL (2010) Roads and wildlife: impacts and implications for wildlife management in Australia. *Wildlife Research*, 37(4): 320-331.

Goldingay, R.L. and Taylor, B.D. (2009). Gliding performance and its relevance to gap crossing by the squirrel glider (*Petaurus norfolcensis*). *Australian Journal of Zoology* 57: 99–104.

van der Ree, R. (2006). Road upgrade in Victoria a filter to the movement of the endangered Squirrel Glider *Petaurus norfolcensis*: Results of a pilot study.

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Van der Ree R., Cesarini S., Sunnucks P., Moore J., Taylor A. (2010) Large Gaps in Canopy Reduce Road Crossing by a Gliding Mammals. *Ecology and Society* 15 (4) 35: [Online] URL: <http://www.ecologyandsociety.org/vol15/iss4/art735>

Attachment A
Final Design Plans - Barrys Creek Twin Bridges