Transport Roads & Maritime Services

WIDENED MEDIAN ASSESSMENT SUPPLEMENTARY REPORT

Oxley Highway to Kempsey

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Contents

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1 Introduction

The Oxley Highway to Kempsey Pacific Highway upgrade 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.

This supplementary report addresses these matters outlined by the DP&I, 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.
- 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.
- 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

As outlined in the staging report, the project will be constructed in three stages. This includes two main stages from the Oxley Highway to Kundabung (OH2Ku) and Kundabung to Kempsey (K2K). OH2Ku will be constructed under a design and construct (D&C) contract and K2K under a construct only contract. As such, detailed design of the K2K stage has been completed, with detailed design for the OH2Ku stage to be conducted by the successful construction contractor.

As such, details on the location and design of rope crossings and glider poles have been determined for K2K (ch. 24040 – ch. 37770). K2K incorporates part of the Ballengarra 1b investigation area and all of the Maria River 1b investigation area. Detailed designs for these crossings were provide to the Department of Planning and Infrastructure (DP&I) and the Environment Protection Authority (EPA) as part of the K2K Fauna Connectivity Report, dated September 2013. This report was approved by the DP&I on 25 September 2013. Notwithstanding, the locations of the rope crossings and glider poles for K2K are detailed in Table 1 and Table 2.

Table 1 Locations of rope crossings within the K2K stage of the Project

Location (ch)	Pole heights (m)	Span distance (m)
24 120	14.35, 13.85	54.1
34 150	10.85, 13.10	60.0
35 700	13.30, 13.35	50.35

Table 2 Locations of glider poles within the K2K stage of the Project

Location (ch)	Pole heights (m) (NB, median, SB)	Glide distances (m)
25 190	26.1, 22.5, 23.8	31.35, 26.75
25 292	22.9, 19.7, 22.8	26.10, 27.59
35 780	21.4, 17.7, 21.4	21.10, 21.70

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. These locations were verified by a site investigation undertaken on 30 and 31 October 2012, in order to determine adjoining vegetation communities, habitat features and take note of other important habitat variables in proximity to proposed glider pole locations.

Tender design for the Oxley Highway to Kundabung section of the Project has been conducted by the preferred tenderer. The approximate locations of the proposed glider poles and rope bridges for this section of the project, as detailed in the tender design, are outlined in Table 3 & Table 4 below. Broad locations for glider poles and rope bridges were developed in consultation with the EPA. All the glider poles detailed in Table 4 are located within the proposed Cairncross widened median and glide distances are approximate maximum distances. All rope bridges and glider poles will be optimised during detailed design in consultation with EPA.

Table 3 Locations of rope crossings within the OH2Ku stage of the Project

Location (ch)	Pole heights (m)	Span distance (m)
9030	15.14, 17.18	44.2
9365	13.44, 17.03	43.8
11355	11.85, 14.79	59.7
11880	13.21, 16.21	44.8
12050	18.26, 18.82	44.8
22970	20.64, 16.71	46.7
23290	18.94, 10.39	56.0
23690	17.89, 16.18	59.5
23790	16.12, 18.98	41.9

Table 4 Locations of glider poles within the OH2Ku stage of the Project. Note: all are located within the Cairncross widened median.

Location (ch)	Pole heights (m) (carriageway)	Glide distances (m) (approximate)
10765	18.62, 21.45 (SB)	23
10930	19.98, 22.84 (SB)	25
11250	17.90, 19.67 (SB)	21
11269	18.43, 16.87 (NB)	19

2.2 Glider pole distances

As identified in Section 2.1, the glide distances in the K2K stage of works will exceed 22m at four locations. In the OH2Ku tender design there are only two occasions where the glide distance may exceed 22m. 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 5.

Table 5 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 *et al* cited in van der Ree *et al* 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 K2K and OH2Ku are all less than the average glide distances cited in the research summarised in Table 5.

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.

Glide distances for the OH2Ku stage of works may be optimised during detailed design, in consultation with EPA. The above equation and research would be utilised during this detailed design.

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 6. These results demonstrate that confirmed and unconfirmed use has been recorded for rope bridges at various heights above the main carriageways.

Table 6 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)
Coopernook 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 Barrys Creek twin bridges fall within the OH2Ku stage of the Project, to be designed and constructed by the successful contractor for these works. As such, the final design of this fauna furniture and the potential to retain vegetation between the bridges will be determined by this contractor. Despite this, all fauna crossings must be designed in consultation with the EPA and must meet the following minimum requirements:

- Clearance of natural vegetation adjacent to the Barrys Creek twin bridges must be minimised during construction.
- Scour protection associated with the entries and exits to the Barrys Creek twin bridges must 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 must be 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 must be 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 must:
    - not obstruct access to the bridge;
    - be endemic and representative of the surrounding natural habitat;
    - be designed to attract native fauna species to the structure; and
    - 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.

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